Kentucky Nonpoint Source Management Plan:
A Strategy for 2019-2023

Kentucky Division of Water

June 30, 2019

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1. Introduction

The Federal Water Pollution Control Act (Act) was passed in 1948 in an attempt to address increasing water pollution concerns in the United States. The Act was not strong enough to give adequate authority to the federal government or prohibit pollution. As a result, water pollution issues continued to worsen. In 1969, the Cuyahoga River in Ohio caught fire and received national attention from Time magazine. A feature article described it as oily, bubbling, and as a river that "oozes rather than flows." Mounting public concern served as a major catalyst for the Act to be amended in 1972, providing it with significant expansion and reorganization. The 1972 amendments gave the Environmental Protection Agency (EPA), the administrator of the Act, the authority it needed to implement pollution control programs. It was also when the Federal Water Pollution Control Act became commonly known as the Clean Water Act (CWA).

Section 319(b) of the CWA provides the legal basis for the creation of state management programs to control pollution added from nonpoint sources (NPS) to the waters within the state, and thus improve the quality of such waters. The vision of the Kentucky Nonpoint Source Pollution Control Program (NPS Program) is to protect the quality of Kentucky's surface and groundwater from known NPS pollution, to abate NPS threats, and to restore degraded waters to the extent that water quality standards are met and beneficial uses are supported.

One of the requirements to qualify for financial assistance under the CWA is the completion of a NPS Management Plan. This update of the Kentucky NPS Management Plan (NPS Management Plan) encompasses the EPA's identified key elements of an effective NPS management program and outlines Kentucky's priorities, goals, and strategies for addressing NPS pollution in the state for the years 2019-2023.

The Kentucky Division of Water (DOW) designed the NPS Management Plan for several purposes. First, it is a way to inform citizens of the work the agency and partners are doing to reduce nonpoint source pollution. Second, anyone applying for a Section 319(h) grant should draw on this document as a way to understand the Commonwealth's priorities for the NPS Program. Finally, it meets the CWA Section 319(b) requirements as well as the EPA's Key Elements guidance.

The NPS Management Plan is in a modular format so that certain sections stand alone as pieces for targeted audiences. Sections 5 through 15 address a subject or "functional area" that might be of concern to a particular citizen, community group, or business; these sections target the DOW objectives and strategies for reducing nonpoint source pollution within that functional area. Each modular section reviews the functional area, identifies the DOW strategy, references educational resources, and identifies opportunities for funding.

1.1 Nonpoint Source Pollution vs. Point Source Pollution

NPS pollution, also known as runoff or diffuse pollution, is a major contributor of contamination in Kentucky's waterways. When rainfall or snowmelt moves over and through the ground, it

picks up and carries away natural and human-made pollutants, finally depositing them into lakes, rivers, wetlands, coastal waters, and ground waters (US EPA, 2018).

NPS pollution comes in many different forms, both from natural and human-made sources. Oil and gas on roads and driveways, fertilizers on lawns, pesticides on crops, soap from car washes, and dirt from construction sites are just a few of the many sources that contribute to NPS pollution. It can also come in the form of things like cattle in streams or collapsing stream banks. As these different pollutants build up in the water, the health of our waterways declines.

Unlike point source pollution, NPS pollution comes from many different sources over a large area. Point source pollution is when a pollutant discharges from a distinct, confined conveyance, such as a pipe, well, or even a boat. Point sources require permits and are monitored by a regulator agency. NPS pollution is all the pollution that cannot be directly attributed to a point source. Generally, this means all pollution on the ground. The wide-spread nature of nonpoint source pollution makes it difficult to monitor and impossible to permit.

Due to the numerous causes and sources of nonpoint source pollution, the DOW partners with a wide variety of organizations including other state, local, and federal agencies as well as private partners to promote non-regulatory pollution control initiatives at the statewide, regional, and local levels.

1.2 Guiding Principles

The NPS Program operates using several fundamental principles to guide the program in achieving its goals. Those guiding principles are listed below:

- The NPS Program will work through voluntary and incentive methods to prevent and reduce nonpoint source pollution.
- The NPS Program recognizes that addressing nonpoint source pollution requires a collaborative effort from many groups across the state. Therefore, the program will seek to build new partnerships and to maintain and improve existing partnerships with other state, local, and federal agencies, watershed groups, non-profit organizations, and other parties or individuals also seeking to reduce nonpoint sources of pollution and improve water quality.
- The NPS Program will be structured and implemented such that there is a focus on realizing and documenting measurable improvements.
- The NPS Program will administer its program as efficiently and effectively as possible.

1.3 Kentucky Nonpoint Source Management Plan

The NPS Management Plan is an element required by Section 319(b) of the CWA. This section of the CWA states that the program shall be open for public comment, should utilize local experts,

and should be developed on a watershed basis. The CWA Section 319(b) also contains a list of specific content that must be included.

The original NPS Management Plan identified Kentucky's NPS pollution control goals and strategies. It described how Kentucky anticipated assessing NPS pollution impacts and threats, identifying priority watersheds and projects, coordinating technical and financial assistance for Best Management Practice (BMP) implementation, implementing statewide education and technology transfer programs, and implementing regulatory and enforcement mechanisms.

The NPS Management Plan builds upon the lessons learned over the years and develops a plan that can be used by a broad audience to decrease NPS pollution in the state. For public comments, please refer to Appendix D.

1.3.1 EPA Key Components Requirements

The EPA has identified Eight Key Components of an effective State Nonpoint Source Management Program to be utilized as the framework for the update of State Nonpoint Source Management Plans. These revised elements are based on the original Nine Key Elements and must all be included for the plan to be approved by the EPA. These components emphasize a well-rounded program with developed partnerships and targeting of funds to a watershed scale. The Eight Key Components are listed below.

Key Component 1: The state program contains explicit short- and long-term goals, objectives and action items to protect surface and ground water.

Key Component 2: The state strengthens its working partnerships and linkages to appropriate state, interstate, tribal, regional and local entities (including conservation districts), private sector groups, citizen groups and federal agencies.

Key Component 3: The state uses a combination of statewide programs and on-the-ground projects to achieve water quality benefits; efforts are well integrated with other relevant state and federal programs.

Key Component 4: The state program describes how resources will be allocated between (a) abating known water quality impairments from NPS pollution and (b) preventing threatened and high quality waters from significant threats caused by present and future NPS impacts.

Key Component 5: The state program identifies waters and watersheds impaired by NPS pollution as well as priority unimpaired waters for protection. The state establishes a process to assign priority and to progressively address identified watersheds by conducting more detailed watershed assessments, developing watershed-based plans, and implementing the plans.

Key Component 6: The state implements all program components required by Section 319(b) of the CWA, and establishes strategic approaches and adaptive management to achieve and maintain water quality standards as expeditiously as practicable. The state reviews and upgrades program components as appropriate. The state program includes a mix of regulatory, non-regulatory, financial, and technical assistance as needed.

Key Component 7: The state manages and implements its NPS management program efficiently and effectively, including necessary financial management.

Key Component 8: The state reviews and evaluates its NPS management program using environmental and functional measures of success, and revises its NPS management program at least every five years.

1.3.2 319(h) Nonpoint Source Grants

Section 319(h) of the CWA is the funding mechanism utilized by state water quality agencies to implement their respective NPS Management Programs. Each year, the DOW applies to the EPA to receive 319(h) funding. After receiving the federal award, the DOW distributes a majority of the monies received through a competitive grant award process. Applicants to the Commonwealth's Nonpoint Source Grant Program must first submit a project proposal. Applicants may include communities, citizen groups, government agencies, colleges or universities, nonprofits, local businesses, and others. Each applicant group submits a short proposal. Proposals are then reviewed and ranked by the DOW and their partners. The proposals that rank highest are invited to apply for a grant award.

The grant award application is substantially more detailed compared to the proposal. Applications include several pages of project summary and background, detailed objectives, a milestone schedule, a list of project partners with letters of support, and a comprehensive budget. The DOW staff are available to work with applicants to ensure all parts of the application are completed sufficiently for submission. Complete applications that are received by the annual deadline are reviewed and ranked by the DOW and an expanded group of invited partners. Awards are granted to those applications that rank the highest. The top applicants consistently build partnerships in their watershed that include stakeholders from all areas to achieve citizen and government support to achieve and maintain sustainable results. The DOW strives to fund as many applications as possible in order to see the greatest positive impact on nonpoint source pollution in Kentucky.

If you are interested in applying for a 319(h) Nonpoint Source Grant, please see Appendix A for more information on the grant application process and how to submit a proposal for the upcoming grant year.

1.3.3 Program Goals, Objectives, and Strategies

The first of the US EPA's Eight Key Elements of a nonpoint source management plan is that the plan should have explicit Short- and Long-Term Goals, Objectives and Strategies. In order to meet this requirement, DOW has developed 3 Long-Term Goals that are designed to guide the extended vision of the Kentucky NPS Program:

Long Term Goal 1: Restore Nonpoint Source Impaired Waters

Long Term Goal 2: Protect Waters Currently Meeting Designated Uses

Long Term Goal 3: Efficient and Effective Implementation of Kentucky's Nonpoint Source Program

Within these Long-Term Goals are Objectives that break down these broad programmatic themes into program-specific concepts that support the achievement of the Long-Term Goals:

Long-Term Goal 1: Restore Nonpoint Source Impaired Waters

Objective 1: Prioritize watershed for restoration potential

Objective 2: Monitor and assess Kentucky's waters

The Objectives are supported by specific strategic Actions, that may be implemented annually, or over the course of 1-5 years, and serve as the Short-Term Goals for the KY NPS Program.

Long-Term Goal 1: Restore Nonpoint Source Impaired Waters

Objective 1: Prioritize watershed for restoration potential

Action 1: Utilize EPA Recovery Potential Screening Tool to select watersheds for implementation, within existing watershed planning areas.

Action 2: Utilize the EPA Recovery Potential Screening Tool to identify 303(d) listed impaired watersheds that have high potential of showing measurable water quality improvement after targeted implementation.

Actions are assessed for completion using the outlined Tracking Measures in Appendix B. The Appendix indicates the Targeted Completion Year expected for each listed Action. Some actions are expected to be completed annually (example: "Number of stream miles assessed", pg. 144) and thus the Appendix shows completion dates in every year from 2019-2023. Other tracking measures may be in progress for a few years (example: "Transfer electronic project management and storage for 319(h) projects to the Department's new ARM database", pg. 156). Progress on all actions will be reported annually in the NPS Annual Report to EPA. To see the complete list of NPS Program Goals, Objectives, Actions, and Tracking Measures, see Appendix B.

2. Water Quality Monitoring

In Kentucky there are 90,961 stream miles; approximately 14% of these waters have been monitored and assessed for support of their designated use, with nearly 42% fully supporting their uses (DOW 2016). Water quality assessments are determined using all acceptable and available data, including nonpoint source (NPS) project monitoring results.

2.1 Monitoring Programs

The NPS program works cooperatively with other Kentucky Division of Water (DOW) monitoring programs to identify specific water quality issues, to assess sources and causes of NPS pollution to target Best Management Practices (BMPs), and to address the effectiveness of BMPs implemented through the watershed planning process.

2.1.1 Groundwater Monitoring

The statewide Ambient Groundwater Monitoring Program provides baseline groundwater data on aquifer characterization, ambient groundwater quality, and potential NPS pollution locations. Groundwater, including public water supplies and private-sector wells and springs, are sampled quarterly and analyzed for many parameters, including metals, nutrients, pesticides, and volatile organic compounds.

Additional wells and springs are sampled as part of the Kentucky NPS program investigations. The groundwater studies occurring as part of these investigations are carried out for surface and sub-surface water. All NPS groundwater sites are sampled on a varying schedule with the same protocol and parameters as the Ambient Groundwater Monitoring Program. More information on groundwater monitoring programs can be found in Chapter 8 of this document.

2.1.2 Surface Water Monitoring

The DOW performs ambient and targeted surface water monitoring for a variety of goals and objectives. Programs include the ambient monitoring network, reference reach monitoring, probabilistic monitoring, special study monitoring and Total Maximum Daily Load (TMDL) monitoring, among others. These programs may identify hotspots of water quality issues, or longer term issues that have persisted over time, which may be addressed by watershed planning. Parameters that are analyzed include nutrients, pathogens, pesticides, herbicides and metals. These programs also conduct visual surveys of surrounding watershed characteristics and land use to determine potential sources and causes of pollution, including NPS pollution. This information is incorporated into watershed plans to effectively target BMPs.

2.1.3 Biological Monitoring

Benthic macroinvertebrates and fish community sampling occurs with several of the monitoring programs discussed in section B. These assemblage assessments provide species-specific data that identify potential water quality impairments to aquatic life habitat, which may be attributable to NPS pollution. NPS monitoring projects include biological monitoring when aquatic life is impaired, or to determine if there are impairments on previously un-assessed

waterbodies. BMPs such as stream restoration, streambank stabilization, riparian improvements and exclusion fencing can address aquatic life impairments.

2.1.4 Success Monitoring

Being able to document measurable water quality improvements is an extremely important measure of success for the NPS, TMDL, and ambient monitoring programs. Stream impairment de-listings or statistically significant water quality improvements are primary reporting requirements for the Division of Water's Clean Water Act (CWA) Section 319(h) and 106 annual grant allocations from the EPA.

The success program approaches monitoring in two ways: (1) monitoring to target pre-BMP implementation, or baseline data collection; and (2) post-BMP installation monitoring. Monitoring projects utilize study designs that select specific streams for baseline sampling based upon proposed locations of NPS project BMP locations, and subsequent post-BMP implementation sampling to track project effectiveness. In future years, other success monitoring approaches (such as a paired watershed approach) may be utilized based on available program resources and needs.

Efforts are being made to increase the number of impaired stream miles de-listed or improved throughout the state. Leveraging additional resources through collaboration with other programs within the DOW is a priority for the success program. The Division is working to increase integration among programs with common goals of improving water quality to achieve successes across the state. An example is partnering with the State Revolving Fund Loan Program (SRF), which provides low interest loans for KY communities to repair or replace weakening and outdated wastewater infrastructure and documenting improvements resulting from these projects. The NPS program will continue to work with project partners to identify locations where they have completed significant concentrations of on-the-ground implementation projects, and prioritize those areas for success monitoring. A few examples of project partners include the USDA Natural Resources Conservation Service, the KY Division of Conservation, and the KY Division of Abandoned Mine Lands.

2.1.5 Lake Monitoring

Lakes are monitored by the DOW through an ambient program of seasonal sampling, through partner agency programs, and through a citizen science volunteer lake monitoring program. Lakes and other bodies of source water for drinking water systems are considered as priorities for many programs, and the NPS program has collaborated to establish source water protection areas as a priority criteria in watershed planning.

2.1.6 National Water Quality Initiative (NWQI)

The National Water Quality Initiative (NWQI) is a targeted water quality effort by the Natural Resources Conservation Service (NRCS) to install agricultural conservation practices that reduce nutrient and sediment NPS pollution going into the state's waterways. The NPS program began cooperating in the NWQI effort in 2010 and will continue to work with NRCS to identify priority watersheds that have good capacity to improve water quality. Additional information can be

found at
http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/programs/financial/eqip/?cid=stelprdb1047761.

2.1.7 Mississippi River Basin Healthy Watersheds Initiative (MRBI)

The Mississippi River Basin Healthy Watersheds Initiative (MRBI) is an NRCS program implementing voluntary conservation practices that improve water quality, restore wetlands, enhance wildlife habitat and sustain agricultural profitability in the Mississippi River Basin. This program began in 2009 with the selection of watersheds in 13 states in the Mississippi River Basin. Additional information can be found at
https://www.nrcs.usda.gov/wps/portal/nrcs/detailfull/national/programs/initiatives/?cid=stelprdb1048200

2.2 Quality Assurance (QA)

The Kentucky Department for Environmental Protection (KDEP) and the Division of Water are required to have a quality assurance program in place for environmental data collection and management that addresses proscribed quality assurance procedures within the organization. The Division of Water is required to complete Quality Management Plans (QMPs) and Quality Assurance Project Plans (QAPPs) to demonstrate how data meet program goals and objectives. A QMP and QAPPs are required for all projects funded by 319(h) grants that involve water quality monitoring or modeling.

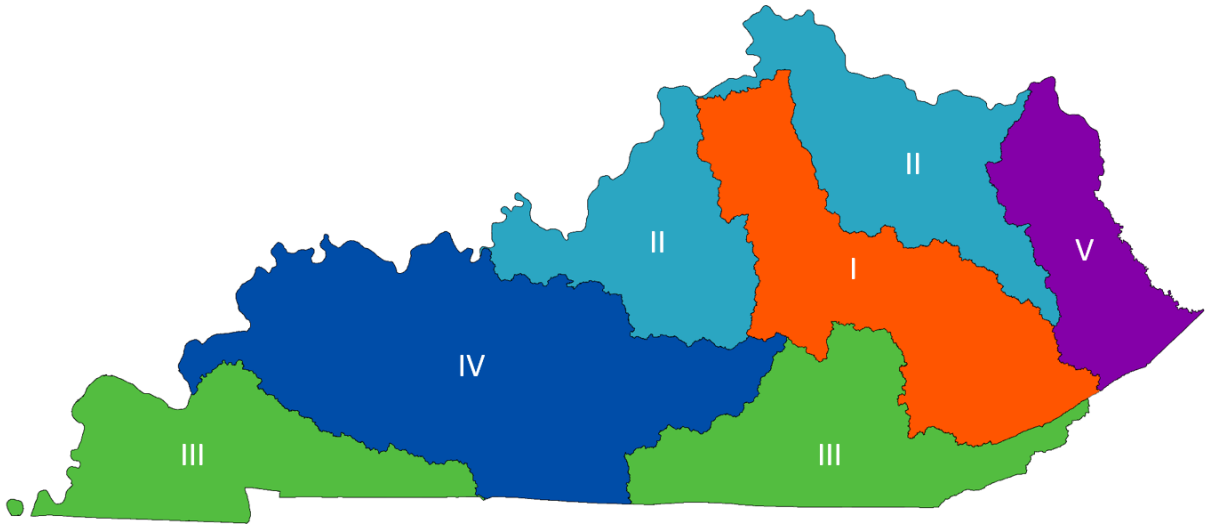
2.2.1 Quality Assurance Project Plans (QAPPs)

Quality Assurance Project Plans (QAPPs) integrate all technical and quality aspects of a project, including planning, implementation, and assessment. The purpose of the QAPP is to document planning results for environmental data operations and to provide a project-specific blueprint for obtaining the type and quality of environmental data needed for a specific decision or use. The QAPP documents how quality assurance (QA) and quality control (QC) are applied to an environmental data operation to assure that the results obtained are of the type and quality needed and expected. The ultimate success of an environmental program or project depends on the quality of the environmental data collected and used in decision-making, and this may rely significantly on the adequacy of the QAPP and its effective implementation.

3. Watershed Management

A watershed includes all the area that drains water into a single stream, river, lake, or body of water. Watersheds come in all shapes and sizes. Small watersheds can be only a few acres. Large watersheds cross county, state, and national boundaries. You might not realize it, but you are always in a watershed. Whether you are in the Western Kentucky Coalfields, Paris, KY, or Paris, France, you are in a watershed. If you would like to know which watersheds you live in, you can visit the Kentucky Watershed Viewer online at https://eppcgis.ky.gov/watershed/ .

Watershed management is a method of supervising the use of water in a given watershed as well as the level of pollution that water is allowed to receive. Managing water involves controlling water supply, drainage, stormwater runoff, waste discharges, water quality, and water rights to a given body of water. Historically, water was managed by political jurisdiction. Through years of planning and permitting, the Kentucky Division of Water (DOW) determined that managing water where it falls and flows is a smarter approach than managing water by artificial political lines. Operating on a watershed basis means more control in all areas of water management.



Kentucky Basin Management Units

Figure 3.1. Basin Management Units of the Commonwealth (see Table 3.1 for legend).

Kentucky has twelve major river basins. In order to facilitate the management of water supply and water quality issues associated with the rivers of Kentucky, these watersheds were grouped into 5 basin management units (Fig. 3.1). The basin management units were based on 6-digit hydrologic unit codes (HUCs), within which are nested 8, 11, and 14-digit HUCs (watersheds). HUCs were developed by the U.S. Geological Survey (USGS), the U.S. Department of

Agriculture's Natural Resources Conservation Service, and others, to standardize hydrologic unit delineations for geographic description and data storage purposes.

Table 3.1. A listing of the five basin management units and their associated statistics is provided below.

Basin Management Unit Number and Description	No. of USGS 8-digit HUCS	Area (sq.km)	%Total State Area
I. Kentucky River	5	18,042	17.2
II. Salt and Licking Rivers	8	23,406	22.4
III. Upper and Lower Cumberland, Tennessee, and Mississippi Rivers	15	25,519	24.4
IV. Green and Tradewater Rivers	12	28,772	27.5
V. Big Sandy, Little Sandy, and Tygarts	6	8,868	8.5

3.1 Framework

The Kentucky Watershed Management Framework is a flexible structure designed for coordinating watershed management across the state. The Watershed Management Framework is a way of coordinating existing programs and building new partnerships that will result in more effective and efficient management of the state's land and water resources (DOW, 1997). Inherent in the design of the framework is the belief that many stakeholder groups and individuals must have ongoing opportunities to participate in the process of managing the abundant natural resources that characterize Kentucky's watersheds.

Benefits to the people of Kentucky include:

- Better information for decision making,
- Increased ability to resolve complex water resource problems,
- Improved communication and coordination among governmental agencies,
- More opportunities for citizens to be involved,

- Increased ability to demonstrate results and benefits of environmental management, and
- More cost-effective use of public and private funds.

Beginning in 1996, the DOW implemented this watershed approach in many of its programs. The Commonwealth's watershed approach is detailed in the Kentucky Watershed Management Framework (see Appendix C).

The framework has five major components.

1) Designation of Basin Management Units (as shown previously in Figure 3.1);
2) Development of protocols to be repeated every five years, once in each basin, creating a basin cycle. These protocols include:
    - Scoping and data gathering,
    - Assessment,
    - Prioritization and targeting,
    - Plan development, and
    - Implementation.
3) Developing a schedule to apply the approach across the Commonwealth;
4) Forming river basin teams to provide opportunity for partnership and public participation; and
5) Developing comprehensive basin and watershed management plans.

These plans identify and prioritize problems in the watershed; develop strategies to protect or restore the waters; and identify resources and stakeholders to implement the plan.

3.2 Priority Watersheds

With the development of the Watershed Framework came the need to determine priority watersheds. *Kentucky Watershed Priority Formula: Application Guidelines and Data Requirements* (DOW, 1999) outlines a method for determining priority 11-digit Hydrologic Unit Code (HUC) watersheds based on criteria such as degree of use impairment, data integrity and geographical balance and weighting for all NPS impaired water bodies. The method was complex and sometimes targeted areas with no local capacity. In 2010, basin teams began to re-evaluate their priority watersheds, but instead of the Watershed Priority Formula, a modified method was utilized. Basin teams used GIS layers to graphically evaluate areas. Each group selected both areas for protection and restoration by using several GIS shapefiles. The teams considered all 303(d) listed (impaired) waters and completed Total Maximum Daily Loads (TMDLs) for restoration, Designated and Special Use Waters for protection, and combined those with local knowledge of existing capacity and feasibility to reprioritize watersheds in their basins.

Currently, the Division of Water's priority watersheds are a mixture of River Basin Team priorities and watersheds with long term Nonpoint Source Program projects. The prioritization method is built around identification of watersheds that are impaired and/or Special Use Waters with identified threats, those that have an approved watershed plan, and/or watersheds that have identified local capacity and feasibility for implementation of water quality improvement activities. In addition the prioritization strategy takes into consideration a watershed's actual potential to recover from its impairment, or the potential time and effort needed to help a watershed show a measurable water quality improvement.

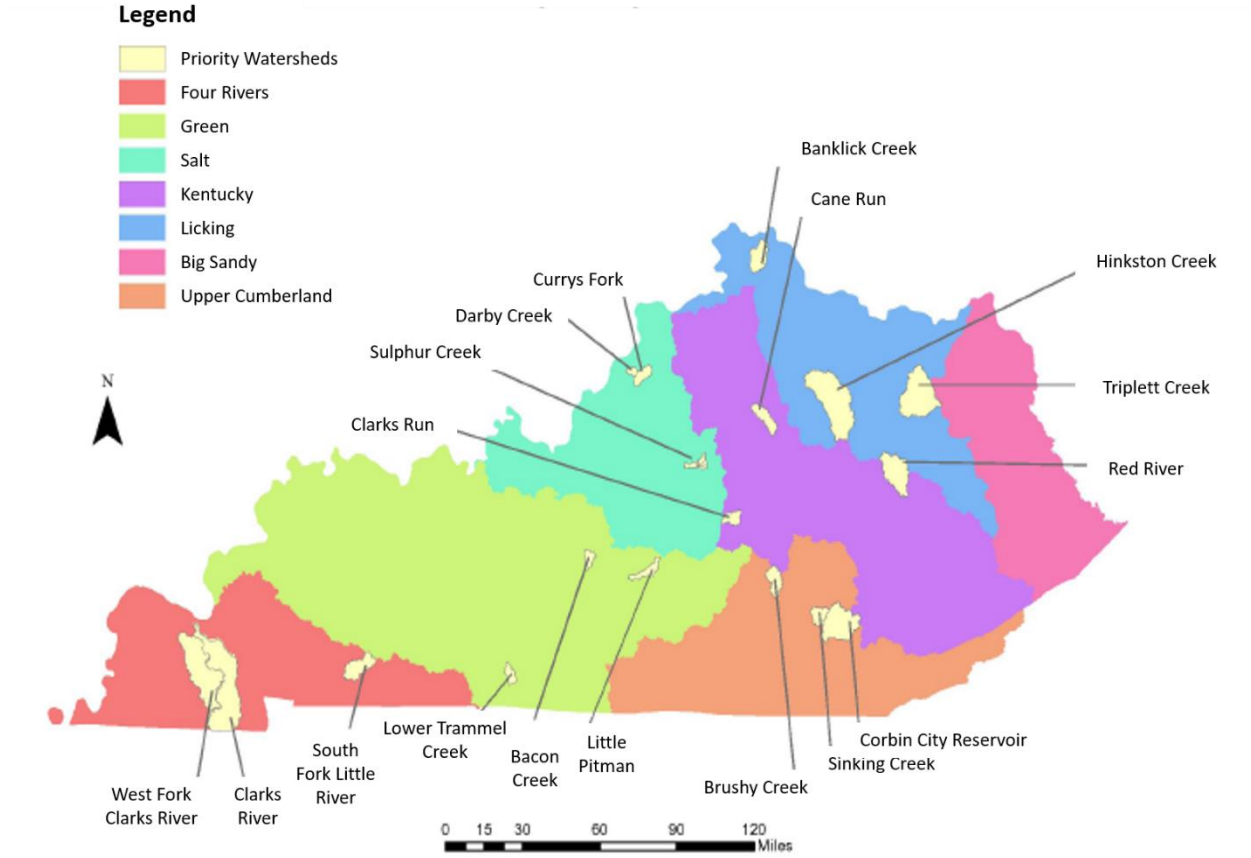


Figure 3.2. Kentucky Priority Watersheds.

A Priority Watershed's recovery potential must be considered in prioritization in order for the KY NPS Program to build a balanced portfolio of watershed plan development and implementation projects for future 319(h) funding. The Division has completed a Kentucky-specific version of EPA's Recovery Potential Tool (RPT), and is working to incorporate its use into the NPS program prioritization process. It is envisioned that the RPT will be utilized to evaluate current Priority Watersheds, determine new priority watersheds, and/or select additional priority watersheds for protection or short term restoration activities through the KY NPS Program.

3.3 Watershed Planning

The Kentucky Nonpoint Source Program has actively funded watershed planning projects since 2004. The program recognizes the importance of these plans to better target implementation to sources which will result in the effective and efficient use of funding and ultimately waterways that meet their designated uses. The current status of Kentucky's plans is outlined in Table 3.2. Watershed Plans in Kentucky.

For much of the initial decade of watershed planning, the majority of efforts focused on plan development. In 2010, the Watershed Planning Guidebook for Kentucky Communities was released to assist contractors in developing more comprehensive plans meeting the a-i criteria. To date, Kentucky has 27 EPA accepted watershed plans. Figure 3.3 shows the status of all of the plans in the state as of January 1, 2019.

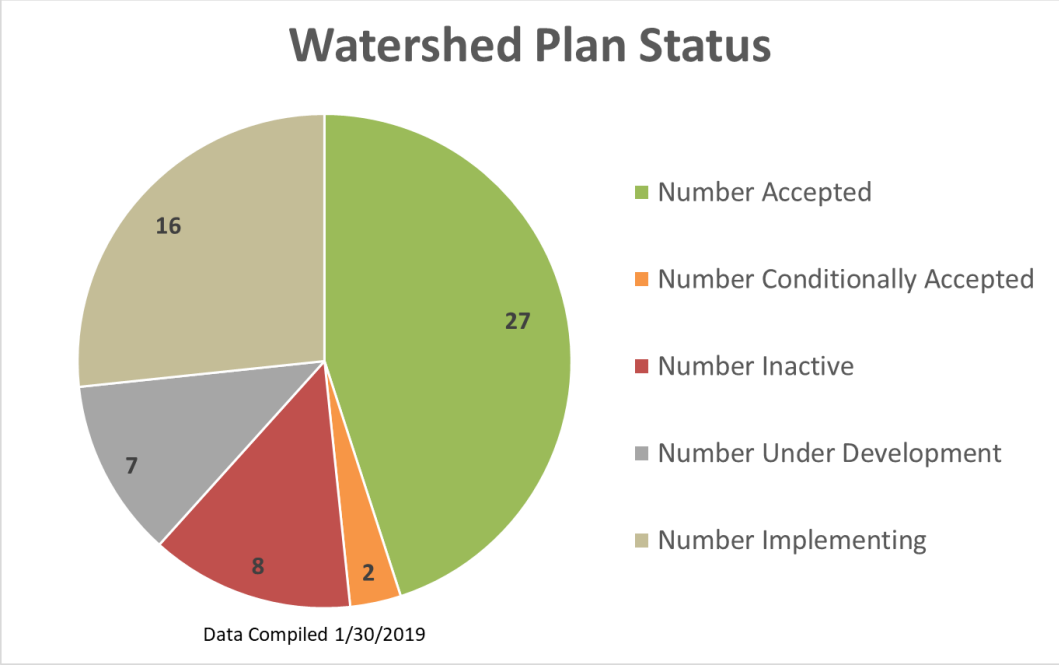


Figure 3.3. Watershed plans in Kentucky.

During the past few years the funding has shifted to plan implementation. Per federal guidelines, the majority of funding will continue to be used for implementation and success monitoring. By tracking the progress of all plans, Kentucky will be able to proactively target implementation funds while selecting new watershed plan development projects.

Table 3.2 Watershed Plan status in Kentucky.

Watershed Name	Project Year	Priority Watersheds	Basin	Size of Watershed (acres)	Size of Watershed (sq. miles)	Status	Completion Date	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Upper East Fork Clarks River	2002	X	Four Rivers	30,720	48.00	Inactive - Not EPA Accepted	Provisionally Accepted March 2010			M																		
Cane Creek	2002		Four Rivers	17,610.73	27.52	Inactive - Not EPA Accepted				M																		
Dix River/Herrington Reservoir Applies to **Clark's Run**	2002	X	Kentucky	18,062.24	28.22	Active - EPA Accepted	Accepted November 2009		M	M	M	M		S														
Dix River/Herrington Reservoir Applies to **Hanging Fork**	2002	X	Kentucky	61,740.36	96.47	Active - EPA Accepted	Accepted November 2009		M	M	M	M																
Floyds Fork	2003		Salt	181,750.30	283.98	Inactive - Not EPA Accepted																						
Dry Creek	2004		Licking	7,474.39	11.68	Inactive - EPA Accepted	Accepted May 2010				M																	
Stockton Creek	2004	X	Licking	3,785.10	5.91	Inactive - EPA Accepted	Accepted June 2010				M																	
Hancock Creek	2004	X	Licking	8,278.83	12.94	Inactive - EPA Accepted	Accepted June 2010	M	M																			
Darby Creek	2004		Salt	6,670.02	10.42	Inactive - EPA Accepted	Accepted March 2016				M																	
Corbin City/Laurel River	2004	X	Upper Cumberland	85,415.54	133.46	Inactive - EPA Accepted	Accepted May 2007	M																				
Pleasant Grove Creek	2005	X	Four Rivers	21,494.64	33.59	Inactive - Not EPA Accepted		M	M	M																		
Bacon Creek	2005	X	Green	13,193.08	20.61	Active - EPA Accepted	Accepted January 2018	M	M																			
Pleasant Run	2005		Green	8,239.72	12.87	Inactive - EPA Accepted	Accepted December 2005	M	M	M	M																	
Ten Mile Creek	2005	X	Kentucky	43,793.62	68.43	Inactive - EPA Accepted	Accepted November 2005	M	M	M	M	M				S												
Benson Creek (Goose Creek)	2005		Kentucky	6,587.84	10.29	Inactive - Not EPA Accepted			M	M	M	M																
Cane Run	2006	X	Kentucky	29,065.03	45.41	Under Development	Accepted October 2011				M	M	M															
Curry's Fork	2006		Salt	18,237.82	28.50	Active - EPA Accepted	Accepted March 2012			M	M	M																
Big South Fork (Big Hanging Fork)	2006		Upper Cumberland	26,891.91	42.02	Inactive - Not EPA Accepted	Provisionally Accepted October 2012				M	M																
Rock Creek	2006		Upper Cumberland	17,454.06	27.27	Inactive - EPA Accepted	Accepted April 2008		M	M	M	M																
Elkhorn Creek	2007	X	Big Sandy	34,138.87	53.34	Inactive - Not EPA Accepted				M	M																	
Banklick Creek	2007	X	Licking	37,248.32	58.20	Active - EPA Accepted	Accepted May 2010																					
Hinkston Creek	2008		Licking	166,489.21	260.14	Active - EPA Accepted	Accepted July 2011					M	M															
Triplett Creek	2008		Licking	119,719.27	187.06	Active - EPA Accepted	Accepted October 2013					M	M															
Chestnut Creek	2009	X	Four Rivers	5,150.89	8.05	Active - EPA Accepted	Accepted May 2016									M1	M1	M2										
Wolf Run	2009		Kentucky	6,514.48	10.18	Active - EPA Accepted	Accepted March 2013							M	M													
Red River (LAC)	2009	X	Kentucky	38,400	60.00	Active - EPA Accepted	Accepted February 2013							M	M													
Red River (HW)	2009	X	Kentucky	33,280	52.00	Active - EPA Accepted	Accepted December 2015							M	M													
Gunpowder Creek	2009		Licking	37,392.80	58.43	Active - EPA Accepted	Accepted April 2015							M1	M2													
Woolper Creek	2010		Licking	21,139.24	33.03	Inactive - EPA Accepted	Accepted October 2016								M2	M2												
Brushy Creek	2010		Upper Cumberland	28,398.24	44.37	Active - EPA Accepted	Accepted June 2016							M1	M1	M2												
Kinniconick Creek	2011		Licking	14,720	23.00	Inactive - Not EPA Accepted										M	M											
Sinking Creek	2011	X	Upper Cumberland	30,347.40	47.42	Inactive - Not EPA Accepted									M1	M1	M2											
South Fork Little River	2014	X	Four Rivers	43,174.07	67.46	Under Development					M	M	M					M										
Damon Creek	2014		Four Rivers	3,610.06	5.64	Active - EPA Accepted	Accepted January 2018											M										
Middle Fork Beargrass Creek	2018	X	Salt	16,148.96	25.23	Under Development																M						
Upper Paint Lick Creek	2018		Kentucky	28,034.61	43.80	Under Development																M						
Lower Howards Creek	Non319		Kentucky	12,361.79	19.32	Inactive - EPA Accepted	Accepted October 2014							M1	M2													
Upper Harrods Creek	Non319		Salt	27,762.92	43.38	Inactive - Not EPA Accepted											M											
Red Bird River	Non319		Kentucky	125,257.58	195.71	Active - EPA Accepted	Accepted April 2016								M	M												
Sulphur Creek	Non319		Salt	14,811.10	23.14	Active - EPA Accepted	Accepted August 2015								M	M												
Clarks Run - North Fork Licking	Non319		Licking	25,729.38	40.20	Under Development																M	M					
Crafts Colly, Sand Lick, & Dry Fork	Non319		Kentucky	9,976.89	15.59	Under Development		M	M	M			M	M					M			M						
Lower Trammel Creek		X	Green			Under Development																M						

WSP Development Stage

Under development	Expected Completion
Future Development	Project Ended / No Plan
EPA Accepted	**Implementation**
Conditional Acceptance (KDOW)	Funded Implementation
	Future Implementation

3.4 TMDL Implementation

The KY NPS and TMDL programs are both organizationally structured within the Division of Water with the TMDL program in the Water Quality Branch, and NPS program in the Watershed Management Branch. The two programs have been coordinating efforts for many years prior to the development of this document. The NPS and TMDL staff participate in regular meetings to coordinate water quality monitoring efforts, TMDL and Watershed Plan development efforts, and to discuss particular issues surrounding shared goals. Historically, TMDL documents have not contained a NPS implementation component. In 2018, the NPS program and the TMDL program, in partnership with the Gunpowder Creek Watershed Initiative, developed the Gunpowder Creek Watershed Plan into Kentucky's first EPA-accepted TMDL Alternative. The Division anticipates that the process determined through the development of this TMDL Alternative will allow for additional future Watershed Plan/TMDL Alternatives.

The coordination of water quality monitoring efforts between the NPS and TMDL programs is a significant effort that is serving to increase the implementation of TMDL documents by creating overlap with watershed planning areas. Watershed groups engaged in the development of new watershed plans, being developed using the KY Watershed Planning Guidebook, are required to collect a comprehensive water quality dataset that is utilized by the group to develop the watershed plan. This data can also be used by the DOW's Integrated Report staff for assessment purposes, as well as by the TMDL Program to write a TMDL document.

Both programs will continue to make efforts toward more effective integration, in an effort to increase the development and implementation of watershed plans or straight to implementation plans in TMDL areas.

3.5 Watershed Planning Guidebook and the Kentucky Watershed Academy

Through a 319(h) grant with Kentucky Waterways Alliance, the Kentucky Division of Water developed the *Watershed Planning Guidebook for Kentucky Communities* (DOW, 2010b). This guidebook was created to help Kentuckians work together to improve or protect the waterways near them. It provides a step-by-step process to create an effective watershed based plan. The development of these plans includes integration of science, leadership, education, and planning. Many communities have the desire to develop robust plans but lack the expertise in certain areas. To help fulfill the education needs of these groups, the Kentucky Watershed Academy is being developed by the Kentucky Water Resources Research Institute Center of Excellence for Watershed Management to provide watershed groups a foundation in areas necessary for successful watershed planning and implementation.

3.6 Centers of Excellence

The EPA Region 4 began the Centers of Excellence for Watershed Management Program in 2007 as a way to work with colleges and universities in the Southeast. The Centers of Excellence will provide hands-on, practical products and services for communities to identify watershed problems and solve them. The EPA designated Center will actively seek out watershed based stakeholder groups and local governments that need cost-effective assistance for watershed

projects. Centers may provide support with development of tools for watershed scientific studies, engineering designs and computer mapping, or provide direct assistance with legal issues, project management, public education, and planning (EPA, 2010). In March 2011, EPA Region 4 designated the Kentucky Water Resources Research Institute as a Center of Excellence for Watershed Management. The Institute was the first Center of Excellence in Kentucky and the seventh in the Southeast region.

3.7 Citizen Reporting

Citizens may contact the DOW at 502-564-3410 to report concerns or complaints about water issues. When calling, inform the operator that you wish to report a concern or complaint to the Division of Water. Please be prepared to explain the nature of the problem and give the location of the problem, including directions to the site. You do not have to give your name; however, if you wish for the DOW to either contact you during the investigation or provide you with the results of the investigation, you must leave your name and contact information.

Problems may also be reported at any of the DOW's regional offices. Regional office contact information and county coverage areas can be found online or by calling 502-564-3410.

For environmental emergencies such as spills of gas, oil, or other substances, immediately contact the Environmental Response Team at 502-564-2380 or 800-928-2380.

3.8 Objectives and Action Items

The Kentucky Division of Water endeavors to reduce nonpoint source (NPS) pollution across the Commonwealth. Although most of the ways the DOW addresses NPS impacts relate specifically to the source of pollution, maintaining a strong NPS program allows the DOW to efficiently address these impacts across the state. The DOW seeks to meet all requirements established by the EPA as grant conditions and to strengthen the NPS program in the state. To achieve the stated Long Term Goal #3 of Efficient and effective implementation of Kentucky's Nonpoint Source Program, the DOW developed several objectives and action items related to protecting the Commonwealth from NPS pollution.

Objective 1: Develop NPS program components to increase program effectiveness and maintain current program staff.

Action 1: Develop tools for increased efficiency.

Action 2: Maintain staffing for effective NPS program coordination and on the ground implementation

Objective 2: Meet federal and state requirements.

Action 1: Track KY's NPS Program Un-liquidated Funding Obligation and maintain a level less than 20% throughout the Federal Fiscal Year.

Action 2: Complete EPA required Grants Reporting and Tracking (GRTS) information updates.

Action 3: Submit Kentucky's Nonpoint Source Annual Report to EPA Region 4 by December 31st of each year.

Action 4: Submit at least one (1) Nonpoint Source Success Story to fulfill the requirements of WQ-10 by August 1st of each year.

Action 5: Review and approve all Nonpoint Source Sub-grantee Quality Assurance Project Plans (QAPP) prior to monitoring activities.

Objective 3: Provide technical assistance and support to the division regarding watershed impacts and the watershed perspective.

Action 1: Participate in DOW projects requiring technical experience from NPS staff.

Action 2: Update the Watershed Framework.

Objectives and action items associated with the first long term goal can be found under each managed functional area, as discussed in Sections 5 through 15. See Appendix B for a complete list of Kentucky's NPS Pollution Program goals, objectives, activities and tracking measures with anticipated completion time frames.

Program Evaluation

The Kentucky NPS Program operates under a philosophy of continuous evaluation and improvement. Lessons learned from program evaluation have helped establish the directions set forth in this updated management plan. At a minimum, the NPS Program will conduct a comprehensive program evaluation every five years to help monitor program effectiveness and evaluate new directions as needed to reflect lessons learned. Results of the program evaluation will be presented at a watershed forum and summarized in the NPS Program Annual Report for the years that it is conducted.

4. Kentucky Nonpoint Source Pollution Control Program Implementation

4.1 Summary

As described in the previous chapter, there are a number of factors and influences taken into consideration during the Kentucky Nonpoint Source Pollution Control Program (NPS Program) watershed prioritization process. Regardless of any particular factor, local capacity and interest are the primary driving factors behind prioritization.

Within the NPS Program, prioritization is at two distinct levels. The first is a broad programmatic level and the second is within the selection of sub-grantee projects. The NPS Program will continue to encompass both levels of prioritization. This includes funding areas where citizens are involved at a local scale and funding direct implementation in areas where the Kentucky Division of Water (DOW) has outlined priorities and can award grants to groups to do specific on-the-ground implementation.

4.2 Program Partner Strategy

The implementation of the NPS Program has been and will continue to be a combination of statewide or topical program integration and local on-the-ground implementation. Statewide program implementation is conducted between the various agency partners that are implementing programs that control nonpoint sources of pollution. Statewide program implementation relies greatly upon finding common agency goals and better integrating program efforts to target specific watersheds or specific NPS pollution issues. This effort requires the NPS Program staff to engage other agencies, coordinate efforts, and potentially develop structured or formal working relationships.

Local implementation is built heavily around interested and engaged communities and citizens who participate with the River Basin Teams or Watershed Watch and who take the additional step of forming local watershed working groups. This type of local community citizen group is one component of what the NPS Program refers to as, “local capacity”. Other aspects of local capacity can be interested and engaged local government officials, or a specific project opportunity that will address a known problem. Currently most on-the-ground implementation opportunities for the NPS Program are a direct result of local capacity.

The NPS Program does not have formalized working partnerships or even day-to-day working relationships with all government agencies or local watershed groups that are making efforts to reduce NPS pollution impacts to Kentucky’s streams. However, through the efforts of NPS staff, specifically Basin Coordinators and Technical Assistants, a network of communication is maintained with these partner organizations allowing the Division to coordinate with appropriate actions to address NPS pollution in the state. These efforts include NPS staff leadership of local Basin Teams, involvement and attendance on partner organizations boards and steering committees (examples include the Ag Water Quality Authority, the Forestry Act BMP board, the Watershed Watch in Kentucky Board, the Kentucky Ag Water Quality

Monitoring Committee, the Kentucky Association for Environmental Education (KAEE) Educational Advisory Committee and many more), organizing forums where common goals may be explored by potential and existing partners. The NPS program strategically reaches out to project partners who can directly support watershed planning and protection efforts and seeks to create opportunities for collaboration. Sections 5 - 15 contain an all-inclusive lists of project partners who are working in some manner to reduce the NPS pollution impacts to Kentucky's waterways, and who the NPS section reaches out to in order to provide support and offer partnership opportunities in watershed management projects. The comprehensive listing is meant to give credit to each of these agencies for the important work that they do and provide an inventory of the resources available for NPS implementation in the Commonwealth.

4.3 Program Functional Areas

The DOW looks at impacts holistically with a watershed perspective. This version of the Kentucky Nonpoint Source Management Plan (NPS Management Plan) addresses the nonpoint source impacts in the state by groupings called functional areas. The functional areas are described in more detail in the following sections:

- Section 5: Agriculture
- Section 6: Developed Lands
- Section 7: Forestry
- Section 8: Groundwater
- Section 9: Onsite Wastewater Treatment
- Section 10: Protection - Healthy Watersheds
- Section 11: Recreation
- Section 12: Resource Extraction
- Section 13: Riparian Areas and Stream Restoration
- Section 14: Water Supply
- Section 15: Education and Outreach

These groupings of pollution sources may include both regulated and non-regulated impacts, and could be addressed with similar best management practices; or grouped because of a similar land use. For example, the section on Developed Lands includes information about urban impacts in Municipal Separate Storm Sewer Systems (MS4) areas as well as impacts in urbanized non-MS4 areas. Each functional area can stand alone, so groups interested in pursuing a project abating a certain impact may read only the section about that functional area. Sections 5 through 15 examine these nonpoint source functional areas in depth.

5. Agriculture

5.1 Summary

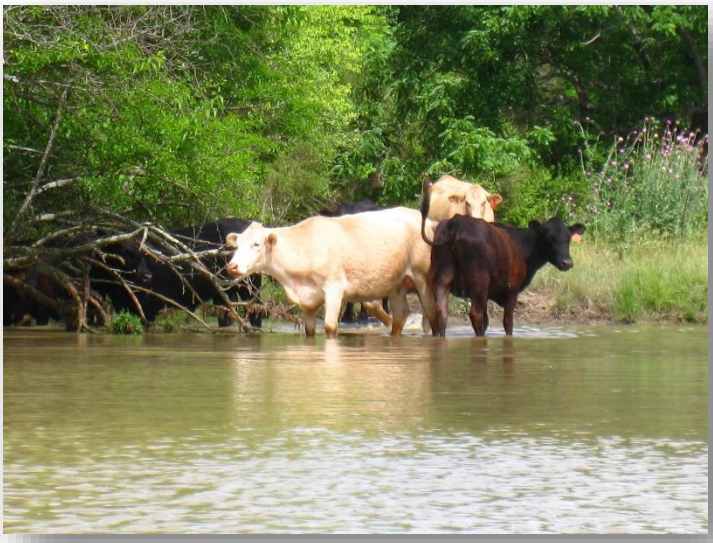


Figure. 5.1. Cattle in a KY stream introduce sediment, nutrients, and bacteria to the waterbody. Fencing livestock out of the stream is a simple way to protect water quality.

Kentucky has approximately 75,800 farms, with the average farm size of 169 acres (Kentucky Department of Agriculture, 2017). Farming operations can be a significant source of nutrients, sediment, and bacteria to Kentucky streams, as well as introducing agricultural chemicals. Best management practices that help prevent these pollutants from entering the stream are implemented by the Division of Water (DOW) and agricultural project partners. Issues relating to the environmental soundness of agriculture production and the concern for the quality of life in rural settings have increased the demand for agencies and organizations to address water quality and nonpoint source pollution. The General Assembly responded to this demand by passing the Kentucky Agriculture Water Quality Act (AWQA) in 1994. The goal of the act is to protect surface and groundwater resources from pollution as a result of agriculture and silviculture (forestry) activities. The AWQA mandates that landowners with ten or more acres in agricultural or silvicultural production must develop a water quality plan based upon guidance from the Kentucky Agriculture Water Quality Plan. It is the sole responsibility of each landowner to develop, implement and revise when needed, a water quality plan for their individual operations. Each plan should contain best management practices (BMPs) that provide methods for the landowner to address nonpoint source pollution. For example, a landowner may choose to fence cattle, like those pictured in Figure 5.1, out of the stream. Keeping livestock out of streams improves water quality in a variety of ways, including stabilizing stream banks and keeping animal waste out of the water. Additionally, herd health has been shown to improve when livestock is kept from the creek because the animals are no longer consuming their own waste products mixed with the stream water.

The University of Kentucky developed the Kentucky Agriculture Water Quality Act Planning Tool which can be used by landowners to assess their operation and identify best management practices to be included in their individual plan. To access the full AWQA, see KRS 224.71-100 through 224.71-140.

5.2 DOW Strategy

The DOW approach to reducing nonpoint source pollution from agricultural operations is agriculturally diverse and relies heavily on partnerships with other state and federal agencies as well as non-governmental organizations. Primarily the division is concerned with pathogens, nutrients, and sediment as the pollutants entering streams from agricultural land. However, pesticides and other farm chemicals as well as petroleum products and human waste from septic systems entering streams from farming operations are additional considerations.

Essentially a "non-regulatory" approach, the strategy involves a combination of education and outreach to property owners in the state, and voluntary best management practice implementation through watershed planning and partnerships with local stakeholders. These stakeholders include organizations like soil conservation districts, local health departments, fish and wildlife, and USDA programs like NRCS.

5.2.1 Partner Strategy

DOW works with many other agencies across the state to address nonpoint source pollution from agriculture. The efforts of these partner agencies are centered around providing technical and financial assistance for agricultural producers to deal with water quality issues on their individual farming operations. In addition to DOW participation with each of these partners, the partner programs are driven by national, state, and local priorities that center around farm profitability, environmental impact issues, wildlife habitat improvement, scientific research, or education. Regardless of whether the primary focus of these partners is water quality, their programs do ultimately have a positive effect on the water quality of Kentucky.

- **Governor's Office of Agricultural Policy (GOAP)** - agpolicy.ky.gov

  The Governor's Office of Agricultural Policy (GOAP) was established in 1998 to provide a direct link between the Governor of the Commonwealth and one of Kentucky's most important industries: agriculture. The Kentucky Agricultural Development Board (KADB) and the Kentucky Agricultural Finance Corporation (KAFC) are administered by the GOAP. The Kentucky Agricultural Development Fund (KADF), by statute, is administered by the KADB. Its mission is to invest monies in innovative proposals that increase net farm income and affect tobacco farmers, tobacco-impacted communities, and agriculture across the state by stimulating markets for Kentucky agricultural products. The KAFC addresses the unique financing needs of agriculture in the Commonwealth. Its mission is to strengthen Kentucky agriculture by providing access to below market interest rates through partnerships with local lending institutions.
- **Kentucky Agriculture Science and Monitoring Committee (KASMC)** - https://ky.water.usgs.gov/projects/ky_ag_monitoring_committee/

  The Kentucky Agriculture Science and Monitoring Committee (KASMC) was created in 2009 with members representing a wide range of state, federal and local agencies as well as academic institutions and the agricultural industry. The US Geological Survey (USGS) Kentucky Water Science Center currently chairs the committee; new members are continually being added and leadership is a truly collaborative process. KASMC

members work collectively to coordinate resources and expertise in order to address the agricultural science and monitoring needs of the citizens of Kentucky. To date KASMC members have collaborated on numerous proposals and outreach efforts. KY Division of Water staff members regularly participate in the quarterly KASMC meetings and the bi-annual conference. KASMC also serves as a subcommittee under Kentucky's Agriculture Water Quality Authority and provides information to help resource managers steer Kentucky's agricultural policies in that role.

- **Kentucky Agricultural Water Quality Authority (AWQA)** - http://conservation.ky.gov/Pages/AgricultureWaterQualityAuthority.aspx

  The Kentucky AWQA is a multi-agency committee charged with implementing the Kentucky Agriculture Water Quality Act and reviewing/updating best management practices that are part of the Kentucky Agriculture Water Quality Plan. The DOW also maintains a Water Quality Liaison and a Nutrient Management Specialist with UK Extension to provide leadership and technical assistance to the AWQA.

- **Kentucky Division of Conservation (DOC)** - conservation.ky.gov

  The Kentucky Division of Conservation (DOC) mission is to provide exemplary leadership in natural resource conservation stewardship for the Commonwealth of Kentucky. DOC's stated mission is to:

  - Assist Kentucky's 121 local conservation districts in the development and implementation of sound soil and water conservation programs to manage, enhance and promote the wise use of the Commonwealth's natural resources; and
  - Responsibly administer the conservation programs of the division to ensure, through conservation districts, the availability of technical and financial assistance to the landowners of Kentucky.

  The DOC and DOW share a very lengthy list of working relationships from shared participation in the KY Envirothon Competition and The Jim Claypool Art and Writing Competition (both for school-aged children) to a shared working effort on the Agriculture Water Quality Authority.

- **Kentucky Soil and Water Conservation Commission** - conservation.ky.gov/Pages/SoilandWaterConservationCommission.aspx

  The Kentucky Soil and Water Conservation Commission establishes and directs the policies under which the Kentucky DOC operates. The members of the commission have the responsibility to assist local conservation districts in carrying out their responsibilities.

- **Natural Resource Conservation Service (NRCS)** - www.ky.nrcs.usda.gov

  The US Department of Agriculture (USDA) NRCS in Kentucky provides leadership in a partnership effort to help people conserve, maintain and improve our natural resources and environment. NRCS envisions a productive, sustainable agricultural sector in balance with a high-quality environment. Productive use of the Nation's cropland, grazing land, and forest land is essential to the Nation's security and the health and

well-being of its citizens. These lands form the foundation of a vibrant agricultural economy that provides food, fiber, forest products, and energy for the Nation. These lands also produce environmental benefits that people need – clean and abundant water, clean air, and healthy ecosystems.

NRCS assists land users and landowners with conserving their soil, water, and other natural resources. Local, state, and federal agencies and policymakers also rely on their expertise. NRCS delivers technical assistance based on sound science and suited to a customer's specific needs. Cost shares and financial incentives are available in some cases. Kentucky has a strong conservation partnership with numerous conservation agencies throughout the state. The NRCS partnership, which includes 121 soil and water conservation districts, provides service to every county in the Commonwealth of Kentucky.

At an agency level, the DOW participates in the NRCS State Technical Committee meetings, sub-committee meetings, and public reviews of programmatic and Conservation Practice modifications. The Division provides also provides technical assistance and compliance requirements with conservation practices guidelines within the NRCS Field Office Technical Guide. At a local level, the DOW NPS Program works with Conservation Districts to secure NRCS funding and technical assistance for the appropriate and effective implementation of agricultural conservation practices. In addition to this standard work, NRCS in Kentucky and the NPS Program have worked jointly to implement the National Water Quality Initiative (NWQI), and to develop and conduct success monitoring for that program.

- **The Nature Conservancy (TNC)** - https://www.nature.org/en-us/about-us/where-we-work/united-states/kentucky/

  The KY Division of Water and The KY Chapter of the Nature Conservancy support each other on several statewide, regional, and local initiatives such as land acquisitions, Watershed Watch volunteer training and sampling event support, Mississippi River Basin Initiative, and other individual Nonpoint Source Program sub-grantee projects.

- **USDA Agricultural Research Service (ARS)** - www.ars.usda.gov

  The Agricultural Research Service (ARS) is the USDA's chief scientific research agency. Their job is finding solutions to agricultural problems that affect Americans every day, from field to table. ARS conducts research to develop and transfer solutions to agricultural problems of high national priority and provide information access and dissemination to ensure high-quality, safe food and other agricultural products; assess the nutritional needs of Americans; sustain a competitive agricultural economy; enhance the natural resource base and the environment; and provide economic opportunities for rural citizens, communities, and society as a whole. ARS has two operating units in Kentucky: 1) the USDA-ARS Forage Animal Production Research Unit is located at the University of Kentucky in Lexington, KY; and 2) the USDA-ARS Food Animal Environmental Systems Research Unit is located in Bowling Green, KY.

5.2.2 Land Grant Institutions

Kentucky's land-grant institutions are charged with providing agricultural research, teaching, and outreach/engagement services to the citizens of the Commonwealth.

- **University of Kentucky (UK) College of Agriculture** - www2.ca.uky.edu
  The UK College of Agriculture is engaged in research and extension related to agricultural water quality, and has partnered with the Kentucky Division of Water on various projects to implement best management practices and encourage landowner adoption of Kentucky Agriculture Water Quality Act plans. The UK College of Ag is currently hosting and maintaining the Ag Water Quality Plan website, where farmers can go to develop an Ag Water Quality Plan for their farming operation.
- **Kentucky State University (KSU)** - https://kysu.edu/academics/cafsss/research-extension/ Kentucky State University is a public, comprehensive 1890 land-grant institution. The Land Grant Program (LGP) works to uphold the mission of KSU through its commitment to research, service, and teaching in the food and agricultural sciences. The various programs of Land Grant are supported by federal and state funds. The KSU LGP works to resolve agricultural, educational, economic and social problems of the people of the Commonwealth of Kentucky, especially limited resource persons and families.

5.2.3 Education and Outreach

Although the AWQA was passed in 1994, many landowners are not aware of the requirements of the act or how to go about crafting their own water quality plans. Often landowners do not even realize that the way they use their land has an impact on water quality. Educating landowners about best management agricultural practices and the AWQA is an essential means to reducing nonpoint source pollution. By understanding how our land use affects our water, we can improve water quality for ourselves, our livestock and our neighbors. The websites and organizations listed below seek to better inform landowners about sustainable agricultural practices.

- **Kentucky Agriculture and Environment in the Classroom (KAEC), Inc.** - https://www.teachkyag.org/ Kentucky Agriculture and Environment in the Classroom (KAEC), Inc. is a nonprofit organization promoting an understanding and appreciation of the system that provides food and fiber for people, emphasizing the importance of agriculture and the environment to our food and fiber supply. KAEC, Inc. serves in an advisory role to the Kentucky Department of Agriculture and other organizations providing educational opportunities throughout the Commonwealth. KAEC, Inc. equips with the resources necessary to enhance classroom instruction, involve community leaders and support groups, and facilitate student interaction in the fields of agriculture and the environment.
- **Kentucky Agricultural Statistics Bulletin** - https://www.nass.usda.gov/Statistics_by_State/Kentucky/Publications/Annual_Statistical_Bulletin/index.php

This report represents a cooperative effort between USDA's National Agricultural Statistics Service, Kentucky Field Office, and the Kentucky Department of Agriculture and contains current statistics for Kentucky's agricultural industry. The information found in this report provides an accurate and unbiased picture on the current state of agriculture in the Commonwealth.

- **Kentucky Agriculture Water Quality Act Plan Development -** https://www.uky.edu/bae/awqp

  This website contains useful information about agriculture BMPs as well as an online tool to help in the development of Agriculture Water Quality Plans.

- **National Agricultural Statistics Service (NASS)** - www.nass.usda.gov

  The USDA's National Agricultural Statistics Service (NASS) conducts hundreds of surveys every year and prepares reports covering virtually every aspect of US agriculture. Production and supplies of food and fiber, prices paid and received by farmers, farm labor and wages, farm finances, chemical use, and changes in the demographics of US producers are only a few examples. NASS is committed to providing timely, accurate, and useful statistics in service to US agriculture.

- **US EPA Agriculture (Ag) 101** - https://www.epa.gov/agriculture/ag-101-overview-agriculture

  Ag 101 provides a brief overview of American agriculture. It covers the primary commodities produced today and the methods of doing so. Technological improvements have allowed the productivity of the American farmer to increase dramatically. During colonial times, one farmer fed four others. Today, one farmer produces food for 130 others. This dramatic increase in productivity has freed up most of our population to pursue other vocations and has been the foundation for the lifestyle we enjoy today. However, with this growth comes added responsibility to ensure that the environment is protected and that the production is sustainable.

- **University of Kentucky Cooperative Extension Service** - http://extension.ca.uky.edu/

  The UK Cooperative Extension Service has county agents in each of the state's 120 counties. These agents deliver research-based information to local citizens and bring the capacity of UK to the people of Kentucky. Educational publications from the UK can be found at www.ca.uky.edu/agcomm/pubs.asp.

- **University of Kentucky Environmental and Natural Resource Issues** - www.ca.uky.edu/enri

  Information on various environmental issues, including publications and education/outreach materials can be found at the UK Environmental and Natural Resource Issues website.

- **University of Kentucky Equine Initiative** - www2.ca.uky.edu/equine/EquineResources

  In the Horse Environments section of this website, numerous extension publications are listed that address environmental issues on horse farms. Those specific to water quality

include muck composting, high traffic pads, pervious concrete washing pads and animal composting.

5.2.4 Funding

The expense of some agricultural BMPs is often cost prohibitive to landowners. There are many times when landowners want to make improvements on their land to better water quality, but they just cannot afford the out-of-pocket expenses. The good news is that there are multiple programs and grant opportunities which offer funding to landowners to help pay for BMP improvements, reducing total project costs for the landowner. Below are some of the programs that offer funding opportunities to landowners willing to make a positive difference with nonpoint pollution control.

- **319(h) NPS Grants** - https://eec.ky.gov/Environmental-Protection/Water/Protection/Pages/Section-319(h)-Grant-Program-Funding.aspx

  319(h) is the section of the Clean Water Act (CWA) dealing with nonpoint source pollution. Each year DOW applies to US EPA to receive 319(h) funding. DOW distributes a majority of the monies received through a grant award process to communities, citizen groups, and organizations throughout Kentucky. Historically, Section 319(h) grants are not awarded to individuals for work on their own properties. However, grants are regularly awarded to local watershed groups, Conservation Districts, county or city governments for the purpose of administering a financial assistance program for local agricultural producers. The goal of the NPS program is to implement agricultural BMPs in specific watersheds for the purpose of improving water quality in that watershed. To find out more about the 319(h) grant process, please visit the DOW website or see Appendix A.

- **Kentucky Agricultural Development Board** - agpolicy.ky.gov/board

  The Kentucky Agricultural Development Board invests funds from the Master Settlement Agreement in innovative proposals that increase net farm income and affect tobacco farmers, tobacco-impacted communities and agriculture across the state by stimulating markets for Kentucky agricultural products, finding new ways to add value to Kentucky agricultural products, and exploring new opportunities for Kentucky farms.

- **Natural Resources Conservation Service (NRCS)** - www.nrcs.usda.gov

  The NRCS has offices in nearly every county across the United States. They work with communities to improve soil, water, air, plants, wildlife and energy use. Their vision is to ensure productive lands in harmony with a healthy environment. They administer the Farm Bill programs including the Environmental Quality Incentives Program (EQIP), Conservation Innovation Grants (CIG), the Conservation Stewardship Program (CSP), and the Agricultural Management Assistance Program (AMA).

- **Kentucky State Cost Share** - conservation.ky.gov/Pages/StateCostShare.aspx

  The Kentucky Soil Erosion and Water Quality Cost Share Program and the Kentucky Soil Stewardship Program were created to help agricultural operations protect the soil and water resources of Kentucky and to implement their agriculture water quality plans. The

program helps landowners address existing soil erosion, water quality and other environmental problems associated with their farming or woodland operation.

The 1994 Kentucky General Assembly established this financial and technical assistance program. Kentucky Revised Statues 146.115 establishes that funds be administered by local conservation districts and the Kentucky Soil and Water Conservation Commission with priority given to animal waste-related problems, agricultural district participants, and to producers who have their Agriculture Water Quality plans on file with their local conservation districts. Funding comes from the Kentucky General Assembly through direct appropriations to the program from the Tobacco Settlement Funds and from funds provided by the KDA. Practices eligible for cost share include animal waste control facilities, animal waste utilization, vegetative filter strips, sinkhole protection, heavy use area protection, rotational grazing system establishment, livestock stream crossing, and riparian area protection. Consult the Kentucky Soil & Water Quality State Cost Share Program Manual for more information.

5.3 Objectives and Action Items

The DOW endeavors to reduce NPS pollution across the Commonwealth. Agriculture is a significant contributor to NPS pollution in Kentucky, and is therefore a primary functional area for KY's NPS program to target work. The Division's efforts in addressing NPS Pollution from Agricultural sources can be broken into three main areas of effort:

1. Provide education and outreach to the state's agricultural industry.
2. Target the installation of Best Management Practices (BMPs) to control NPS pollution from agricultural sources.
3. Coordinate and develop partnerships with other federal, state, and local agencies in an effort to address agricultural NPS issues.

- **Education and Outreach**
  Kentucky's NPS Program has in the past and will continue to fund the Agriculture Water Quality Authority Liaison and Nutrient Management Planning position between the DOW and the University of Kentucky Cooperative Extension Service (UKCES). This position is primarily responsible for educating the agriculture community about water quality issues on a statewide level. This position is appointed as a member of the State Agriculture Water Quality Authority and is involved in numerous issues including but not limited to Nutrient Management Planning, producer Agriculture Water Quality Plan development, Education and Outreach to the Agriculture community, and the development of corrective measures protocols.

  Although KY's NPS Program has moved toward targeted agriculture BMP implementation to achieve water quality improvement, there is still a significant need to install and demonstrate best management practices for agricultural producers and conservation professionals. BMP Demonstrations must include technologies that will be effective at addressing the specific agricultural resource concerns of a particular

agricultural industry such as livestock or row crop production. Geographic coverage of BMP Demonstrations will at a minimum be at the watershed level, where plans exist, but preferably will be conducted at a regional or statewide level to achieve the greatest educational value for the investment. Success of BMP Demonstration projects will be determined by the number of people educated and how well the BMPs are being promoted through various media outlets.

- **Install Best Management Practices**
  Kentucky is fortunate in that there a number of state and federal agencies that provide funding for the installation of agricultural BMPs. KY's NPS Program targets funding for agricultural BMPs utilizing three strategies: The first is to coordinate at a program level with state and federal agencies to target efforts and funding at specific priority watersheds throughout the state. The second is to directly fund agriculture BMPs in watershed planning areas where other sources of funding cannot be secured. The third is to utilize 319(h) funding to hire Watershed Coordinators within local conservation districts for the specific purpose of securing multiple sources of funding for on the ground BMP implementation. Watershed Coordinators must be capable of providing both administrative and technical assistance to agricultural producers in order to be effective at securing funding sources, supervising the installation of BMPs, and to help address other resource concerns on a farming operation.

- **Coordination**
  Staff members from Kentucky's NPS Program will continue to play an active role in numerous agency level meetings and conferences with the KY Division of Conservation, Natural Resources Conservation Service (NRCS), US Geological Survey (USGS), and other agencies over the next five years. Participation in these meetings helps develop and strengthen inter-agency working relationships which allow each agency to be more effective. Regular meeting participation also provides an opportunity for NPS Program staff to discuss targeting of funding and/or resources to specific watersheds or problem areas.

  The Kentucky DOW and DOC operate closely together to address shared goals for water quality through agricultural BMPs. They collaborate on the Gulf Hypoxia Task Force, the AWQA, and in support of the 121 soil and water conservation districts across the state.

  Kentucky's NPS Program and NRCS maintain a very good working relationship with regards to the National Water Quality Initiative (NWQI). The DOW and NRCS worked together to select HUC 12 watersheds where Sediment and Nutrients were the primary impairments, with Agriculture as the primary source of impairment. These watersheds are also priority areas due to several factors including pre-existing water quality data, watershed planning efforts, TMDL development, and Source Water Protection Areas. NRCS continues to focus a great deal of effort to fully implement the NWQI funding allocation within the selected watersheds. The DOW will continue working with NRCS on NWQI information sharing and other shared activities. DOW will also be working with

NRCS to determine the impacts of BMP types and concentrations installed within the NWQI watersheds.

To achieve the goal of restoring nonpoint source impaired waters, DOW has developed several objectives and action items related to agricultural NPS.

Long Term Goal 1: Restore Nonpoint Source Impaired Waters

Objective 5: Decrease input of pollutants from agricultural sources.

Action 1: Support projects that educate the agricultural community.

Action 2: Provide financial and/or technical support for the implementation of BMPs that reduce nonpoint source pollution from agricultural sources.

Action 3: Coordinate with NRCS and KY Division of Conservation to implement BMPs in watershed planning areas.

Action 4: Coordinate with NRCS to identify and prioritize NWQI watersheds.

Action 5: Participate in state wide meetings and conferences that have a focus on Agriculture and Water Quality.

See Appendix B for a complete list of Kentucky's NPS Pollution Program goals, objectives, activities and tracking measures with anticipated completion time frames.

6. Developed Lands

6.1 Summary

Runoff occurs when precipitation from rain and/or snowmelt flows over land or impervious surfaces and does not get a chance to seep into the ground. As the runoff flows over the land or impervious surfaces (paved streets, parking lots, and building rooftops), it accumulates debris, chemicals, sediment, or other pollutants that could adversely affect water quality if the runoff is discharged untreated. Developed lands such as cities, neighborhoods, and commercial areas, have a high percentage of impervious surfaces relative to undeveloped areas, and consequently are a source of nonpoint source (NPS) pollution in many of Kentucky's streams. Pollutants can include nutrients and pesticides from yard application, bacteria from pet waste, failing onsite sewage systems, as well as sediment and metals from land disturbance, construction, and industrial impacts. While regulatory approaches are appropriate in some situations, the primary method to control these types of stormwater discharge is through the use of best management practices (BMPs). New technologies and best management practices are being developed and implemented in communities across the Commonwealth to reduce NPS pollution from developed lands.

In addition to NPS pollution impacts on water quality, stormwater runoff has real world implications from a water quantity standpoint. The increased impervious surface in watersheds with large developed areas, loss of streambank vegetation, and stream channelization all can lead to more water entering streams and rivers and can cause serious property damage during storm events through erosion and flooding.

Figure 6.1. Pervious parking lot and rain garden at Georgetown, KY fire station.

6.2 DOW Strategy

The DOW strategy in urban areas aims to reduce excessive stormwater runoff, decreasing the loading of nutrients, pathogens, and sediments. The NPS program addresses impacts from developed lands through both regulatory and non-regulatory approaches.

From the non-regulatory perspective, DOW works with communities to install BMPs that emphasize stormwater management, allowing rainwater to slow down and soak in. In many communities this takes the form of encouraging development that incorporates green infrastructure such as permeable pavers, pervious concrete, riparian zone restoration, rain gardens, rain barrels, and green roofs. Larger projects may involve detention basin retrofits that store, absorb, and filter stormwater

that collects off of roads, buildings, and parking lots. By reducing the quantity of stormwater entering streams many of these BMPs may also serve to reduce flood potential in many communities. With this in mind, the DOW provides technical assistance to the Kentucky Division of Emergency Management in its development of the State Hazard Mitigation Plan, which includes plans for flooding and extreme weather events.

Division programs for MS4s, CSOs, SSOs, brownfields and construction sites provide assistance for the regulatory aspects of urban stormwater runoff. These programs are discussed in more detail in the following sections (6.2.1-6.2.5).

6.2.1 Municipal Separate Storm Sewer Systems (MS4s)

Municipal stormwater is regulated under the Municipal Separate Storm Sewer System (MS4). According to population and density, areas are designated as either Phase I or Phase II and required to be permitted. In Kentucky, there are 104 MS4 permitted entities including 49 permittees and 55 co-permittees. Most stormwater discharges are considered point sources and require coverage under a National Pollution Discharge Elimination System (NPDES) permit. Most states are authorized to implement the Stormwater NPDES permitting program. Kentucky implements the program through the Division of Water's MS4 program. Additional information about the MS4 program and requirements is included in Section 6.4.2.

6.2.2 Combined Sewer Overflows (CSOs)

Combined sewer systems are sewers that are designed to collect rainwater runoff, domestic sewage, and industrial wastewater in the same pipe. Most of the time, these systems transport all of their wastewater to a treatment plant, where it is treated and then discharged to a stream. During periods of heavy rainfall, however, the wastewater volume in a combined sewer system can exceed the capacity of the treatment plant. For this reason, combined sewer systems are designed to overflow occasionally and discharge excess wastewater directly to nearby streams, rivers, or other water bodies. These overflows, called combined sewer overflows (CSOs), may contain not only stormwater but also untreated human and industrial waste, toxic materials, and debris. According to US EPA, approximately 860 cities in the US have combined sewer systems (CSS). Kentucky has 14 areas with combined sewer systems with a total of 257 CSO outfalls in the current or draft permits. Eleven of the CSO communities are under Consent Judgments with the Commonwealth of Kentucky, and two of the CSO communities are under Consent Decrees jointly with the federal government and the state. One CSO community and 3 former CSO communities were under Consent Judgments with the state that have been fulfilled and terminated. The consent orders are intended to bring the CSO communities into compliance with the CWA, 1994 CSO Control Policy, and state statutes and regulations within the next 19-21 years. All but one current consent judgements and approved LTCPs have a deadline of 12/31/2038. One deadline is being extended to 1/1/2040.

6.2.3 Sanitary Sewer Overflows (SSOs)

Properly designed, operated, and maintained, sanitary sewer systems are meant to collect and transport all of the sewage that flows into them to a wastewater treatment plant. Occasional unintentional discharges of raw sewage occur in almost every system. These types of discharges

are called sanitary sewer overflows (SSOs). SSOs have a variety of causes, including but not limited to severe weather, improper system operation and maintenance, and vandalism. The US EPA estimates that there are at least 40,000 SSOs each year. The untreated sewage from overflows contaminate our waters, causing water quality problems.

The Municipal Section of the Surface Water Permits Branch of DOW has negotiated corrective action plans with many municipal systems experiencing SSOs and other wet weather-related capacity problems in Kentucky. Some of these corrective action plans are formal Sanitary Sewer Overflow Plans (SSOPs) which commit the community to a firm schedule for elimination of SSOs. Moreover, the Municipal Section conducts inspections of all municipal major and minor dischargers to ensure compliance with proper wet weather management of Publicly Owned Treatment Works, including collection systems. Some of those sewer utilities have been referred to the Kentucky DEP Division of Enforcement for development of agreed orders between the cabinet and the permitted utility to ensure compliant operation. Currently, several sewer utilities are implementing remedial measures pursuant to an agreed order, which may be enforced in Franklin Circuit Court if the utilities do not comply with them. Additional information about SSOs is included in Section 6.4.4.

6.2.4 Brownfields

Brownfield sites are abandoned or underused properties where there may be environmental contamination. Redevelopment efforts are often hindered by the liability for the cleanup or the uncertainty of cleanup costs. Brownfield sites that aren't cleaned up represent lost opportunities for economic development and for other community improvements. Cleaning up and reinvesting in these properties protects the environment, reduces blight, and takes development pressures off green spaces and working lands. Because most brownfield sites result from noncompliance with regulations and permitting, nonpoint source funding is not typically available for remediation efforts. However, other programs and agencies offer funding for brownfield cleanups and restoration efforts, as discussed in Sections 6.3 and 6.4. Additionally, brownfield sites that involve resource extraction may be eligible to coordinate with NPS reduction efforts. For more information, see brownfields partner programs in Section 12.3 and funding opportunities in Section 12.5.

6.2.5 Construction

Stormwater runoff from construction activities can have a significant impact on water quality. As stormwater flows over a construction site, it can pick up pollutants like sediment, debris and chemicals and transport these to a nearby storm sewer system or directly to a stream, river or lake. Therefore it is important to prevent erosion and control sediment runoff from these sites. Kentucky requires construction site operators engaged in clearing, grading and excavating activities that disturb one or more acres, including smaller sites in a larger common plan of development or sale, to obtain a permit for their stormwater discharges. The permit requires the operator to develop a Stormwater Pollution Prevention Plan (SWPPP) that describes how the site will be managed. The operator is also responsible for routine inspections and maintenance of all BMPs on the site until the site is stabilized. Additional information about stormwater runoff from construction sites is included in Section 6.4.3.

6.2.6 Partner Strategy

The impacts from developed lands are vast and DOW does not have the resources to manage these issues alone. The work of our partners is vital in addressing these issues so that Kentucky can continue to grow while improving the quality of our water resources. As existing infrastructure reaches capacity or begins to fail, and development of our land continues, we must work toward long-term, sustainable solutions. This includes providing support to local communities actively addressing these issues, as well as encouraging other communities to adopt better stormwater management practices. It also requires working with regulatory programs to ensure that effective approaches to addressing stormwater impacts are part of permit requirements. Kentucky NPS program staff help provide technical expertise to our partners in the MS4 program through the review of Stormwater Quality Management Plans and through training of local MS4 coordinators. NPS staff will continue to provide technical support on stormwater management in urban areas to internal staff and Kentucky communities through the partnership with Kentucky Stormwater Association.

Below is a list of some of the organizations assisting with these efforts and the work they are performing throughout the Commonwealth:

- **Bluegrass Greensource** - https://bggreensource.org/

  Bluegrass Greensource is a 501(c)(3) organization dedicated to providing environmental resources and information to schools, community groups, local governments, and citizens in Central Kentucky. The organization provides outreach programs that focus on household hazardous waste, rain barrels, environmentally-friendly lawn care, waste reduction, rain gardens, energy efficiency and more. Counties in their service area include Anderson, Bourbon, Boyle, Clark, Estill, Garrard, Fayette, Franklin, Harrison, Jessamine, Lincoln, Madison, Mercer, Montgomery, Nicholas, Owen, Powell, Scott, Shelby, and Woodford. Bluegrass Greensource partners with DOW to assist local leaders and communities in their understanding and acceptance of green infrastructure practices.

- **Division of Compliance Assistance (DCA)** - dca.ky.gov

  The Division of Compliance Assistance (DCA) is a division within Kentucky's Energy and Environment Cabinet, Department for Environmental Protection. DCA works with entities throughout the Commonwealth to improve regulatory compliance and increase environmental knowledge. DCA works with DOW to sponsor and organize trainings regarding MS4 compliance, green infrastructure, and brownfields redevelopment.

- **Kentucky Association of Mitigation Managers (KAMM)** - kyem.ky.gov/assistance/hazardmitigation/kamm.htm

  The Kentucky Association of Mitigation Managers (KAMM) was formed in order to promote floodplain management and mitigation in Kentucky. Its members represent local floodplain coordinators, planning and zoning officials, engineers, surveyors, GIS specialists, hydrologists, and emergency managers. In 2010, KAMM helped the KSA in hosting the first annual KSA conference. KAMM is currently promoting the use of green

infrastructure to assist with other flood control practices. NPS provides annual updates on Watershed Planning activities and priority watershed planning areas to KAMM and often participates in annual meetings with the organization.

- **Kentucky Erosion Prevention and Sediment Control (KEPSC) training** - www.kyt2.com/training/program/ky-erosion-prevention-sediment-control-kepsc

  The Kentucky Erosion Prevention and Sediment Control (KEPSC) program was developed in 2006 through a cooperative agreement between the Kentucky Transportation Cabinet and the Kentucky MS4 Workgroup. It is managed by the University of Kentucky's Transportation Center in the Technology Transfer Program. This program has built upon the previously 319(h) funded Erosion Prevention and Sediment Control workshops. KEPSC is designed to offer introductory knowledge as well as assist developers, contractors and government agencies in complying with the Kentucky Pollutant Discharge Elimination System (KPDES) General Permit for Construction.

- **Kentucky Stormwater Association (KSA)** - http://kystormwater.org

  The Kentucky Stormwater Association (KSA) is a nonprofit group made up of MS4 communities throughout the Commonwealth. The organization was formed in 2009 from a loose affiliation of communities known as the Kentucky MS4 Workgroup. The purpose of the group is to train MS4 communities and coordinate communication with the communities and state regulators. The KSA routinely coordinates with DOW regarding current and pending regulations and is working with DOW to secure funding to support its education and outreach mission. The KSA annually hosts three regional training meetings and statewide training conferences.

  Nonpoint Source Program staff are working with KSA to train volunteers for water quality monitoring in the MS4 areas and conducting Project WET workshops that will provide the communities with resources for their education and outreach efforts. Staff members also participate in the stormwater workgroup to review and provide input on the Phase II Stormwater permit.

6.2.7 Education and Outreach

Education and outreach efforts are fundamental aspects in engaging citizens and communities to understand their impacts and change their behaviors. There are a number of organizations and tools listed below that are available to assist with education and outreach efforts in developed areas. Some communities in Kentucky are taking the initiative and bringing best management practices for developed lands to the schools, educating children about the importance of water stewardship at an early age (see Figure 6.3). Listed below are general educational resources for developed lands and specific resources targeted to regulatory programs and green infrastructure. Please see Section 15 of the full NPS Management Plan for more information on education and outreach efforts and water education resources.

Figure 6.2. Rain garden installation at Turkeyfoot Middle School in Kenton County, Kentucky.

Urban/Developed Lands

The following programs provide general urban and stormwater educational materials and tools for a variety of audiences. These resources can be used for large cities as well as smaller communities.

- **Center for Watershed Protection** - www.cwp.org

  The Center for Watershed Protection is a nonprofit organization that creates viable solutions and partners for responsible land and water management. Their website contains a number of education and outreach tools for communities across the nation.

- **Kentucky Wet Growth Tools for Sustainable Development: A Handbook on Land Use and Water for Kentucky Communities** - https://www.hudexchange.info/resource/4608/kentucky-wet-growth-tools-for-sustainable-development-a-handbook-on-land-use-and-water-for-kentucky-communities/

The Kentucky Wet Growth Tools for Sustainable Development handbook was developed by the Center for Land Use and Environmental Responsibility at the University of Louisville. It provides a variety of tools for cities, counties, multi-stakeholder groups, watershed groups, and other interested members of the public to manage or control growth and development for water resource protection. The handbook identifies the impacts of land use on water quality, water supplies, and the overall health and functioning of watersheds on which all communities, and all life, depend. It provides extensive tools and resources for local communities to use to achieve "wet growth", land use and development that is sustainable with respect to water. These include a variety of methods, such as low-impact development, water conservation, green infrastructure, smart growth, land conservation, and the restoration, remediation, and re-use of land. They also include a variety of tools, including planning, regulation, incentives and market-based tools, private initiatives, public infrastructure, impact assessment, public participation and multi-stakeholder involvement, and public education and engagement. Finally, the handbook's appendices include the Center for Watershed Protections Codes & Ordinances Worksheet to help localities to evaluate their local regulations, and examples of ordinances, regulations, and other legal documents from many communities throughout Kentucky and the US. The handbook can be downloaded in PDF format.

- **US EPA Urban Waters** - www.epa.gov/urbanwaters

  This site provides information regarding US EPA's Urban Waters program. It presents resources for connecting communities and programs to assist with urban water quality efforts.

- **US EPA Nonpoint Source Pollution in Urban Areas** - www.epa.gov/nps/nonpoint-source-urban-areas

  The EPA Nonpoint Source Pollution in Urban Areas resource provides a wide range of assets pertaining to urban nonpoint source pollution. Links to fact sheets, guidance documents and research studies relating to urban areas can be found on this website.

Stormwater/MS4

The following programs provide stormwater educational materials and tools for MS4 communities. These resources can also be used by non-MS4 communities interested in managing their stormwater runoff.

- **Kentucky Stormwater** - stormwater.ky.gov

  This site, developed and maintained by the Kentucky Transportation Cabinet, provides a number of education and outreach resources for Kentucky. This material is targeted to Kentucky communities and educational tools along with announcements for stormwater events, trainings and workshops.

- **MS4 Program** - https://www.epa.gov/npdes/stormwater-discharges-municipal-sources

This site contains links to multiple resources for MS4 communities. US EPA provides an overview of the MS4 program at the national level and specific information regarding the six minimum control measures for MS4 communities.

- **National Menu of Stormwater BMPs** - https://www.epa.gov/npdes/national-menu-best-management-practices-bmps-stormwater#edu

  US EPA hosts the National Menu of Stormwater BMPs within its NPDES pages. This site contains a menu of BMPs based on the Stormwater Phase II Rule's six minimum control measures. It also contains a link to US EPA's Urban BMP Performance Tool which contains performance information for over 275 BMPs.

Construction

The following are educational materials and tools for controlling stormwater on construction sites. These materials are useful for construction site operators and inspectors.

- **Kentucky Erosion Prevention and Sediment Control Field Guide** - www.epa.gov/sites/production/files/2015-11/documents/esc_guide_0.pdf

  This helpful field guide provides instruction on how to properly install and maintain BMPs on a construction site.

- **Kentucky Erosion Prevention and Sediment Control Technical Manual** - dep.ky.gov/formslibrary/Documents/09BMPManual_Final.pdf This technical manual contains information on BMPs for construction sites. It was developed to help engineers, landscape architects, developers, construction managers, and others plan and implement measures that reduce water quality impacts from construction sites.

- **Stormwater Discharges from Construction Activities** - www.epa.gov/npdes/stormwater-discharges-construction-activities

  US EPA provides an overview of the construction regulations and offers a number of educational resources. Additionally, US EPA proposed effluent limits and rulemaking documents can be found at this site.

SSO/CSO

The following are educational materials and tools for SSO and CSO communities. The materials range from general education regarding these issues to more specific tools that can be used by these communities for addressing requirements.

- **Combined Sewer Overflows** - www.epa.gov/npdes/combined-sewer-overflows-csos US EPA provides general information on CSOs and a number of educational documents. Information regarding US EPA's CSO Control Policy is included as well.

- **Sanitary Sewer Overflows and Peak Flows** - www.epa.gov/npdes/sanitary-sewer-overflows-ssos

  This site provides general information on SSOs and a number of educational documents. It also contains specific case studies of SSO communities.

- **Sanitary Sewer Overflow Toolbox** - www3.epa.gov/region1/sso/toolbox.html

  US EPA hosts a number of tools to help municipalities and states implement SSO requirements in an effective and cost-efficient manner.

6.2.8 Green Infrastructure

Green infrastructure is an approach to stormwater management that utilizes nature's capacity to reduce stormwater runoff and improve water quality. The sites below provide both national and Kentucky specific information about green infrastructure. These sites have beneficial information for regulated and non-regulated communities about green infrastructure practices, installation and maintenance costs, and performance measures.

- **Green Infrastructure** - www.epa.gov/green-infrastructure

  This US EPA site contains a wide array of information regarding Green Infrastructure for multiple audiences. This resource is a great one-stop-shop for all things about green infrastructure.

- **KAMM Green Infrastructure Resources** - www.kymitigation.org/green-infrastructure-info/

  The Kentucky Association of Mitigation Managers (KAMM) has generated this resource to help communities incorporate green infrastructure into community infrastructure projects to reduce flooding, clean and conserve water, and provide recreational benefits to the public.

6.2.9 Funding

Funding is often a major barrier for communities addressing impacts from developed lands. The following provides information about funding resources available for stormwater related projects. Many of these sites are updated as funding becomes available; therefore it is important to check these locations on a regular basis.

- **319(h) NPS Grants** - https://eec.ky.gov/Environmental-Protection/Water/Protection/Pages/Section-319(h)-Grant-Program-Funding.aspx

  319(h) is the section of the CWA dealing with nonpoint source pollution. Each year DOW applies to US EPA to receive 319(h) funding. DOW distributes a majority of the monies received through a competitive grant award process to communities, citizen groups, and organizations throughout Kentucky. This funding may not be used to address permit requirements. However, it can be used to address stormwater issues outside of the permit requirements. To find out more about the 319(h) grant process, please visit the DOW website.

- **Clean Water State Revolving Fund (SRF)** - https://eec.ky.gov/Environmental-Protection/Water/Funding/CWSRF/Pages/default.aspx

  The SRF is a low-interest loan program for planning, design, and construction of wastewater infrastructure projects, stormwater projects, and nonpoint source projects. This funding is available for communities throughout Kentucky.

- **DOW Funding Information** - https://eec.ky.gov/Environmental-Protection/Water/Funding/Pages/default.aspx

  This site provides links to funding for water related projects from a variety of sources.

- **US EPA Green Infrastructure** - www.epa.gov/green-infrastructure/green-infrastructure-funding-opportunities

  US EPA provides a number of funding resources for green infrastructure projects. Some resources are for specific areas of the country while others are available nationally.

6.3 Objectives and Action Items

The Kentucky Division of Water endeavors to reduce nonpoint source pollution across the Commonwealth. To achieve the stated goal of restoring nonpoint source impaired waters in Kentucky, DOW has developed an objective and three action items related to NPS from developed lands.

Long Term Goal 1: Restore Nonpoint Source Impaired Waters

Objective 6: Decrease input of pollutants from developed lands.

Action 1: Provide financial and technical support for the implementation of green infrastructure (GI), low-impact-development (LID), and stormwater management BMPs.

Action 2: Coordinate with Kentucky Emergency Management to incorporate GI, LID, and/or stormwater management BMPs that address nonpoint source pollution into the State Hazard Mitigation Plan.

Action 3: Support Kentucky's MS4 program.

See Appendix B for a complete list of Kentucky's NPS Pollution Program goals, objectives, activities and tracking measures with anticipated completion time frames.

7. Forestry

7.1 Summary

Forests are an important natural resource in the state of Kentucky. An estimated 49% of Kentucky, or roughly 12.5 million acres, is covered by forests. While the size of the total forest coverage varies year-to-year, there has been a net loss of 780,000-forested acres over the past 15 years. Maintaining and managing healthy forests within the state is important because of the many benefits forests provide. Healthy forests provide clean air and water, fish and wildlife habitat, outdoor recreation, carbon sequestration, and natural beauty. Then there are the economic benefits. The forest industry employs approximately 30,000 Kentuckians and the United States Forest Service (USFS) has estimated the total economic importance of Kentucky's forests at nearly $8.7 billion annually. Private individuals own the majority of Kentucky's forests, totaling 88.3%. The USFS is the second largest land manager in the Commonwealth responsible for 6.4% of the land area (See Figure 7.1) (Third Rock, 2010).

The forests of Kentucky represent one of the most diverse mixes of hardwood species in the nation, second only to Florida. At least 75% of the Commonwealth's forested land, or roughly 9.3 million acres, is composed of oak-hickory species. Due to the composition, Kentucky ranks third nationally in hardwood production (Third Rock, 2010).

7.2 DOW Strategy

The Kentucky Nonpoint Source Pollution Control Program (NPS Program) has developed various approaches to encourage and promote healthy forests and watersheds within the state. The goal is to preserve the critical ecosystem functions that forests provide and to reduce the nonpoint source (NPS) pollution resulting from forest related activities. The natural processes of a forest work to improve water quality and quantity by providing such functions as stream bank stabilization, reduction of soil erosion and runoff of excess nutrients, shading of streams, increasing groundwater recharge, slowing the water velocity, and providing habitat and food for aquatic organisms.

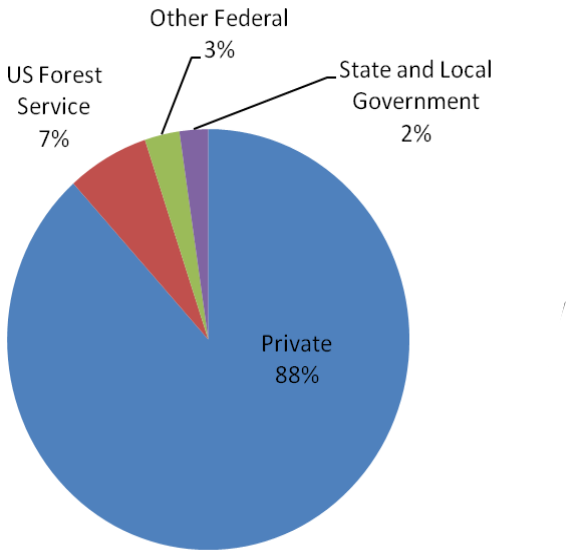


Figure 7.1. Ownership of Kentucky Forests.

The Kentucky Statewide Assessment of Forest Resources and Strategy, written by Third Rock Consultants and released in June 2010 by the Kentucky Division of Forestry (KDF), revealed that water quality/quantity was the second most important issue facing Kentucky's forest resources according to a statewide survey of the citizens of the Commonwealth. The loss of forested areas has impacts on Kentucky's streams. Approximately 58% of the Commonwealth's streams

and rivers that have been assessed were found to be impaired (DOW, 2016). One of the primary causes of impairment was related to habitat changes. The loss of forest cover in a stream's riparian zone, such as that pictured in Figure 7.2, was frequently the direct or indirect cause of stream impairment. Maintaining forested riparian zones is a key way to protect Kentucky's water bodies. Watersheds surrounding Special Use Waters have a mean percent forested area of 65% to 97.7% (Third Rock, 2010).

Figure 7.2. Forest covered mountain stream at Buckhorn State Resort Park. Photo © Michelle Shane, 2011.

The Kentucky Division of Water (DOW) goal is to reduce NPS pollution resulting from forest related activities and to protect and improve forests and water quality. Strategies used to achieve this goal include working with partners, education and outreach, providing 319(h) grants to NPS pollution control forestry projects, and offering assistance on developing guidelines and regulations that deal with forests and water quality issues. The DOW works with the Forest Conservation Act Best Management Practices Review Board, which is a sub-committee of the Agriculture Water Quality Authority, to set minimum best management practices to be utilized by loggers for their timber harvesting operations. Additionally, the DOW responds to requests from the KDF to assess potential violations of the Clean Water Act (CWA) on active and historical logging sites. The DOW also works to provide current information to the KDF and UK Forestry Extension regarding the location of Designated Use Waters.

7.2.1 Partner Strategy

Partnerships are crucial to the DOW forestry management and protection strategy. This work is primarily undertaken by the Division through non-regulatory means such as committee participation, information sharing, and participation in education/outreach programs. The Kentucky Division of Forestry is primarily responsible for the regulatory oversight of timber harvesting operations, but the DOW becomes involved when water quality violations are observed. Both agencies are partners in the Agriculture Water Quality Authority and provide technical expertise regarding forestry related BMPs. The Division of Water also partners with the USFS in implementation of protection plans in the Daniel Boone National Forest. In addition, the Division of Water will continue to partner with the Forest Conservation Act BMP Board, developing educational and technical support for Act BMP implementation.

The following is a brief description of the primary partners working with the DOW and within the state on forestry issues that impact NPS pollution. Many of the partners provide direct support in the form of funding for forest management and additional conservation programs.

- **Bernheim Arboretum and Research Forest** - www.bernheim.org

  The Bernheim Arboretum and Research Forest is a nonprofit organization that provides education on natural resources to the public. Their mission is to promote interest in the outdoors by "providing ample opportunities for quiet, personal experiences with the outdoors". The organization seeks to inspire outdoor enthusiasts with natural history programs and exhibits, art and cultural activities, and thorough research in horticulture, natural areas management, and habitat restoration.

- **Daniel Boone National Forest, US Forest Service** - www.fs.fed.us/r8/boone

  The Daniel Boone National Forest is comprised of approximately 707,000 acres, mostly in the eastern half of the state. The forest was established in 1937 and extends over 21 counties. The USFS offices are located in Winchester and in Cumberland, London, Stearns, and Redbird. The forest is managed for a variety of uses including recreation, timber, wildlife, fish, minerals, wilderness, and water quality. The Division of Water and the Daniel Boone National Forest have an active Memorandum of Understanding to work cooperatively toward the assessment, protection, and restoration of waterways on USFS land.

- **Forest Conservation Act BMP Board** - forestry.ky.gov/KentuckyMasterLoggerProgram/Pages/KentuckyForestConservationAct.aspx

  In 1998, the Kentucky General Assembly passed KRS 149.330 to 149.355, known as the Kentucky Forest Conservation Act (KFCA). The act places the primary responsibility for good logging practices on loggers, however private forest owners should also be aware of the law. It places the KDF as the primary agency responsible for inspection and enforcement of the act and for the master logger program. Preservation of water quality is one of the most important aspects of the KFCA. The KFCA requires loggers to use BMPs during tree harvesting and to correct any damage to land and water. It also requires that a master logger be on-site at all commercial logging operations. Landowners should be aware of the BMPs and water quality concerns related to forestry operations as part of their requirements under the Agriculture Water Quality Act (KRS 224.71-100 to 224.71-140), which includes activities such as timber harvesting.

  The Division of Water is an active participant with the KFCA BMP Board meetings and timber harvesting BMP training. Nonpoint Source Program staff attend meetings, and provide technical information on water quality issues for the Board on an as needed basis. Changes proposed by the KFCA BMP Board are reviewed and approved by the Agriculture Water Quality Authority and the KY Division of Water in order to become final.

- **Kentucky Division of Forestry** - forestry.ky.gov/Pages/default.aspx

  The KDF is responsible for enforcing compliance with the Forest Conservation Act. The KDF works with private landowners to help them develop forest management plans and also with loggers to provide current and practical educational courses on BMPs. When appropriate, the KDF seeks input and technical guidance from the DOW on changing developments within the forest industry.

  The agency administers the Forest Stewardship Program for nonindustrial private forest landowners. This free program is available to all private forest landowners who want to enhance the natural resources of their property by providing better wildlife habitat and clean water. The KDF works with a landowner to determine priority land uses. Depending on the landowner's goals for the property, the KDF will create a management plan or arrange for a wildlife biologist and other natural resources professionals to provide assistance.

  The KDF is a participant in the Kentucky Interagency Groundwater Monitoring Network.

- **Kentucky Natural Lands Trust (KNLT)** - www.knlt.org

  The Kentucky Natural Lands Trust is a statewide land trust established in 1995. The purpose of the organization is to preserve and restore wildlands in Kentucky. The trust works with private landowners in project areas who are interested in developing sustainable forestry management plans or want to preserve forestland. The following are current projects the trust is working on:

  - The Pine Mountain Wildlands Corridor Project is working to connect existing protected areas on Pine Mountain to form a contiguous forested migratory corridor from Virginia to Tennessee, a distance of nearly 125 miles. Large forest tracts are extremely important for the survival of many different plants and animals, as well as, to the health of the forest itself. KNLT partners with state, federal and nonprofit partners to identify those areas most in need of protection, negotiates the purchase of land with willing sellers, and implements a stewardship plan.
  - The Blanton Forest Project preserves and protects more than 3,000 acres of old growth forest and buffer lands on Pine Mountain in Harlan County, Kentucky.
  - The Fort Knox-Bernheim Wildlife Corridor Project consists of conservation easements in a one mile buffer zone around the military base with the goal of creating a wildlife corridor connecting Ft. Knox with Bernheim Arboretum and Research Forest. This project grew out of a partnership between KNLT, Bernheim and the Department of Defense. KNLT agreed to help negotiate and hold conservation easements with landowners within the one-mile border around Fort Knox. Army Compatible Use Buffer (ACUB) funding enabled KNLT to acquire two conservation easements and one tract of land. The U.S. Department of Defense established ACUB in an effort to limit encroachments around army post that would disrupt or diminish training capabilities and to protect key natural habitats and ecological systems. KNLT continues to work with these partners to

explore conservation strategies aimed at protecting more of the corridor. Current efforts are focused on expanding Knobs State Forest & Wildlife Management Area, a 1,500-acre protected area within the corridor.

- The Imperiled Bat Conservation Fund was established in 2009 through a partnership between U.S. Fish and Wildlife Service (USFWS) Kentucky Ecological Services Field Office and KNLT. The IBCF is a multi-faceted fund that uses a combination of grant, mitigation, and federal discretionary funding to focus resources on bat, forest, and at-risk terrestrial species conservation in Kentucky. The fund is administered by KNLT with the assistance of the USFWS. Since 2011, KNLT has also managed a similar fund for the USFWS Tennessee Ecological Services Field Office.

- **Land Between the Lakes (LBL) National Recreation Area, US Forest Service** - **https://www.landbetweenthelakes.us/**

  The inland peninsula was formed when the Cumberland and Tennessee Rivers were dammed. In 1963, President John F. Kennedy designated the peninsula Land Between The Lakes National Recreation Area in an effort to demonstrate how an area with limited timber, agricultural, and industrial resources could be converted into a recreation asset that would stimulate economic growth in the region. LBL has more than 170,000 acres and 300 miles of undeveloped shoreline, with a wide range of outdoor recreation opportunities.

- **Natural Resources Conservation Services (NRCS)** - www.ky.nrcs.usda.gov

  The NRCS provides assistance to landowners in Southeastern Kentucky in restoring and protecting forestland. Objectives of the Healthy Forests Reserve Program are to promote the recovery of endangered and threatened species, improve plant and animal biodiversity, and enhance carbon sequestration. The program works by enrolling voluntary landowners in either permanent or 30 year easements. Landowners are compensated for the easement and must implement a forest management plan.

  A second NRCS program that provides support to nonindustrial forest landowners is the Conservation Stewardship Program (CSP). The conservation program encourages sustainability by providing financial and technical assistance to eligible landowners to conserve and enhance soil, water, air, and related natural resources on their land.

- **Northern Kentucky Urban and Community Forestry Council** - www.nkyurbanforestry.org

  The nonprofit Northern Kentucky Urban and Community Forestry Council works to promote and build healthy communities by preserving and enhancing urban forests. The council provides forestry related information to the public, promotes urban forestry practices, techniques, education, and the creation of public policy aimed at protecting urban forests. The organization offers advice and assistance with urban forestry planning. Education and outreach is one of the organization's primary strategies.

- **The Nature Conservancy (TNC)** - https://www.nature.org/en-us/about-us/where-we-work/united-states/kentucky/

The Nature Conservancy (TNC) TNC is a national nonprofit conservation organization with an active program in Kentucky. The organization has protected more than 45,000 acres in the Commonwealth and there are currently forty preserves owned and managed by TNC. TNC works with state and federal agencies to share information and target potential areas in need of restoration or preservation.

- **University of Kentucky Department of Forestry** - www.ca.uk.edu/forestry

  The UK Department of Forestry works closely with KDF. The Department of Forestry is part of the university's College of Agriculture, which manages the cooperative extension program throughout the state. The forestry extension program is run with cooperation from KDF. Faculty within the Department of Forestry frequently consult with state and federal agencies on issues related to forests management and serve as a valuable source of information on current research and changes within the forest industry.

  The KY Division of Forestry and UK Department of Forestry also work cooperatively to administer the Forest Conservation Act BMP Board and Kentucky Master Logger program. Master Logger is an education program designed to train loggers on the proper implementation and utility of the Forest Conservation Act BMPs. Every timber harvesting operation in the state must have a certified Master Logger on site during operation. To receive a KY Master Logger certification, Loggers must attend the introductory three-day course, and they must attend continuing education classes to maintain their certification.

- **Wild Rivers Program** -

  https://eec.ky.gov/Nature-Preserves/conserving_natural_areas/wild-rivers/Pages/default.aspx

  In 1972, the Kentucky Wild Rivers Act established the Wild Rivers Program which is administered by the Office of Kentucky Nature Preserves. The program is intended to preserve pristine rivers throughout the state. Portions of nine rivers of exceptional quality and aesthetic character have been designated as Kentucky Wild Rivers. Each Wild River is actually a linear corridor encompassing all visible land on each side of the river up to a distance of 2,000 feet. The nine Wild River corridors comprise a total of 114 river miles and 26,382 acres of land. Activities that are strictly prohibited within a Wild River corridor include surface mining, clear-cutting of timber and construction of dams or other in-stream disturbances. Activities that might impair the river's water quality or natural condition are regulated through a permit system.

7.2.2 Education and Outreach

There has been a considerable effort by partners over the past several years to improve education and outreach regarding forestry issues in Kentucky. The primary messages being conveyed are related to scientific and sustainable land management, which includes an emphasis on water quality issues related to timber harvesting. There are a number of organizations actively engaged in providing technical assistance and management tools to forest landowners, loggers, and the general public that will aid them in reaching their individual management goals. Listed below are general educational resources regarding forestry issues

specific resources targeted to regulatory programs that impact the forest industry. Please see Section 15: Education and Outreach of the full NPS Management Plan for more information on other water education resources.

- **Mountain Association for Community Economic Development (MACED)** - www.maced.org

  MACED is a nonprofit organization that seeks to improve Appalachian communities by building stronger economies. As part of the overall strategy, MACED also works to provide information on the importance of properly managing natural resources for continued sustainability. Kentucky counties within the Eastern Appalachian region of the Commonwealth are some of the most heavily forested. MACED has been involved in forest related issues since 1979.

- **Project Learning Tree (PLT)** - https://www.plt.org/network/kentucky/

  The Project Learning Tree is an award-winning environmental education program designed for teachers and other educators, parents, and community leaders working with youth from preschool through grade 12. The PLT uses the forest as a "window" on the world to increase students' understanding of our environment; stimulate students' critical and creative thinking; develop students' ability to make informed decisions on environmental issues; and instill in students the commitment to take responsible action on behalf of the environment. The organization's service-learning programs, like GreenWorks! and GreenSchools!, provide powerful teaching opportunities to engage students in meaningful service through a process carefully integrated with learning objectives. In Kentucky, the PLT is hosted by The Kentucky Association for Environmental Education.

- **University of Kentucky Cooperative Extension Forestry Program** - www.ca.uky.edu/forestryextension/whatsextension.php

  The following is a program conducted by the UK Cooperative Extension program.

  - **Master Logger Program** - forestry.ky.gov/KentuckyMasterLoggerProgram/Pages/default.aspx

    The Kentucky Master Logger Program teaches logging and best management practices. In order to receive certification, loggers must complete a three-day course to receive their card and complete six hours of continuing education every three years to maintain their master logger status. The program was developed following the passage of the Kentucky Forest Conservation Act, which regulates all commercial loggers and requires the use of BMPs that help protect water quality.

7.2.3 Funding

The expense of forestry BMPs is often cost prohibitive to landowners. There are many times when landowners want to make improvements on their land to better water quality, but they just cannot afford the out-of-pocket expenses. The good news is that there are multiple programs and grant opportunities offering funding to landowners to help pay for BMP

improvements and for reducing total project costs for the landowner. Below are some of the programs that offer funding opportunities to landowners willing to make a positive difference with nonpoint source pollution control.

- **319(h) NPS Grants** - https://eec.ky.gov/Environmental-Protection/Water/Protection/Pages/Section-319(h)-Grant-Program-Funding.aspx

  319(h) is the section of the Clean Water Act dealing with nonpoint source pollution. Each year, the DOW applies to the EPA to receive 319(h) funding. The DOW distributes a majority of the monies received through a competitive grant award process to communities, citizen groups, and organizations throughout Kentucky. Historically, these funds have been utilized in part for statewide or regional education projects, as well as statewide forestry program development efforts by government agencies and universities. Individual landowners who are seeking funding for timber stand improvement, forest management plan development, or haul road construction will need to seek NRCS funding for those and other forest land management activities. To find out more about the 319(h) grant process, please visit the DOW website or see Appendix A.

- **Kentucky State Cost Share** - https://eec.ky.gov/Natural-Resources/Conservation/Pages/State-Cost-Share.aspx

  The Kentucky Soil Erosion and Water Quality Cost Share Program and the Kentucky Soil Stewardship Program were created to help agricultural and silvicultural operations protect the soil and water resources of Kentucky and to implement their Agriculture Water Quality Plans. The program helps landowners address existing soil erosion, water quality, and other environmental problems associated with their farming or woodland operation.

  The 1994 Kentucky General Assembly established this financial and technical assistance program. Kentucky Revised Statues 146.115 establishes that funds be administered by local conservation districts and the Kentucky Soil and Water Conservation Commission with priority given to animal waste related problems, agricultural district participants, and to producers who have their Agriculture Water Quality Plans on file with their local conservation districts. Funding comes from the Kentucky General Assembly through direct appropriations to the program from the Tobacco Settlement Funds and from funds provided by the Kentucky Department of Agriculture. Practices eligible for cost share include forest land erosion control systems and riparian area protection.

- **Kentucky Heritage Land Conservation Fund (KHLCF)** - https://eec.ky.gov/Nature-Preserves/conserving_natural_areas/KHLCF/Pages/heritage-land-conservation-fund.aspx

  The KHLCF provides funds to protect and preserve natural areas with unique value and qualities. The Office of Kentucky Nature Preserves administers this program and has used funds to acquire private land within or adjacent to designated Wild River corridors. Revenue for the fund comes from the nature license plate, the state portion of the un-mined minerals tax, and environmental fines. The Kentucky Environmental Education

Council (KEEC) receives $150,000 of environmental fines each year for environmental education programs. In addition to the Kentucky Wild Rivers Program, other agencies are allocated 10% portions of the funds, including the Kentucky Department of Fish and Wildlife Resources, the Kentucky Department of Parks, the Kentucky Division of Forestry, and the Office on Kentucky Nature Preserves. The remaining 50% of funds are allocated in a competitive process to local governments, state colleges and universities, and other state agencies.

- **Natural Resource Conservation Service (NRCS)**- www.nrcs.usda.gov

  The NRCS has offices in nearly every county across the United States. They work with communities to improve soil, water, air, plants, wildlife, and energy use. Their vision is to ensure productive lands in harmony with a healthy environment. They administer the Farm Bill programs including the Healthy Forest Reserve Program (HFRP), Conservation Reserve Program (CRP), the Environmental Quality Incentives Program (EQIP), and the Conservation Innovation Grants (CIG).

7.3 Objectives and Action Items

The Kentucky Division of Water endeavors to reduce the nonpoint source pollution impact from forestry activities across the Commonwealth. This work is primarily undertaken by the Division through non-regulatory means such as committee participation, information sharing, and participation in education/outreach programs. The KDF is primarily responsible for the regulatory oversight of timber harvesting operations, but the DOW becomes involved when water quality violations are observed. Both agencies are partners in the Agriculture Water Quality Authority and provide technical expertise regarding forestry related BMPs. The Division of Water also partners with the USFS in implementation of protection plans in the Daniel Boone National Forest. To achieve the stated goal of restoring nonpoint source impaired waters in Kentucky, the DOW has developed one objective and two actions related to NPS pollution from forestry activities.

Long Term Goal 1: Restore Nonpoint Source Impaired Waters.

Objective 7: Preserve the critical ecosystem functions which forestlands provide and reduce NPS pollution resulting from forestry related activities.

Action 1: Support watershed projects that focus on sustainable forestry management with water quality being the primary concern.

Action 2: Work with partners to protect and enhance forestlands for the purposes of protecting or restoring water quality, water supply, and aquatic habitat.

See Appendix B for a complete list of Kentucky's NPS Pollution Program goals, objectives, activities and tracking measures with anticipated completion time frames.

8. Groundwater

8.1 Summary

Groundwater is a vital resource for Kentucky. It provides drinking water for close to 2 million Kentuckians and is a source of water for agriculture and industry. Groundwater usage for agriculture, including irrigation and livestock watering, continues to rise throughout the state. Industrial and commercial processes and economic growth can be limited by the availability of usable water, and groundwater is often the source of this economically valuable water in the Commonwealth.

Groundwater that moves to the surface is also important as a recharge supply of water to sustain flow in many Kentucky streams during the drier summer months. Rocks such as limestone, that can be easily dissolved, lie beneath almost 50% of Kentucky. These rocks have the potential for karst aquifer development, and approximately 25% are well developed karst drainages. Groundwater in these karst regions is particularly susceptible to contamination from nonpoint source pollution. The karst landscape is characterized by sinkholes, crevices, caves, and underground streams. The rapid movement of water from the surface to the subsurface in these landscapes does not allow filtration of contaminants carried along with the water from the surface before entering the aquifer (DOW, 2010a). In addition, the branched nature of the drainage pattern of most karst systems will allow NPS pollutants to be gathered and concentrated from a large surface area and discharged at a single spring. Therefore, the Kentucky Division of Water (DOW) faces unique challenges in defining pollution sources and developing protective management practices for these sensitive regions. Figure 8.1 (previous page) is a map of the different groundwater sensitivity levels in Kentucky. This map and others

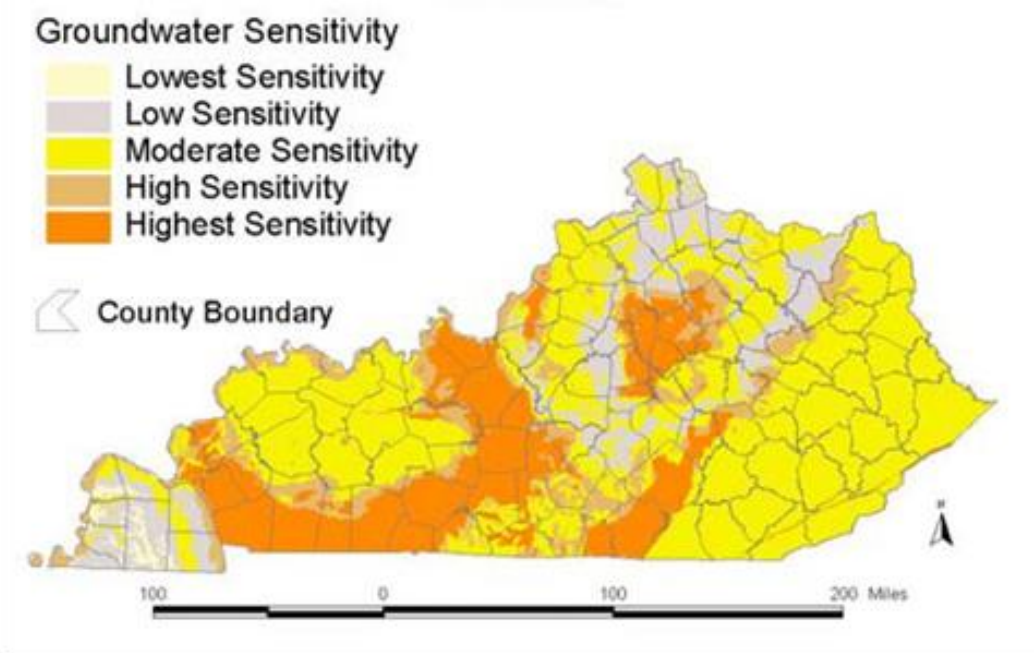


Figure 8.1. Groundwater sensitivity regions of Kentucky.

like it are available at the Kentucky Geological Survey at kgs.uky.edu/kgsmap/helpfiles/default_help.shtm.

The most extensive karst aquifers in Kentucky are in the Pennyroyal region, located in the Western part of the Commonwealth. Karst aquifers are also present, but less well developed, in the Inner Bluegrass region. The availability of groundwater in karst areas is highly variable and generally supports public and domestic drinking water supplies.

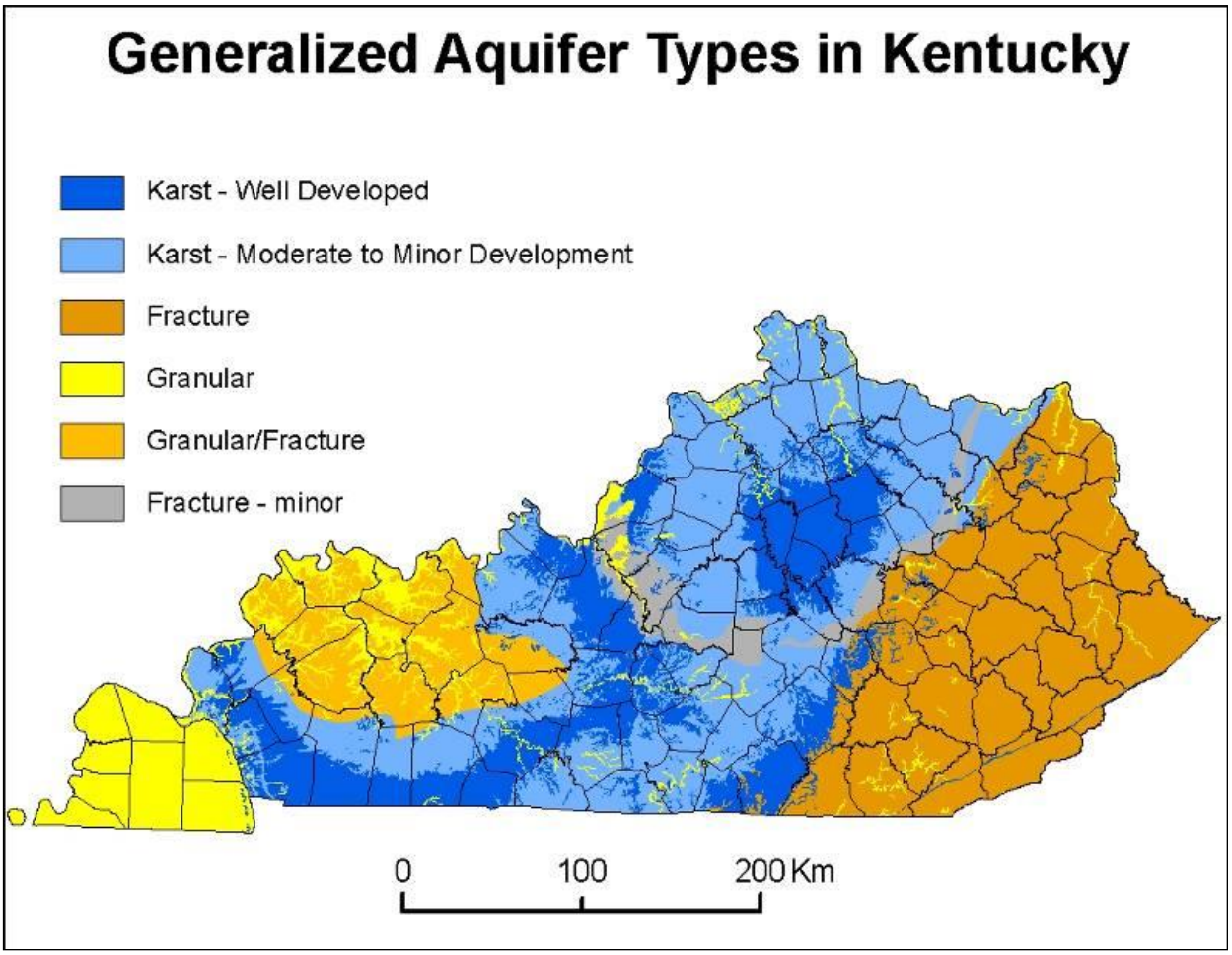


Figure 8.2. Generalized Aquifer Types in Kentucky.

Figure 8.2 is a generalized map of aquifer types in Kentucky based on geological units, although local variation may exist. Fractured aquifers in sandstone, shale, and limestone rocks provide significant groundwater resources. The greatest occurrence and usage of these aquifers occurs in the Eastern and Western Coal Fields of Kentucky. Water wells for public and domestic drinking water supplies are very common, especially in Eastern Kentucky. For these aquifers, recharge typically occurs by means of percolation through the overlying soils, which provides considerable filtration.

Granular aquifers are present in river valleys throughout the Commonwealth and occur in some of the deeper sandstone units of Western Kentucky. Perhaps the most widely used is the Ohio River Alluvium Aquifer, which supports numerous water wells used for drinking water and industrial supplies. Additionally, shallow sand and gravel aquifers in far Western Kentucky provide groundwater sources for public and domestic drinking water and agricultural water supplies. Groundwater flow velocities in some of these shallow granular aquifers can be especially fast, which can leave them more vulnerable to contamination. As with karst aquifers, there are unique challenges in developing protective management practices for these sensitive regions.

These descriptions are highly generalized. On a local, or site-specific, scale the aquifer(s) of interest may display more than one of the characteristics described above. Due to the diversity and variability of groundwater resources in Kentucky, no single strategy can adequately address all potential monitoring, assessment, and protection requirements. Therefore, numerous programs have been developed to manage this resource.

8.2 DOW Strategy

Protecting the Commonwealth's groundwater resources is essential to ensuring a sustainable and secure future for citizens and businesses that rely on groundwater for their water needs. While currently there are no groundwater priority protection areas designated in the state, many watershed planning areas and priority watersheds are located in karst prone areas where groundwater is a concern. NPS staff personnel consult with DOW Groundwater Section personnel to be sure that groundwater issues are addressed in all watershed planning efforts.

The DOW Groundwater Section manages multiple programs to monitor and protect this valuable resource. The mission of the DOW Groundwater Section is to develop, establish, and implement a comprehensive groundwater program that manages, enhances, and protects the groundwater resources of the Commonwealth for present and future generations. These goals are primarily achieved through the development of regulations, implementation of Best Management Practices (BMP), technical assistance, educational outreach, groundwater studies, ambient monitoring, resource management, and data collection. The programs related to these activities and initiatives are:

- **Ambient Groundwater Monitoring Programs** - https://eec.ky.gov/Environmental-Protection/Water/GW/Pages/GWMonitor.aspx

  The Groundwater Section coordinates groundwater quality monitoring and quantity assessment through various programs. The DOW initiated systematic groundwater monitoring in 1995; prior to this there was no statewide effort to characterize the resource. Through coordination with other state and federal agencies, the Interagency Technical Advisory Committee (ITAC) on groundwater was formed. Legislation passed in 1998 (KRS 151.625; 151.629 and 151.035) formalized the ITAC, established the ambient groundwater monitoring program, and made the Kentucky Geological Survey the official repository for Kentucky's groundwater data. In addition to the Ambient Groundwater Monitoring Program, the Groundwater Section also monitors groundwater quality

through a Memorandum of Agreement with the Kentucky Department of Agriculture. These groundwater source sites are focused in high-intensity agricultural areas of the Commonwealth. The Groundwater Section conducts numerous NPS assessments of groundwater resources throughout the state. These projects include reconnaissance of groundwater sources, water quality assessments, and aquifer mapping in karst regions.

- **Complaints and Technical Assistance** - https://eec.ky.gov/Environmental-Protection/Water/GW/Pages/GWAssist.aspx

  The Groundwater Section responds to groundwater complaints, provides technical assistance, and conducts groundwater investigations as requested by the public, regulated community, local, state, and federal governments.

- **Geothermal Energy Initiatives** - https://eec.ky.gov/Environmental-Protection/Water/GW/Pages/GWAssist.aspx

  The Groundwater Section provides technical assistance to geothermal installers through the development of BMPs for closed loop geothermal systems. The section also serves in an advisory role for drafting proposed statutes and regulations for construction and abandonment of closed loop vertical boreholes.

- **Groundwater Protection Plans (GPPs)** - https://eec.ky.gov/Environmental-Protection/Water/GW/Pages/GWGPP.aspx

  The Groundwater Protection Plan regulation 401 KAR 5:037 was promulgated in 1994 by the DOW to ensure protection for Kentucky's groundwater resources. Anyone engaged in activities that have the potential to pollute groundwater must develop and implement a Groundwater Protection Plan that identifies these activities at a facility and defines the Best Management Practices to be used to protect groundwater.

- **Underground Injection Control (UIC)** - https://www.epa.gov/uic

  The Underground Injection Control program in Kentucky is administered by the United States Environmental Agency (EPA) Region 4. Groundwater wells meeting this classification require a permit for operation through the EPA. The DOW Groundwater Section actively partners with the EPA in developing permit conditions for operating UIC wells in Kentucky. The DOW is serving in an advisory role for proposed guidelines for stormwater infiltration into the subsurface through green initiatives that require Class V injection well permits through the UIC program.

- **Well Drillers Certification Program** - https://eec.ky.gov/Environmental-Protection/Water/GW/Pages/GWDrillers.aspx

  The Technical Services staff of the DOW Groundwater Section coordinate the Well Drillers Certification Program for water well and monitoring well drillers in Kentucky. The Groundwater Section also fields questions regarding compliance with state well construction regulations and questions regarding problems with and maintenance of water wells and monitoring wells. In addition, section staff publish the Kentucky Driller Quarterly newsletter and maintain a current directory of certified water well drillers.

- **Wellhead Protection Program (WHPP)** - https://eec.ky.gov/Environmental-Protection/Water/GW/Pages/GWOwnerAssist.aspx

  Kentucky's Wellhead Protection Program was approved by the EPA in September 1993. Kentucky's WHPP is coordinated by the DOW and is regulated through the Water Supply Planning regulation 401 KAR 4:220. This regulation requires that counties develop county or regional water supply plans that assess the quantity of water used by their public water systems (PWSs) and formulate protection plans for the source waters used by those systems. The WHPP is designed to assist those communities relying on groundwater as their drinking water source to develop groundwater protection strategies. Currently, 114 public water systems that utilize groundwater must develop a WHPP plan. Kentucky's wellhead protection program is implemented at the local level using a five-step program: 1) forming a planning team; 2) delineating the wellhead or springhead protection area; 3) conducting a contaminant source inventory; 4) managing contaminant sources; and 5) contingency planning for the future. The DOW also provides technical assistance to nontransient/noncommunity, semi-regular use, systems and smaller community PWSs upon request.

8.2.1 Partner Strategy

Groundwater impacts are diverse and numerous across Kentucky. With so many Kentuckians depending upon clean groundwater as a source of drinking water and for agricultural and industrial uses, there is a clear need to identify threats and protect our valuable groundwater resources from contamination by nonpoint source pollutants. Kentucky Nonpoint Source staff work with the Groundwater staff in the Division to incorporate groundwater concerns into watershed plans and monitor Kentucky's waters for groundwater impacts from NPS pollutants. The Divisions of Forestry, Waste Management, Mining and Reclamation Enforcement, Oil and Gas, and Drinking Water all provide technical assistance in groundwater protection. In addition, the DOW partners with outside organizations to effectively address the complex issues of groundwater protection. These include partnership with Kentucky Geological Survey (KGS) who provide assistance with mapping wells in the state and track groundwater quality, the Kentucky Water Resources Research Institute (KWRRI). Partnerships with County Health departments have been key in addressing groundwater contamination from failing onsite wastewater systems.

The DOW is not able to address the impacts to groundwater from nonpoint source pollutants without these key partnerships. Below is a list of some of the organizations assisting with these efforts and the work they are performing throughout the Commonwealth:

- **County Health Departments** - https://chfs.ky.gov/agencies/dph/dafm/Pages/lhd.aspx

  Local health departments assist homeowners who use a well, spring, or cistern as a drinking water source. The health department will test the private water source for

bacteriological contamination, usually fecal coliform or *E. coli*, to determine if the water must be disinfected before use.

- **Kentucky Department of Agriculture (KDA)** - http://www.kyagr.com/

  The Agriculture Water Quality Act requires the development and implementation of a groundwater protection plan (GPP) to protect groundwater from farming activities that have the potential to pollute groundwater on farms greater than ten acres in size. Farms of less than ten acres are subject to GPP requirements as administered by the DOW.

- **Kentucky Division of Forestry (KDF)** - https://eec.ky.gov/Natural-Resources/Forestry/forest-stewardship-program-and-landowner-services/Pages/default.aspx

  The Kentucky Forest Conservation Act regulates all commercial loggers and requires a Kentucky Master Logger be on-site and in charge of the commercial logging operation (including horse logging), as well as requiring the use of BMPs during logging activities to prevent groundwater contamination.

- **Kentucky Division of Mining and Reclamation Enforcement (KDMRE) -** https://eec.ky.gov/Natural-Resources/Mining/Pages/default.aspx

  KDMRE assesses potential impacts to groundwater prior to mining permit issuance and conducts site-specific groundwater assessments related to alleged impacts from mining activities.

- **Kentucky Division of Oil and Gas -** https://eec.ky.gov/Natural-Resources/Oil-and-Gas/Pages/default.aspx

  Kentucky Division of Oil and Gas implements groundwater protection regulations and conducts site-specific groundwater assessments related to alleged impacts from oil and gas exploration and production activities.

- **Kentucky Division of Waste Management (KDWM)** - https://eec.ky.gov/Environmental-Protection/Waste/Pages/default.aspx
  - **Solid Waste Branch (SWB)** - https://eec.ky.gov/Environmental-Protection/Waste/solid-waste/Pages/default.aspx

    The Solid Waste Branch provides oversight of permitting, groundwater investigation, monitoring, and corrective action activities at active and inactive solid waste landfill sites, including contained, residual, special waste, greater-than-one-acre, and construction-demolition debris landfills, as well as land farming and composting facilities and registrations for permit-by-rule facilities.

  - **Superfund Branch** - https://eec.ky.gov/Environmental-Protection/Waste/superfund/Pages/default.aspx

The Superfund Branch provides oversight of any groundwater investigation and monitoring activities that may be required during cleanup and remedial actions at uncontrolled or abandoned hazardous waste contamination sites and non-underground storage tank related petroleum contamination sites. The branch also maintains priority lists of these sites that are available through an open records request.

- **Underground Storage Tank (UST) Branch** - https://eec.ky.gov/Environmental-Protection/Waste/underground-storage-tank/Pages/default.aspx

  The Underground Storage Tank Branch provides oversight of groundwater investigation, monitoring, and corrective action activities at active and inactive regulated underground storage tank sites. It also implements a compliance program to minimize releases and subsequent groundwater impacts from USTs.

- **The DOW Drinking Water Program** - https://eec.ky.gov/Environmental-Protection/Water/Drinking/Pages/Drinking%20Water.aspx

  The DOW regulates public water systems that obtain raw water from a groundwater source through implementation of the Groundwater Rule, and the performance of sanitary surveys and groundwater under the direct influence of surface water (GUDI) determinations of public groundwater systems.

- **Kentucky Geological Survey (KGS)** - www.uky.edu/KGS

  The USGS actively collaborates with numerous federal, state, local, and tribal partners to collect the unbiased information needed to understand the nation's water resources. The USGS provides access to water data, tools, publications, and maps, as well as to recent water projects and events.

- **Kentucky Rural Water Association (KRWA)** - www.krwa.org

  The KRWA was established in 1979 as a private, nonprofit organization and is a self-governed, member driven association. It is an affiliate of the National Rural Water Association. The KRWA provides on-site technical assistance to its member public water and wastewater systems. This assistance can take the form of circuit riders who assist a water system operator in solving operational problems, a leak detection program to help a water system find and correct water losses, assistance in establishing a WHPP, or other technical assistance.

- **Kentucky Water Resources Research Institute (KWRRI)** - https://www.research.uky.edu/kentucky-water-resources-research-institute

  The KWRRI coordinates the Interagency Technical Advisory Committee and facilitates the meetings. The institute also stimulates water resources and water-related environmental research and provides an annual forum for water related research presentations to allow networking and technology transfer among groundwater and water quality professionals.

- **United States Geological Survey (USGS)** - www.usgs.gov

The USGS implements an extensive network of collaborative efforts to understand the nation's water resources. Through diverse programs, the USGS collects hydrologic and water-quality information and provides access to water data, publications, and maps, as well as to recent water projects and events.

8.2.3 Education and Outreach

Many of the issues that lead to contamination of groundwater supplies are related to actions and processes that most people do not identify as harmful to groundwater. For this reason, it is an important part of Kentucky's protection and restoration strategy for the DOW to offer information and opportunities for learning, awareness, and involvement. This is accomplished through the following materials and activities supported by the DOW and our partners.

- **Generalized Geologic Maps for Land-Use Planning** - kgs.uky.edu/kgsweb/download/geology/landuse/lumaps.htm

  These county maps were developed by KGS to help non-geologists understand the geology of the places where they live, work and play, and to avoid damages from geologic hazards.

- **Kentucky Division of Forestry (KDF)** - https://eec.ky.gov/Natural-Resources/Forestry/forest-stewardship-program-and-landowner-services/Pages/default.aspx

  The KDF supports a variety of programs that provide education and information regarding the protective relationship between forests and groundwater.

- **The DOW Groundwater Awareness** - https://eec.ky.gov/Environmental-Protection/Water/GW/Pages/GWBasics.aspx

  Through a Frequently Asked Questions format, this website provides information and advice pertaining to groundwater in Kentucky, as well as links to other information resources.

- **The DOW Groundwater Section** - https://eec.ky.gov/Environmental-Protection/Water/GW/Pages/GWAssist.aspx

  The Groundwater Section regularly presents results of research projects and provides technical assistance and general groundwater training to professional conferences, other government agencies, private industry, and to in-house personnel. Educational outreach activities regularly include class presentations on general geology and environmental issues to elementary and middle school students.

- **Mountain Association for Community Economic Development (MACED)** - www.maced.org

  The MACED is a nonprofit organization that seeks to improve Appalachian communities by building stronger economies. The MACED works to provide information on the importance of properly managing natural resources, including groundwater, for continued sustainability.

- **National Groundwater Association (NGWA)** - www.ngwa.org

  The NGWA is a nonprofit organization composed of US and international groundwater professionals, including contractors, scientists and engineers, equipment manufacturers, and suppliers. Their purpose is to provide guidance to members, government representatives, and the public for sound scientific, economic and beneficial development, protection, and management of the world's groundwater resources.

- **University of Kentucky Cooperative Extension Forestry Program** - www.ca.uky.edu/forestryextension/whatsextension.php

  The UK Cooperative Extension program implements and supports several programs that provide educational opportunities and information sharing related to forestry and water quality, including groundwater.

8.2.4 Funding

Funding is often a major barrier for communities addressing impacts from developed lands. The following provides information about funding resources available for groundwater related projects. Many of these sites are updated as funding becomes available. Therefore, it is important to check these locations on a regular basis.

- **319(h) NPS Grants** - https://eec.ky.gov/Environmental-Protection/Water/Protection/Pages/Section-319(h)-Grant-Program-Funding.aspx

  The 319(h) is the section of the Clean Water Act dealing with nonpoint source pollution. Each year, the DOW applies to the EPA to receive 319(h) funding. The DOW distributes a majority of the monies received through a competitive grant award process to communities, citizen groups, and organizations throughout Kentucky. Groundwater education, groundwater protection BMPs, and watershed planning that includes groundwater in the holistic approach are all projects that are eligible for funding. To find out more about the 319(h) grant process, please visit the DOW website.

- **Kentucky State Cost Share -** https://eec.ky.gov/Natural-Resources/Conservation/Pages/State-Cost-Share.aspx

  The Kentucky Soil Erosion and Water Quality Cost Share Program and the Kentucky Soil Stewardship Program were created to help agricultural operations protect the soil and water resources of Kentucky and to implement their agriculture water quality plans. The program helps landowners address existing soil erosion, water quality, and other environmental problems associated with their farming or woodland operation.

  Practices eligible for cost share are animal waste control facilities, animal waste utilization, vegetative filter strips, sinkhole protection, heavy use area protection, rotational grazing system establishment, livestock stream crossing, and riparian area protection.

- **Natural Resource Conservation Service (NRCS)** - www.nrcs.usda.gov

The Natural Resource Conservation Service (NRCS) has offices in nearly every county across the United States. They work with communities to improve soil, water, air, plants, wildlife, and energy use. Their vision is to ensure productive lands in harmony with a healthy environment.

- **State Revolving Fund (SRF)** - **Clean Water State Revolving Fund (CWSRF)** - https://eec.ky.gov/Environmental-Protection/Water/Funding/CWSRF/Pages/default.aspx

  The Drinking Water State Revolving Fund (DWSRF) and the CWSRF programs can be important sources of financial assistance to help states and systems initiate a variety of efficiency measures and programs.

- **USGS Cooperative Water Program** - water.usgs.gov/coop/about

  The program is the Water Mission Area's "bottom-up, on-the-ground" program that is designed to bring local, State, and Tribal water science needs and decision-making together with USGS national capabilities related to USGS nationally consistent methods and quality assurance; innovative monitoring technology, models, and analysis tools; and robust data management and delivery systems. The CWP conducts studies in every State, protectorate, and territory of the U.S.

  The program provides the foundation for USGS strong and robust water monitoring networks (quantity and quality) and supports interpretative studies – about 700 annually – that cover a wide range of issues that are important to the USGS water mission and that inform local, State, and Tribal water decisions. (read more on Cooperative Water Science Priorities)

  Because data and analyses adhere to strict national protocols, findings are directly comparable across local, State, regional and national levels; water issues in a specific watershed, municipality, or State can be compared to those in other geographic regions and at different periods of time; and large-scale syntheses and problem-solving in different regions and across the Nation are possible.

8.3 Objectives and Action Items

The DOW endeavors to reduce nonpoint source pollution across the Commonwealth. To achieve the stated goal of restoring nonpoint source impaired waters in Kentucky, the DOW has developed one objective and 2 action items related to NPS pollution in groundwater.

Long Term Goal 1: Restore Nonpoint Source Impaired Waters.

Objective 8: Protect and monitor Kentucky's groundwater.

Action 1: Provide technical and/or financial support for the assessment of groundwater impacts from nonpoint source pollution.

Action 2: Provide technical and/or financial support for groundwater protection plans (GPP).

See Appendix B for a complete list of Kentucky's NPS Pollution Program goals, objectives, activities and tracking measures with anticipated completion time frames.

9. Onsite Wastewater Treatment

9.1 Summary

Addressing bacteria contamination in streams is one of the priority issues for the DOW. Failing or nonexistent onsite wastewater treatment systems are a major nonpoint source of this type of contamination. According to the 1990 US Census, 40% of the homes in Kentucky relied upon onsite sewage systems to treat wastewater. An additional 57,000 thousand homes did not have adequate plumbing, with many homes relying on straight pipes. According to the 2010 Census, 0.9% of Kentucky homes had incomplete plumbing. Inadequate wastewater treatment is especially problematic in Eastern Kentucky where the steep terrain and poor soil cover makes it difficult to install onsite systems. Figure 9.1 illustrates the extent of areas in the state with known public water distribution lines, contrasted with the portion of the state that also has public sewer service. This figure does not account for the additional populated areas of the Commonwealth served by well or other water supply sources. It can be assumed that areas of Kentucky with public water service and without public sewer service are utilizing some form of onsite wastewater treatment or straight pipe.

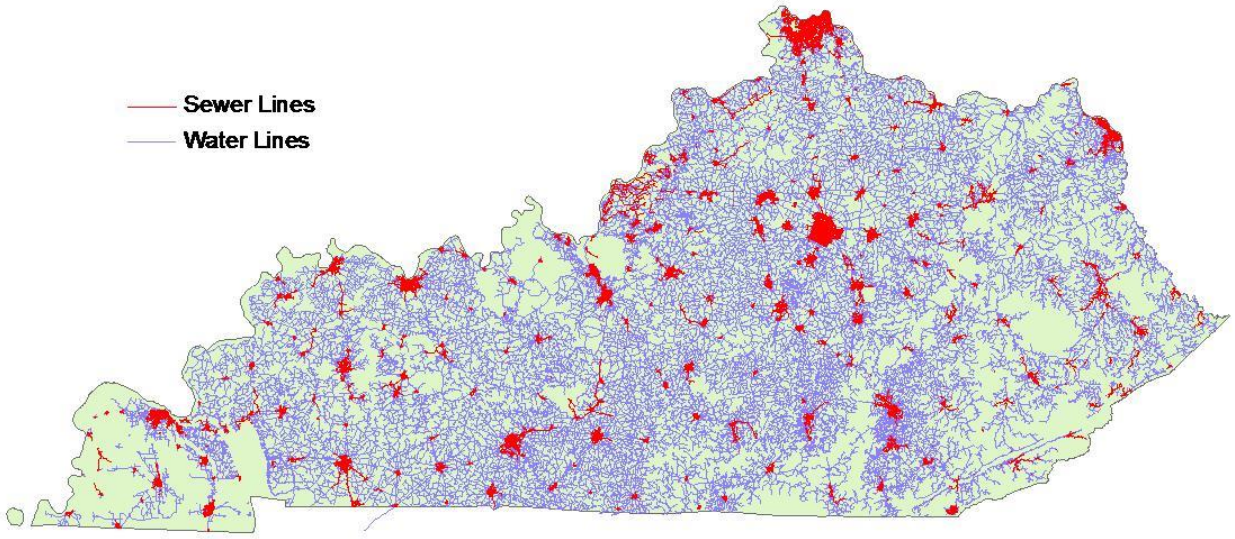


Figure 9.1. Sewer and water infrastructure in Kentucky.

The Kentucky Cabinet for Health and Family Services (CHFS) is the lead state agency for administering the Onsite Sewage Disposal Systems program. State regulation 902 KAR 10:081 establishes specific authority relative to onsite sewage disposal systems that have a subsurface discharge. The regulation requires certification of inspectors and installers of onsite sewage systems, adoption of regulations to carry out this authority, and other related matters.

9.2 DOW Strategy

The DOW's regulatory responsibilities include permitting package wastewater plants, issuing discharge permits for municipal and industrial facilities, as well as responding to complaints regarding straight pipe and onsite wastewater system dischargers to surface water.

The DOW's Watershed Management Branch strategy for onsite wastewater is to actively reduce pollution resulting from failing septic systems and straight pipes by working with organizations and agencies with similar goals, and through education and outreach. In addition, many 319(h) grant projects address pollution from failing septic systems and straight pipes or demonstrate new technologies for onsite wastewater treatment. Over the past few years septic education, repair, and replacement programs have gained popularity, and the Division is now exploring Homeowner Assistance Programs that help citizens tap on to new sewer lines where possible. The DOW also provides funding through the Clean Water State Revolving Fund (CWSRF), through which applicants may be selected to receive a low interest loan for an onsite wastewater treatment project.

9.2.1 Partner Strategy

Working with partners allows the DOW to begin to meet the vast needs for adequate onsite wastewater treatment across the Commonwealth. Many areas in Kentucky are unsuitable for public sewers and require onsite solutions. Additionally, there are many failing septic systems and straight pipes that continue to pollute Kentucky waterways. The DOW works with a variety of nonprofit groups and local health departments to abate known problems of failing septic systems. Regional and state agencies and organizations are critical partners in providing oversight and assistance for onsite systems. In particular the DOW will make efforts in increase the number of county health departments that are aware of funding opportunities through 319(h) grants, and increase involvement with organizations like the Great Lakes Rural Community Assistance Program (RCAP), to help address the issues associated with improper sewage treatment. DOW will continue to work with these groups to address pathogen impairments in prioritized watersheds. Additionally, the NPS program will work with the KPDES program to target inspections in areas of concern for pathogens.

Below is a list of some of the organizations assisting with these efforts and the work they are performing throughout the Commonwealth:

- **Community Action Kentucky (CAK)** - kaca.org

  Community Action Kentucky (CAK) represents twenty-three community action agencies that provide direct social services to Kentuckians with low and moderate incomes in all 120 Kentucky counties. Those agencies collectively manage a budget of $150 million and employ nearly 4,000 people, all engaged in the administration of programs to fight poverty in a comprehensive nature. The range of services these agencies provide varies with the needs of the individual communities as identified by a comprehensive community needs assessment process and includes:

  - Services for children, families and senior citizens - such as Head Start, Child Care, Family Preservation, Family Reunification, Meals on Wheels, Foster Grand Parents;

- Basic needs including energy assistance, housing, weatherization and other conservation programs, and emergency assistance; and
- Individual opportunity programs such as education, employment training and transportation.

- **County Health Departments** - chfs.ky.gov/agencies/dph/dafm/Pages/lhd.aspx

  Local health departments assist homeowners who use a well, spring or cistern as a drinking water source. The health department will test the private water source for bacteriological contamination, usually fecal coliform or *E. coli*, to determine if the water must be treated before use.

  The Nonpoint Source Program works with individual County Health Departments on a case-by-case basis where watershed plans are being implemented. The working relationship varies by project.

- **Great Lakes Rural Community Assistance Program (RCAP)** - www.glrcap.org

  The Rural Community Assistance Program (RCAP) began as a local demonstration project in Roanoke, Virginia in 1969, and has grown into a national network of nonprofit organizations that serve rural and Native American communities in all 50 states and Puerto Rico. RCAP works with communities to address their drinking water, wastewater treatment, and other community services and development needs.

  The Great Lakes RCAP was formed in 1980 and WSOS Community Action Commission in Fremont, Ohio serves as the regional management entity. WSOS delivers on-site community services directly within the state of Ohio, and partners with the following state community action associations to deliver service in six other states: Illinois Association of Community Action Agencies, Indiana Community Action Association, Community Action Kentucky, Michigan Community Action Agency Association, West Virginia Community Action Partnership and Wisconsin Community Action Program Association.

- **Kentucky Cabinet for Health and Family Services (CHFS)** - chfs.ky.gov

  The CHFS works with local health departments to administer the Onsite Wastewater Program. Various program activities include the use of onsite evaluations to determine if site and soil conditions are suitable for onsite wastewater systems. Certified inspectors perform site evaluations and inspections and certified installers must install systems unless a homeowner wishes to install his or her own system and obtains a homeowner's permit. CHFS and local health departments are responsible for investigating complaints regarding a septic system, septic system installer, or septic tank pumper. Many homes and residences that rely on onsite septic systems also depend on private drinking water wells. Local health departments will respond to homeowner complaints and test wells for coliform bacteria for a $5 sampling fee.

  The CHFS is the primary agency responsible for on-site wastewater system compliance in the state. The CHFS and the DOW do not currently have an agency level

Memorandum of Understanding for on-site wastewater issues, but both agencies work together as issues arise.

- **Kentucky Onsite Wastewater Association (KOWA)** - www.kentuckyonsite.org

  The Kentucky Onsite Wastewater Association, Inc. (KOWA) was officially organized in 1995 as a nonprofit corporation. Voting members include manufacturers, installers, pumpers and regulators of onsite sewage disposal systems and components. Voting members of KOWA may also be members of academic institutions or government agencies involved in other aspects of the onsite sewage disposal systems industry. Other persons with related interests in the industry may also be admitted to the organization.

9.2.3 Education and Outreach

One of the best ways to improve the use and function of onsite wastewater treatment systems is through educating homeowners about their design, operation, and maintenance. The following websites and organizations provide resources to better inform homeowners about onsite systems.

- **National Environmental Health Association (NEHA) Online Wastewater Treatment Systems (OWTS) Programs** - www.neha.org/eh-topics/topics-a-to-z?field_resources_topic_tid=68&field_deliver_method_value=All&combine=

  The National Environmental Health Association (NEHA) is committed to providing education, resources, and support to onsite wastewater professionals around the country. The organization continues to work with the US EPA and other partner groups to promote improved onsite wastewater treatment systems design, installation, operations, and management. This includes NEHA's Annual Educational Conference & Exhibition and online educational opportunities. In addition to developing the national credential for onsite wastewater system installers, NEHA is part of a select group of national organizations that signed a Memorandum of Understanding with the EPA to improve the quality and quantity of resources and education available to professionals in the onsite wastewater field, state and local regulatory agencies, and those whose work involves building on or buying/selling land with dwellings that will use an onsite system.

- **National Onsite Wastewater Recycling Association (NOWRA)** - www.nowra.org

  Education and training is a key component of NOWRA's mission: "To provide leadership and promote the onsite wastewater treatment and recycling industry through education, training, communication and quality tools to support excellence in performance". Throughout NOWRA's history, the process for educating and training the membership and the general decentralized wastewater industry has occurred during NOWRA's annual national conference, recently through the Installer Academy and through state association training programs. NOWRA's educational programs are offered with continuing education units (CEUs). CEUs are required in many states for professionals in the industry.

- **UK Cooperative Extension publication "Septic System Maintenance"** - www2.ca.uky.edu/agcomm/pubs/henv/henv501/henv501.pdf

  This Cooperative Extension Service publication is very easy to read and only four pages so it can be easily distributed at informational meetings.

- **US EPA Septic Systems (Onsite/Decentralized Systems)** - www.epa.gov/septic

  The US EPA has several informational publications and brochures for homeowner care and maintenance of septic systems.

- **Wastewater Education Onsite Wastewater** - www.wastewatereducation.org

  The mission of this 501(c)(3) organization is to provide education which increases public awareness of the link between clean drinking water, safe recreational waters, environmentally sustainable surface and groundwater with watershed based, best management practices related to appropriate wastewater systems, technology, treatment, and management.

9.2.4 Funding

Funding available for onsite wastewater management through the DOW includes the CWSRF and some of the implementation or demonstration projects funded through the 319(h) grant award program. Several other sources of funding are available through state nonprofit groups or federal agencies. The following websites provide information on these opportunities.

- **319(h) NPS Grants** - https://eec.ky.gov/Environmental-Protection/Water/Protection/Pages/Section-319(h)-Grant-Program-Funding.aspx

  319(h) is the section of the Clean Water Act dealing with nonpoint source pollution. Each year the DOW applies to the EPA to receive 319(h) funding. The DOW distributes a majority of the monies received through a grant award process to communities, citizen groups, and organizations throughout Kentucky. These funds are potentially available to fund onsite treatment system demonstrations of new technologies or to implement onsite treatment solutions in conjunction with a watershed planning project. To find out more about the 319(h) grant process, please visit the DOW website or see Appendix A.

- **Clean Water State Revolving Fund (CWSRF)** - https://eec.ky.gov/Environmental-Protection/Water/Funding/CWSRF/Pages/default.aspx

  The CWSRF, also referred to as Fund A, is a 20-year loan program for planning, design, and construction of wastewater infrastructure projects, stormwater projects, and nonpoint source projects. Fund A1 provides assistance to small communities in financing the preliminary costs prior to construction. It is a five-year loan for planning, design, and sanitary sewer evaluation study (SSES). If a community applies for a loan for the construction portion of the project under Fund A, the Fund A1 can be rolled over to the Fund A loan.

- **Personal Responsibility in a Desirable Environment (PRIDE) Grant Program** - kypride.org/programs/septic

The goal of the PRIDE Homeowner Septic System Grant program is to give low-income homeowners the opportunity to replace their straight pipes, outhouses, or failing septic systems with sanitary wastewater treatment systems. The program is based on PRIDE's founding principle that each resident of Southern and Eastern Kentucky is personally responsible for the environment.

- **Southern and Eastern Kentucky Environmental Improvement Program (US Army Corps of Engineers Section 531 Funds)** - www.lrh.usace.army.mil/Missions/Civil-Works/Current-Projects/Env-Infrastructure-for-SE-Kentucky-531-Program-/

  The primary objective of the Section 531 Program is to provide design and construction assistance to non-federal interests for carrying out water related environmental infrastructure and resource protection and development projects in a twenty-nine county area of Southern and Eastern Kentucky. Projects may include wastewater treatment facilities, water supply facilities, and surface water resource protection and development.

9.3 Objectives and Action Items

The DOW endeavors to reduce nonpoint source pollution across the Commonwealth. To achieve the stated goal of restoring nonpoint source impaired waters in Kentucky, the DOW has developed an objective and two action items to reduce NPS pollution from onsite wastewater.

Long Term Goal 1: Restore Nonpoint Source Impaired Waters.

Objective 9: Decrease nonpoint source pollution from onsite wastewater sources in Kentucky's water bodies.

Action 1: Provide financial, technical, and/or educational support to projects that decrease the negative impacts on water quality from sewage.

Action 2: Coordinate with partners to decrease impacts from onsite wastewater.

See Appendix B for a complete list of Kentucky's NPS Pollution Program goals, objectives, activities and tracking measures with anticipated completion time frames.

10. Protection – Healthy Watersheds

10.1 Summary

Healthy watersheds provide many ecosystem services and environmental benefits, including clean water, recreational opportunities, habitat for fish and wildlife, and reduced vulnerability to severe impacts such as flooding and climate change (EPA, 2009). Traditionally, the chemical, biological, and physical characteristics of a watershed are to determine a waterbody's health. However, a more holistic approach is necessary to maintaining the integrity of healthy watershed systems. It is also necessary to understand the hydrology, geomorphology, and natural disturbance patterns in the area (EPA, 2009). Only with a complete understanding of these factors can we effectively protect the remaining healthy waters in the Commonwealth.

Benjamin Franklin once noted, "An ounce of prevention is worth a pound of cure". This statement applies to both human health and to the health of our environment. For example, the costs of treating contaminated groundwater supplies average 30-40 times greater than the costs of preventing contamination; with some treatment costs capable of rising 200 times that of prevention costs (Kentucky Division of Forestry, 2010). Yet we have long neglected the protection of our healthy watersheds, losing the valuable ecosystem services these systems provide, and consequently paying huge out-of-pocket sums for the human equivalent of those services that were once free. Many areas of the Commonwealth are protected through 401 KAR 10:026 and 10:031 (Fig. 10.1).

Nearly 40% of fish in North American freshwater streams, rivers, and lakes are classified as vulnerable, threatened, or endangered; nearly twice as many as were included on the imperiled list from a similar survey conducted in 1989 (Jelks et al., 2008). While impairment is a problem stream and river systems, loss is a problem associated with the Commonwealth's wetlands. From the 1780s to the 1980s, approximately 1,566,000 acres of wetland in Kentucky were reduced to 300,000 acres, an 81% reduction (Kentucky Division of Forestry, 2010). To save the remaining healthy areas, protection of such watersheds must become a priority charge of the DOW.

Since 2010, the DOW has been working with the EPA to develop healthy watershed components within the NPS program. The EPA's Healthy Watersheds Initiative "encourages states, local governments, watershed organizations, and others to take a strategic, systems approach to conserve healthy watersheds with a goal to protect high quality waters and prevent future water quality impairments" (EPA, 2009). The DOW plans to continue efforts in protection strategies to avoid the inflated costs associated with restoration efforts of impaired water bodies.

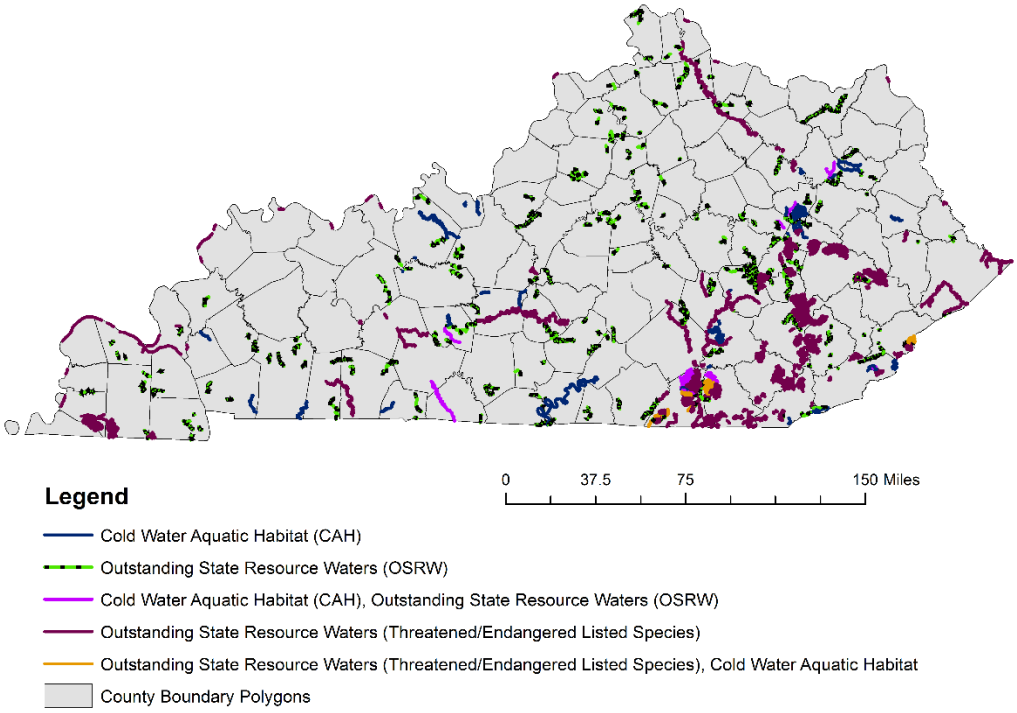


Figure 10.1. DOW Designated Use Waters.

10.2 DOW Strategy

Healthy watersheds provide numerous ecosystem services that save money in reduced water treatment costs, protect communities from destructive flooding, sustain invaluable habitat for wild and aquatic life, provide numerous recreation opportunities, and many more benefits. The Kentucky Division of Water has included protection as a priority of funding since 1997. When ranking 319(h) projects for award, protection is included as a ranking element. Basin Teams also use protection as a criterion for selecting areas of interest for conservation and watershed planning efforts.

10.2.1 Partner Strategy

Although partners have restrictions placed on them based on their different programs, the effectiveness of the protection initiative is in the spaces where the partner programs overlap. For instance, the Nature Conservancy is looking at areas for protection broadly; US Fish and Wildlife Service is interested in areas with endangered species; the Office of Kentucky State Nature Preserves is interested in areas with state listed endangered or threatened species; the Kentucky Division of Conservation is interested in areas with agriculture; and the US Forest Service is interested particularly in watersheds within the Daniel Boone National Forest. The KY NPS program plans in the next 5 years to develop a partnership that integrates the NPS program goals with one or more of these organizations through watershed planning. In addition, the Division participates in the EPA Healthy Watersheds Initiative and hopes to continue prioritization of healthy areas to protect these resources.

Below are descriptions of partners and their roles in protecting watershed health in the Commonwealth, including a section on land trusts and their activities in Kentucky. Please note that many partner organizations also include a land trust component in their protection strategies.

- **Association of Clean Water Act Administrators (ACWA)** - www.acwa-us.org

  Founded in 1961 as the Association of State and Interstate Water Pollution Control Administrators (ACWA), the ACWA is a national, nonpartisan professional organization. ACWA members are the state, interstate, and territorial officials who are responsible for the implementation of surface-water protection programs throughout the nation. In addition to serving as a liaison among these officials, ACWA facilitates their communication with the federal government and promotes public education. Long before the enactment of the Clean Water Act, state and interstate professionals were working to protect and improve water quality. As the national voice of state and interstate water programs, the ACWA strives to protect and restore watersheds to achieve "clean water everywhere for everyone."

- **Kentucky Division of Conservation (DOC)** - https://eec.ky.gov/Natural-Resources/Conservation/Pages/default.aspx

  The Kentucky Division of Conservation (DOC) has a two-fold mission: 1) To assist Kentucky's 121 local conservation districts in the development and implementation of sound soil and water conservation programs to manage, enhance, and promote the wise use of the Commonwealth's natural resources; and 2) To responsibly administer the conservation programs of the DOC to ensure, through conservation districts, the availability of technical and financial assistance to the landowners of Kentucky. Each local district is governed by a seven-member board of supervisors elected by the registered voters within that district. These conservation districts assist the landowners in each county with creating and implementing practices to protect the soil and water quality. The conservation districts help conserve Kentucky's resources by helping local people match their needs with technical and financial resources.

- **Kentucky Division of Forestry (KDF)** - https://eec.ky.gov/Natural-Resources/Forestry/forest-stewardship-program-and-landowner-services/Pages/Statewide-Assessment-of-Forest-Resources-and-Strategy.aspx

  A survey of twenty-seven drinking water utilities' treatment costs and watershed characteristics finds that for every 10% increase in forest cover of the source area, chemical and treatment costs decrease by 20% (Ernst et al., 2004). The Division of Forestry's (KDF) *2010 Kentucky Statewide Assessment of Forest Resources and Strategy* document identifies key forest-related issues and priorities to support development of a long-term resource strategy specific to Kentucky's forest needs. The resource explores strategies and history in Section 1, Issue 2, "Water Quality and Quantity". The high quality waters of Kentucky consistently feature watersheds with large areas of forestland (Figure 10.3).

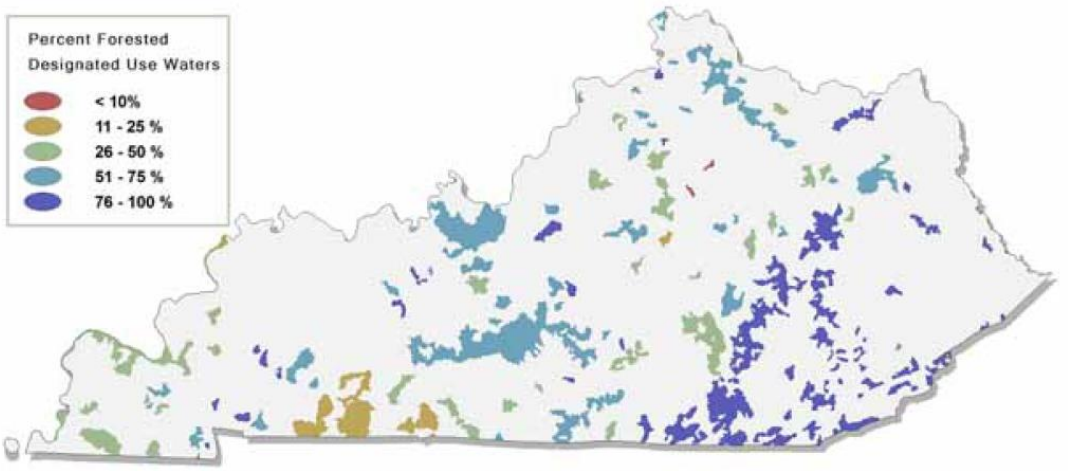


Figure 10.2. Percent forested Designated Use Waters. (Kentucky Division of Forestry, 2010)

- **The Office of the Kentucky Nature Preserves (KNP)** - https://eec.ky.gov/Nature-Preserves/Pages/default.aspx

  The Office of Kentucky Nature Preserves (KNP) was established with the consolidation of the Kentucky State Nature Preserves Commission, the Kentucky Heritage Land Conservation Fund, and the Kentucky Wild Rivers System into one agency. The 1976 Kentucky legislature created the Kentucky State Nature Preserves Commission to protect the best remaining natural areas in the state, not only to preserve our natural heritage, but also in recognition of the dependence of our well-being on healthy ecosystems. To identify those natural areas, the agency has participated in an international network of programs that monitor biodiversity. The Kentucky Heritage Land Conservation Fund was established in 1994 to provide funding for and oversee the purchase and conservation of natural areas that possess unique natural features. The Wild Rivers program was established with the Kentucky Wild Rivers Act of 1972 to protect the commonwealth's most pristine rivers from development or use which may impair the river's water quality or natural condition. The Office of Kentucky Nature Preserves continues to carry out all of these functions.

- **Kentucky Waterways Alliance (KWA)** - www.kwalliance.org

  Established in 1993, the Kentucky Waterways Alliance (KWA) works with communities on local watershed issues and at the state and national levels advocating for the best regulations possible. The KWA's mission is to protect and restore Kentucky's waterways. The KWA's mission is accomplished through four strategic goals: 1) Identify key places for protection on a local watershed level; 2) Carry out a statewide movement to protect Kentucky's waterways through grassroots activism and large-scale awareness; 3) Work on behalf of communities and the promises laid out in the Clean Water Act by influencing public policy; and 4) Build a strong and sustainable water network by promoting and supporting local watershed groups. The KWA's work is made possible by

their members, supporters and partners who are all working toward the same ultimate goal: healthy waterways and healthy communities in Kentucky.

The Division of Water's Nonpoint Source Program partners with the KWA on watershed plan development and implementation projects around the state. Most notably, the Nonpoint Source Program and KWA partnered on the development of the Watershed Planning Guidebook for Kentucky Communities, which is now the standard for watershed plan development in the state.

- **Natural Resources Conservation Service (NRCS)** - www.nrcs.usda.gov

  The Natural Resources Conservation Service (NRCS) is an agency committed to "helping people help the land"—their mission is to provide resources to farmers and landowners to aid them with conservation. The NRCS administers the Healthy Forest Reserve Program (HRFP), a program created by Section 508 of the *Healthy Forest* Restoration Act of 2003. The purpose of the program is to help landowners restore, enhance, and protect forestland resources on private lands through easements and financial assistance. The HRFP also aids in the recovery of endangered and threatened species under the Endangered Species Act, improves plant and animal biodiversity, and enhances carbon sequestration. The program works by enrolling voluntary landowners in permanent and 30-year easements. Landowners are compensated for the easement and must implement a forest management plan.

  A second NRCS program that provides support to nonindustrial forest landowners is the Conservation Stewardship Program (CSP). The conservation program encourages sustainability by providing financial and technical assistance to eligible landowners to conserve and enhance soil, water, air, and related natural resources on their land.

- **Southern Aquatics Resource Partnership (SARP)** - https://southeastaquatics.net/

  The Southeast Aquatic Resources Partnership (SARP) is a regional collaboration of natural resource and science agencies, conservation organizations, and private interests developed to strengthen the management and conservation of aquatic resources in the Southeastern United States. SARP will, with partners, protect, conserve, and restore aquatic resources including habitats throughout the Southeast for the continuing benefit, use, and enjoyment of the American people. SARP's approaches include 1) support and facilitation of on-the-ground and in-the-water science based action to improve and protect aquatic habitats and resources; and 2) focused habitat assessments, restoration actions, monitoring, and evaluation of some of the nation's most economically and socially significant aquatic habitats.

- **The Nature Conservancy (TNC) of Kentucky** -

  https://www.nature.org/en-us/about-us/where-we-work/united-states/kentucky/

  The Nature Conservancy (TNC) is a leading conservation organization working around the world to protect ecologically important lands and waters for nature and people. Since opening its doors in Kentucky in 1975, TNC of Kentucky has protected almost 45,000 acres of diverse habitat throughout the Commonwealth, including more than 8,000 acres by direct ownership and 6,500 acres by conservation easements. During this

time, TNC also conserved more than 100,000 acres of additional lands and waters throughout the Commonwealth in partnership with corporations, government agencies, conservation organizations, and private landowners.

- **EPA Healthy Watersheds Program** - water.epa.gov/polwaste/nps/watershed/index.cfm

  The objective of the federal Clean Water Act is to "restore and maintain the chemical, physical, and biological integrity of the nation's waters." While other EPA programs focus on restoring impaired waters, the EPA Office of Water created the Healthy Watersheds Program (HWP) to bring more emphasis to protecting high quality waters under the Clean Water Act objective. The HWP takes a non-regulatory, collaborative approach to maintaining clean waters by supporting EPA and its partners in assessing and protecting watershed health through CWA programs. This approach is essential for addressing future threats such as emerging water quality problems, loss and fragmentation of aquatic habitat, altered water flow and availability, invasive species, and climate change.

  US Forest Service Watershed Condition Framework - www.fs.fed.us/publications/watershed

  In 2011, the US Forest Service released the first national "Watershed Condition Framework" and the accompanying "Watershed Condition Classification Technical Guide". The Watershed Condition Framework establishes a new consistent, comparable, and credible process for improving the health of watersheds on national forests and grasslands. The Watershed Condition Classification Maps characterize the health and condition of National Forest System lands in the more than 15,000 watersheds across the country. The US Forest Service will use these maps as a baseline condition in conjunction with information on ecological, social and economic factors, and partnership opportunities to establish watershed restoration priorities. The DOW will utilize these maps to assist with determining the best candidate water bodies for protection.

- **US Fish and Wildlife Service (USFWS)** - www.fws.gov

  The US Fish and Wildlife Service (USFWS) is the premier government agency dedicated to the conservation, protection and enhancement of fish, wildlife and plants, and their habitats. USFWS also helps ensure a healthy environment for people through its work benefiting wildlife, and by providing opportunities for Americans to enjoy the outdoors and our shared natural heritage. USFWS is responsible for implementing and enforcing some of our Nation's most important environmental laws, such as the Endangered Species Act, the Migratory Bird Treaty Act, and the Marine Mammal Protection Act. They also provide extensive training and educational opportunities for the general public, landowners, professionals, teachers, and students.

  The Fisheries and Habitat Conservation Program is unique within the US Fish and Wildlife Service in its ability to apply a dual approach to natural resource management; it focuses on both helping manage species and helping to conserve their habitats. The Program relies on collaboration and joint ventures with State agencies, Tribes, private

landowners, industry, other Federal agencies and the public to achieve these conservation goals. In doing so, the Program combines expertise in habitat restoration, contaminant assessment and remediation, genetics, population dynamics and management, fish culture and fish health, fish passage, invasive species management, wetlands, water development and management, wind energy, coastal, instream flow and other disciplines. Fisheries and Habitat Conservation blends these capabilities to provide expert technical assistance to conservation partners.

- **Wild Rivers Program**

  Kentucky is preserving the unique scenic, fish and wildlife, botanical, geological, cultural, and recreational values of its least impacted rivers through the Wild Rivers Program. Established by the 1972 Kentucky Wild Rivers Act, the Office of Kentucky Nature Preserves administers the program. Nine Kentucky Rivers have sections designated as Kentucky Wild Rivers. This designation includes a linear corridor encompassing all visible land on each side of the river up to a distance of 2,000 feet. Cumberland Falls (Figure 10.2) is just one of these gorgeous natural sites. The Wild River corridors comprise a total of 114 river miles and 26,382 acres of land.

  The Wild Rivers system recognizes those rivers that retain many of their natural attributes and protects them from unwise use and development. Some activities are strictly prohibited within a Wild River corridor, such as surface mining, clear-cutting of timber, and construction of dams or other in-stream disturbances. Although residential and agricultural uses continue, a permit system is in place to limit changes that might impair the river's water quality.

  With funding provided by the Kentucky Heritage Land Conservation Fund (KHLCF), the Office of Kentucky Nature Preserves purchases land within or adjacent to designated Wild River corridors. This funding comes mostly through a voluntary fee paid by citizens when purchasing a nature themed license plate.

Figure 10.3. Cumberland Falls, a Wild River site.

10.2.2 Land Trusts

Land trusts, also called land conservancies, have been in existence since 1891. The goal of conservation trusts is to preserve sensitive natural areas, farmland, ranchland, water sources, cultural resources or notable landmarks forever. Many protected areas are still under private

ownership, which tends to limit access as well. Land trusts often work to open land to the public for recreation in the form of hunting, hiking, fishing, camping, wildlife observation, water sports, and other responsible outdoor activities. This is often with the assistance of community groups or government programs. In some instances, land may be used for sustainable agriculture or ranching, or even for sustainable logging.

There are several active land trust groups in Kentucky. In addition to many of the partner groups listed above that use land trusts as a preservation tool, below are some of the land trust organizations that work in Kentucky along with a description of their work and history.

- **21st Century Parks** - 21cparks.org

  Founded in 2005, 21st Century Parks is a Kentucky-based private, nonprofit corporation, created to bring a fresh vision to the preservation and development of new public parklands in and around Louisville, Kentucky. Great parks are part of Louisville's nature, due to the incomparable work of world-renowned landscape architect Frederick Law Olmsted. The current project of 21st Century Parks is The Parklands of Floyds Fork; in Eastern and Southern Louisville, is one of the largest new urban park systems in the nation. Building on the visionary effort of former Lt. Governor Steve Henry and The Future Fund, Inc., and joining in partnership with Louisville Metro Government and Louisville Metro Parks, The Parklands encompasses nearly 4,000 acres of preserved lands in the last undeveloped corridor of the Louisville community. This acreage will be protected as public parkland in perpetuity.

- **Bluegrass Land Conservancy** - www.bluegrassconservancy.org

  Bluegrass Conservancy and Limestone Land Trust merged in 2016 to become Bluegrass Land Conservancy (BLC), the largest accredited land trust in the Commonwealth of Kentucky. A nonprofit land trust working to protect the Inner Bluegrass Region, the organization seeks to conserve land for future generations. As a nationally accredited, community supported, 501(c)(3) nonprofit land trust, they work on a voluntary basis with landowners, community groups, and municipalities to encourage the preservation of land for agricultural viability, natural habitat, rural heritage, and scenic open space. Landowners or community groups contact the organization and they work with the property owners on an individual and confidential basis to explore if conservation is right for them.

- **Ducks Unlimited (DU)** - www.ducks.org

  Ducks Unlimited (DU) is the world's leader in wetlands and waterfowl conservation. DU got its start in 1937 during the Dust Bowl when North America's drought-plagued waterfowl populations had plunged to unprecedented lows. Determined not to sit idly by as the continent's waterfowl dwindled beyond recovery, a small group of sportsmen joined together to form an organization that became known as Ducks Unlimited. Its mission: habitat conservation.

  Kentucky is part of the Mississippi Flyway and provides important winter habitat for waterfowl that are produced in the Prairie Pothole Region and Great Lakes states. In some years, Kentucky has the potential to winter large numbers of mallards, black

ducks, and wood ducks. The Delta portion of western Kentucky provides important wintering waterfowl habitat including bottomland hardwoods, cypress/tupelo brakes, moist-soil wetlands, and flooded agricultural crops. DU's goal is to secure habitat as a key wintering area for migratory waterfowl in North America.

- **Fayette Alliance** - fayettealliance.com

  The Fayette Alliance is a coalition of citizens dedicated to achieving sustainable growth in Lexington-Fayette County through land-use advocacy, education, and research. Fayette County lost over 19,000 acres of agricultural land between 1997 and 2002, and was named as one of the most endangered cultural landscapes in the world by the World Monuments Fund in 2006. And yet it's estimated that there are over 17,000 acres of vacant, underdeveloped and underutilized land inside the Urban Services Boundary. The Fayette Alliance believes it can provide an answer that protects irreplaceable Bluegrass landscape, while also improving the city, quality of life, and local economy.

- **Fort Thomas Forest Conservancy (FTFC)** - www.ftfc.org

  The mission of the Fort Thomas Forest Conservancy (FTFC) is to protect, restore, and conserve the natural areas that contribute to the vitality and unique character of Fort Thomas through land preservation, responsible stewardship, and the promotion of community awareness, understanding, and enjoyment for present and future generations. The specific objectives and purposes of the FTFC are 1) to serve as a land trust dedicated to the protection and preservation of natural areas and green space; and 2) the development of park amenities and trails for the enjoyment of nature within the city of Fort Thomas, Kentucky.

- **Future Fund, Inc.** - https://www.guidestar.org/profile/20-0831835

  Founded in 1993, Future Fund, Inc., is located in Louisville, Kentucky. The primary purpose is to raise money for the acquisition of lands surrounding the Louisville Metro area for use as a park system.

- **Kenton Conservancy** - www.kentonconservancy.org

  The Kenton Conservancy is a community based nonprofit organization with the goal of land conservation in Kenton County for the benefit of people and nature. Landowners who share this goal may work hand-in-hand with the Kenton Conservancy in using a land conservation option on their own land. These options are flexible and may qualify for a variety of income, property, and estate tax benefits.

- **Kentucky Natural Lands Trust (KNLT)** - www.knlt.org

  Established in 1995, the Kentucky Natural Lands Trust (KNLT) is a statewide land trust with a mission to protect, restore, and connect Kentucky's remaining wildlands. The KNLT does this through the direct purchase of land, purchase of conservation easements and by working with other conservation partners. The KNLT was initially established to protect Blanton Forest on Pine Mountain, the largest old-growth forest remaining in the Commonwealth. A tremendously successful campaign resulted in the purchase and

establishment of the forest as a Kentucky state nature preserve. The KNLT has expanded efforts into a variety of conservation projects across Kentucky, currently including the Pine Mountain Wildlife Corridor, the largest landscape level project ever undertaken in the Commonwealth. Through partnerships with government agencies, nonprofits, corporations, and private individuals, the KNLT has protected thousands of acres of wildlands.

- **Land Trust Alliance** – www.landtrustalliance.org

  The Land Trust Alliance promotes voluntary private land conservation to benefit communities and natural systems. The Alliance is the national convener, strategist, and representative of more than 1,700 land trusts across America. Their mission is to save the places people love by strengthening land conservation across America. To fulfill their mission, the Land Trust Alliance has worked for more than 25 years with the national conservation community, comprised of 1.5 million dedicated land conservation professionals, volunteers and supporters, to quickly, effectively, and permanently, save our most valued natural resource across America. The Land Trust Alliance believes that if they focus combined efforts to increase the pace, quality, and permanence of conservation, they can turn the tide and ultimately change the way the land development takes place in America. Accomplishments include pioneering the use of conservation easements to conserve private land and developing Land Trust Standards and Practices, the guidelines for ethical performance by land trusts. The Southeast Regional Program includes Kentucky, one of the fastest growing areas in the nation. The Land Trust Alliance offers grants, trainings, tools and resources, as well as a Guided Organizational Assessment Program for existing land trusts.

- **Louisville/Jefferson County Environmental Trust** -

  https://louisvilleky.gov/government/parks/louisville-jefferson-county-environmental-trust

  The Louisville and Jefferson County Environmental Trust protects land for future generations through voluntary cooperative programs. Created in 1997, the trust helps to implement Cornerstone 2020's goals related to parks and natural areas, greenways, historic sites, and farmland. The trust's nine-member Oversight Board consists of five citizens and four members who represent government agencies responsible for public land. The staff of the Louisville and Jefferson County Environmental Trust, housed at Metro Public Works, is a unique cooperative arrangement. Metro Parks and Recreation, Metro Planning and Design, Metropolitan Sewer District, and the Jefferson County Attorney's Office provide technical expertise and staff support.

- **National Wild Turkey Federation (NWTF)** - www.nwtf.org

  The National Wild Turkey Federation (NWTF) is a leader in upland wildlife habitat conservation in North America. The NWTF is a nonprofit organization dedicated to conserving the wild turkey and preserving America's hunting heritage. Through dynamic partnerships with state, federal, and provincial wildlife agencies, the NWTF and its members have helped restore wild turkey populations throughout North America, facilitating the spending of more than $488 million in wildlife conservation and the

preservation of North America's hunting heritage. Wild turkeys and hundreds of other species of upland wildlife, including quail, deer, grouse, pheasant and songbirds, benefit from this improved habitat. The NWTF's habitat conservation program helps private landowners, industry partners, and wildlife agencies conserve wildlife habitat and improve hunting opportunities. The program helps private landowners protect property from development through conservation easements. NWTF is headquartered in Edgefield, South Carolina, and has local chapters in every state and Canada.

- **North American Land Trust** - www.northamericanlandtrust.org

  The North American Land Trust is a national organization whose mission is to promote long-term stewardship of our natural and cultural heritage by implementing successful private land conservation projects and promoting innovative land conservation techniques.

- **River Fields, Inc.** - www.riverfields.org

  River Fields protects, preserves, and enhances the natural and cultural resources, including agricultural and scenic resources, on both sides of the Ohio River between Westport and West Point, Kentucky, for the benefit of the public. River Fields is the largest and oldest river conservancy along the 981 mile Ohio River. For over 57 years, River Fields has utilized its resources to effectively protect, preserve, and enhance the natural and cultural resources of the land and water around the Ohio River in our region. Through their programs of land conservation, advocacy, and education, River Fields strives to create harmony between nature, history, and the people who live here. River Fields owns land or holds conservation easements on 37 properties, totaling more than 2,000 acres, most of which is preserved forever.

- **Rocky Mountain Elk Foundation (RMEF)** - www.rmef.org

  The Elk Foundation's mission is to ensure the future of elk, other wildlife, and their habitat. Healthy elk herds are a sign of healthy ecosystems; they are part of an interconnected natural and human community that includes thriving hunting and ranching traditions and a rich diversity of wildlife. Permanently protecting habitat is key to ensuring the future of elk. Equally important is providing ample food, water and cover, and studying and managing elk in ways that guarantee productive herds and provide hunter opportunity. On-the-ground action includes permanently protecting lands, stewarding habitat and supporting research, restoring elk to their historic ranges, and educating people about the role humans play in conserving wildlife. Since 1984, the RMEF and its partners have conserved or enhanced more than 7.3 million acres of North America's finest elk country. In the Commonwealth, the foundation has worked in partnership with the Kentucky Department of Fish and Wildlife Resources to restore elk to the Eastern Kentucky coalfields.

- **Southeastern Cave Conservancy, Inc. (SCCi)** - www.scci.org

  The Southeastern Cave Conservancy, Inc. (SCCi) is a nonprofit 501(c)(3) corporation dedicated to protect caves and karst landscapes throughout the southeastern US through conservation, education, and recreation. The SCCi currently owns or leases

thirty-one preserves containing 170+ caves in six states. The organization is interested in caves anywhere in the Southeastern US that need protection or management for conservation or access reasons. They are particularly interested in caves that are threatened with closure or destruction or those that provide a habitat for endangered species such as the Gray Bat, Tennessee Cave Salamander, or Hart's Tongue Fern. In Kentucky, SCCi owns the Frenchman Knob Cave and leases the Logsdon Cave, both in Hart County. In 2017, they purchased the Elroy and Marilyn Daleo Cave Preserve, which is an entrance to the Roppel section of Mammoth Cave, the longest cave system in the world.

- **The Boone Conservancy** - www.theblooneconservancy.org

  The Boone Conservancy, established in 1999, is a private, nonprofit conservation organization dedicated to the permanent protection of nature parks and lands with unique or significant recreational, natural, scenic, historical, and/or cultural value in Boone County, Kentucky. The conservancy is dedicated to working with all sectors of the community, including landowners, farmers, businesses, developers, government and concerned individuals, who recognize that planning for appropriate land conservation improves the quality of life and increases economic prosperity in Boone County. The conservancy will pursue its mission through the voluntary acquisition of land and interests in land, in partnership with the many constituencies in the community.

- **The Hillside Trust** - www.hillsidetrust.org

  The Hillside Trust, a 501(c)(3) nonprofit, was incorporated on October 21, 1976. The hillsides form an integral part of the natural fabric of Greater Cincinnati and Northern Kentucky. As the supply of buildable land diminishes, combined with growing market demand for “view” properties, the region’s hillsides have come under increasing development pressure over the last 40 years. The advent of heavy earth moving machinery and technological advances has made it possible to build on a hillside, build into it, or simply haul the hill away all together. The Hillside Trust actively works to help achieve a balance between the competing interests of development and conservation of our remaining hillside land. The Hillside Trust accomplishes its mission through work in three broad program areas: research and education, land conservation, and advocacy of responsible land use.

- **Trout Unlimited (TU)** - www.tu.org

  Trout Unlimited (TU) is a national organization with about 300,000 members and supporters organized into over 400 chapters and councils from Maine to Montana to Alaska. This dedicated grassroots army is matched by a respected staff of lawyers, policy experts, and scientists who work out of more than 30 offices nationwide. These conservation professionals ensure that TU is at the forefront of fisheries restoration work at the local, state, and national levels.

  The organization remains committed to applying “the very best information and thinking available” in its conservation work and has developed cutting-edge tools such as the Conservation Success Index (CSI), a sophisticated framework for assessing the

health of coldwater fish species throughout their native range. Whether this range encompasses a few hundred miles or multiple states, the CSI helps the organization target its efforts toward those populations most in need of protection and restoration.

The CSI also enables TU to measure its progress in achieving the bold goals laid out in its mission and vision. These goals require the organization to work at increasingly larger scales, and to collaborate with other conservation interests, local communities and state and federal partners to begin to rebuild the natural resiliency of watersheds. Such efforts are crucial if North America's trout and salmon are to survive climate change and the host of threats facing them at the start of the 21st century.

TU's Eastern Abandoned Mine Program focuses on the conservation, protection, and restoration of coldwater fisheries and their watersheds impacted by historic coal mining. With more than 10,000 stream miles polluted from abandoned mines in Pennsylvania and West Virginia alone, the pollution legacy of the coal mining industry is a stark reminder of what can happen when natural resources are developed without proper regulations in place. This program is working to bring life back to these rivers and streams and to make them once again places where brook trout can thrive- and where anglers can again cast to wild brookies that once were found in these waters.

- **Woods & Waters Land Trust (WWLT)** - www.woodsandwaterstrust.org

  The mission of the Woods & Waters Land Trust is to protect the forested lands and riparian areas in the lower Kentucky River watershed and to promote sustainable land use in the region for the benefit of present and future generations. WWLT can assist in establishing conservation easements in the Kentucky River watershed in Franklin, Owen and Henry counties. Easements are permanent binding contracts held and monitored by the trust. They will work with landowners to develop guidelines to be followed by future property owners.

10.2.3 Education and Outreach

An essential component of the healthy watersheds concept is changing behavior through education and developing responsible attitudes among watershed citizens and communities. Efforts to protect and conserve our healthy watersheds will fail without stakeholder participation and cooperation (EPA, 2011). Thankfully, outreach tools for healthy watersheds do not differ greatly from outreach tools for other water education initiatives and many tools can be adapted from a restoration focus to a conservation focus. Listed below are some programs and organizations targeting conservation in their environmental education efforts. Please see the Education and Outreach Section of this report for more information on other water education resources.

- **Association of Zoos and Aquariums (AZA)** - www.aza.org/conservation-education

  The Association of Zoos and Aquariums (AZA) is committed to promoting high standards of excellence in all aspects of conservation education. Accreditation standards and board-approved policies have been established to ensure this objective is achieved and evolves to meet increasingly rigorous criteria. AZA member volunteers work

collaboratively within AZA committees, animal programs, and scientific advisory groups to provide valuable visitor research data, educational information, resources, planning tools, and activities to enhance conservation education for kids and families, enrich animal programs, augment resources for educators, and promote careers in zoos and aquariums. AZA accredited zoos and aquariums play a vital role in educating over 180 million visitors and 51 million students in the classroom or in the field, about wild animals, their habitats, their related conservation issues, and the ways in which they can contribute to their preservation. Over the past ten years, AZA accredited institutions have also trained more than 400,000 teachers with award-winning and proven science curricula. In Kentucky, the Louisville Zoological Garden and the Newport Aquarium are both accredited by the AZA.

- **Conservation Education (CE)** - fs.usda.gov/conservationeducation

  A program of the US Department of Agriculture, the Conservation Education (CE) program helps people of all ages understand and appreciate our country's natural resources and how to conserve those resources for future generations. Through structured educational experiences and activities targeted to varying age groups and populations, the Conservation Education program enables people to realize how natural resources and ecosystems affect each other and how to use resources wisely. Through conservation education, people develop the critical thinking they need to understand the complexities of ecological problems. It also encourages people to act on their own to conserve natural resources and use them in a responsible manner. The CE program has targeted educational materials, including resources for water and climate change education.

- **Leave No Trace Center for Outdoor Ethics** - www.lnt.org

  The Leave No Trace concept is over 50 years old. Leave No Trace was formally developed by the US Department of Agriculture Forest Service in the 1960's. Today, the Leave No Trace Center for Outdoor Ethics is an educational, nonprofit organization dedicated to the responsible enjoyment and active stewardship of the outdoors by all people, worldwide. Leave No Trace was incorporated as a 501(c)(3), nonprofit organization in 1994. Since its inception, the center has developed a comprehensive, three-tiered training system, encompassing field courses such as the five-day Master Educator course and workshops that range from an hour to two days.

  Major program development has focused on providing quality Leave No Trace education while broadening the program's reach, including: 1) A Traveling Trainer Program that uses mobile educators traveling throughout the continental United States teaching Leave No Trace; 2) A youth program called Promoting Environmental Awareness in Kids (PEAK) that reaches over 100,000 diverse youth annually with direct programming; 3) Custom front country programs for regional, state and city parks; 4) Complex community initiatives including a state advocate program that encourages localized support and training as well as regional volunteerism; 5) International programs, training options and branch organizations in Australia, Canada and Ireland; and 6) An extensive scholarship program for various training as well as materials grants for

educators. Today, the program reaches millions of Americans and dozens of countries each year with minimum impact training, educational tools, and information.

- **Tread Lightly!** - www.treadlightly.org

  Tread Lightly! is a national nonprofit organization with a mission to promote responsible recreation through stewardship, education, and communication. The organization was launched in 1985 by the US Forest Service and became a nonprofit organization in 1990. Tread Lightly!'s educational message, along with its training and restoration initiatives, are strategically designed to instill an ethic of responsibility in a wide variety of outdoor enthusiasts and the industries that serve them. The program's goal is to balance the needs of the people who enjoy outdoor recreation with our need to maintain a healthy environment. Tread Lightly!'s core focus is on people that use or are affected by motorized and mechanized vehicles. The organization offers unique programs and services to help remedy growing recreation issues. The federal government officially recognizes the organization as a sole-source service provider of education and training on how to be environmentally and socially responsible while using motorized and mechanized vehicles.

- **EPA Healthy Watershed Outreach Tools** -

  https://cfpub.epa.gov/npstbx/index.html

  In 2003, the EPA released *Getting in Step: A Guide for Conducting Watershed Outreach Campaigns*. Updated in 2010, the guide presents key principles, techniques and information for effective watershed outreach. Watershed managers are encouraged to read this guide, as it will help them understand the audiences in their watershed, create messages that resonate with the audience, find appropriate ways to communicate targeted messages, and prompt changes in behavior to reduce negative impacts to our natural ecosystems. The guide also provides the tools needed to develop and implement an effective public outreach campaign.

  The EPA's Nonpoint Source Outreach Toolbox also contains a wealth of information and resources for watershed outreach campaigns including: guides; ready-made logos, slogans, and mascots; surveys and evaluations; and TV, radio, and print ads. There are a host of other outreach programs available online through the Healthy Watershed Outreach Tools.

10.2.4 Funding

Funding conservation of our existing healthy waterways is essential because protection costs far less than restoration. Protection also preserves vital ecosystem services. Available funding sources appear below.

- **319(h) NPS Grants** - https://eec.ky.gov/Environmental-Protection/Water/Protection/Pages/Section-319(h)-Grant-Program-Funding.aspx

  319(h) is the section of the Clean Water Act dealing with nonpoint source pollution. Each year the DOW applies to the EPA to receive 319(h) funding. The DOW distributes a majority of the monies received through a competitive grant award process to

communities, citizen groups, and organizations throughout Kentucky. Watershed based planning for sensitive areas and other protection activities can be funded through this grant. To find out more about the 319(h) grant process, please visit the DOW website or see Appendix A.

- **Conservation Reserve Enhancement Program (CREP)** - www.fsa.usda.gov/FSA/webapp?area=home&subject=copr&topic=cep

  The Conservation Reserve Enhancement Program (CREP) is a voluntary land retirement program that helps agricultural producers protect environmentally sensitive land, decrease erosion, restore wildlife habitat, and safeguard ground and surface water. The program is a partnership among producers; tribal, state and federal governments; and, in some cases, private groups. The CREP is an offshoot of the country's largest private lands environmental improvement program, the Conservation Reserve Program (CRP). Like CRP, the CREP is administered by USDA's Farm Service Agency (FSA). By combining CRP resources with state, tribal, and private programs, CREP provides farmers and ranchers with a sound financial package for conserving and enhancing the natural resources of farms. CREP addresses high priority conservation issues of both local and national significance, such as impacts to water supplies, loss of critical habitat for threatened and endangered wildlife species, soil erosion, and reduced habitat for fish populations such as salmon. CREP is a community based, results oriented effort centered around local participation and leadership.

- **Forest Legacy Program (FLP)** - www.fs.fed.us/spf/coop/programs/loa/aboutflp.shtml

  The Forest Legacy Program (FLP) is a federal program that supports state efforts to protect environmentally sensitive forestlands through property acquisition or conservation easements. The FLP allows for the purchase of forestland from willing sellers to keep it in its natural state. The state holds title to the forest legacy lands. Priority is given to lands that can be effectively protected and managed. Participation is limited to private forest landowners.

- **Kentucky Aquatic Resource Fund (KARF)** - https://kwalliance.org/what-we-do/restoration/karf/

  In 2009, Kentucky Waterways Alliance (KWA) began an exciting and groundbreaking partnership with the US Fish & Wildlife Service's Kentucky Field Office to administer the Kentucky Aquatic Resource Fund. KARF provides a way for multiple agencies and partners to contribute funding and other resources to conserve Kentucky's best places. The KWA's role in the partnership is to act as the financial steward of the fund, which supports conservation projects across the Commonwealth. The fund exists to ensure that all ill effects to aquatic species are adequately addressed, and that real conservation and recovery benefits are provided. In practice, that means that KARF supports voluntary land preservation agreements and has funds designated to match other grants or programs that support or match their goals. The fund will support much needed research, surveys and monitoring of waterways and water quality along with stream and stream/riverbank area management. The funds will also support threatened

species propagation and introductions throughout the state and promote habitat restoration and enhancement through best management practice installations.

- **Kentucky Heritage Land Conservation Fund (KHLCF)** - heritageland.ky.gov/Pages/default.aspx

  Established in 1994, Kentucky Heritage Land Conservation Fund (KHLCF) provides funding for preserving and conserving natural areas that possess unique features. These features may include habitat for rare and endangered species, areas important to migratory birds, areas that perform important natural functions that are subject to alteration or loss, and areas to be preserved in their natural state for public use, outdoor recreation and education. Revenue for the fund comes from the sale of nature license plate, the state portion of the unmined minerals tax, and environmental fines. The Kentucky Environmental Education Council receives $150,000 of environmental fines each year for environmental education programs.

- **Land and Water Conservation Fund (LWCF)** - www.nps.gov/lwcf

  The National Park Service Land and Water Conservation Fund (LWCF) provides matching grants to states and local governments for the acquisition and development of public outdoor recreation areas and facilities. The program's intent is to create and maintain a nationwide legacy of high quality recreation areas and facilities and to stimulate non-federal investments in the protection and maintenance of recreation resources across the United States. Over 40,000 grants to states and localities have been approved under the LWCF grants program for acquisition, development and planning of outdoor recreation opportunities in the United States. Grants have supported purchase and protection of 3 million acres of recreation lands and over 29,000 projects to develop basic recreation facilities in every State and territory of the nation. They are in every geographic region of the US, in every county, and almost all localities.

- **North American Wetlands Conservation Fund** –

  https://www.fws.gov/birds/grants/north-american-wetland-conservation-act.php

  The North American Wetlands Conservation Act (NAWCA) of 1989 provides matching grants to organizations and individuals who have developed partnerships to carry out wetlands conservation projects in the United States, Canada, and Mexico for the benefit of wetlands associated migratory birds and other wildlife. The act was passed, in part, to support activities under the North American Waterfowl Management Plan, an international agreement that provides a strategy for the long-term protection of wetlands and associated uplands habitats needed by waterfowl and other migratory birds in North America. In December 2002, Congress reauthorized the act and expanded its scope to include the conservation of all habitats and birds associated with wetlands ecosystems. In 2006, Congress reauthorized the act to extend its appropriation authorization of up to $75 million per year to 2012.

  There is a Standard Grant Program and a Small Grants Program. Both are competitive grants programs and require that grant requests be matched by partner contributions at no less than a one-to-one ratio. Funds from US federal sources may contribute towards

a project, but are not eligible as match. The Standard Grants Program supports projects in Canada, the United States, and Mexico that involve long-term protection, restoration, and/or enhancement of wetlands and associated uplands habitats. The Small Grants Program operates only in the United States; it supports the same type of projects and adheres to the same selection criteria and administrative guidelines as the US Standard Grants Program. However, project activities are usually smaller in scope and involve fewer project dollars. Grant requests may not exceed $100,000, and funding priority is given to grantees or partners new to the NAWCA's grants program.

- **Purchase of Agricultural Conservation Easement (PACE) Corporation** – http://www.kyagr.com/marketing/PACE.html

  In 1994, the Kentucky General Assembly established the Purchase of Agricultural Conservation Easement (PACE) Corporation and authorized the state to purchase agricultural conservation easements in order to ensure that lands currently in agricultural use will continue to remain available for agriculture and not be converted to other uses. Although PACE was established to purchase conservation easements, landowners also are encouraged to donate easements in order to dedicate their land to agricultural uses. The PACE Corporation has purchased agricultural conservation easements on 108 farms totaling 25,280 acres. The easement costs have averaged $854 per acre. The farm size has averaged 234 acres. In addition, 61 easements on 8,499 acres have been donated to the program, bringing the total inventory to 170 farms containing 33,780 acres. Since the inception of the program, the department has received 816 applications from 75 counties statewide totaling over 160,000 acres. A total of 667 applications are currently pending for a total of over 129,000 acres with an estimated easement value of over $100 million.

10.3 Objectives and Action Items

The Kentucky Division of Water endeavors to prevent nonpoint source pollution across the Commonwealth. To achieve the stated goal of protecting waters currently meeting designated uses, the DOW has developed an objective and three actions related to protecting lands from NPS pollution.

Long Term Goal 2: Protect waters currently meeting designated uses.

Objective 1: Promote the identification and protection of healthy watersheds throughout Kentucky.

Action 1: Provide technical and/or financial support for land conservation programs.

Action 2: Provide technical and/or financial support for sub-grantee projects that implement the protection components of an approved watershed plan.

Action 3: Develop and implement a NPS Program strategy for better coordination with the Healthy Watersheds program.

See Appendix B for a complete list of Kentucky's NPS Pollution Program goals, objectives, activities and tracking measures with anticipated completion time frames.

11. Recreation

11.1 Summary

Nationally, approximately 49% of Americans participate in outdoor activities, increasing from 144.4 million American participants in 2016 to 146.1 million Americans in 2017 (Outdoor Industry Association, 2018). A contributing factor to these statistics locally is the Commonwealth of Kentucky, which offers an abundance of diverse recreational opportunities.

Kentucky's economy is significantly bolstered by its recreation industry. Leisure activities are important to humans' sense of well-being and provide a means of refreshment and relaxation from the everyday grind and stresses from one's regular occupation. Unfortunately, there are negative impacts to the natural environments associated with these activities. Many human leisure activities can pollute Kentucky's water resources and present challenges for resource managers whose mission is to abate and control nonpoint source pollution. Among the diverse recreational opportunities afforded visitors to both public and private lands throughout the Commonwealth, those which pose the greatest threat to water quality include ATV riding, biking, boating, swimming, trail hiking, camping, horseback riding (Figure 11.1), and fishing. Two broad categories in which these recreational activities can be placed are land based recreation, and water based recreation.

Figure 11.1. Horseback riding at Dale Hollow State Resort Park.

11.1.1 Land Based Recreation

Land based recreation can have negative effects on the water quality of Kentucky's surface and groundwater resources. Kentucky is experiencing an overall growth in outdoor recreational use on public and private lands, and all of these activities can create erosion, decreased infiltration rates, and/or nutrient enrichment. Some examples of land-based outdoor recreation include:

- **All-terrain vehicles (ATVs).** Off-roading accelerates erosion by tearing up vegetation and creating trails which then wash out in rain events. ATVs that are driven in or through streams also destroy aquatic habitat and increase water turbidity.
- **Horseback riding**. Horseback riding also may make trails that have the potential to erode, contributing sediment to the streams. Horse manure can also be a source of bacteria to a water body.

- **Hiking/trail use and camping activities.** Hiking trails and clearing areas for camp sites can create erosion issues as vegetation is lost, leasing to sedimentation issues in waterbodies. Campers may also leave trash and camping debris that may negatively impact the area.

In addition to the more rural recreation, outdoor activities such as golfing, urban park trails, dog parks, and other urban land based recreation can have similar impacts to the environment.

11.1.2 Water Based Recreation

Nonpoint source pollution from marinas, water crafts, and fishing can negatively affect the environment if adequate management steps are not taken to control it. The various means of pollution from water based recreation are outlined below.

- **Docks, boat ramps, and decks**. These surfaces offer ways for people to reach and enjoy the waterfront. However, if these structures are not properly constructed and maintained they may cause water quality problems such as chemical contamination from treated wood, paints or stains used to maintain surfaces, and soil erosion and sedimentation from deck construction. Additionally, surface runoff from marina facilities and parking lots often directly enter adjacent waterways.
- **Fishing**. Releases of nonnative baitfish and unrecovered tackle are contributors to degraded water quality and deadly threats to fish and wildlife.
- **Marinas and boating activities**. At marinas, water craft can introduce fuel, motor oil, bottom paints, hull cleaners and anti-freeze into the environment from operation and maintenance activities. Wave action from water crafts cause shoreline erosion and sedimentation of streams and lakes. Improper discharge of waste holding tanks and a lack of pumpout stations at marinas can increase bacterial and nutrient levels in the water. Introduction of sewage, detergent cleaning products and fish waste allows excessive levels of nitrogen and phosphorus to accumulate in the water.
- **Swimming**. Recreational bathing can potentially introduce illness causing protozoa and viruses into reservoirs and streams. These and other organisms that come from the intestinal tract are shed from the body during swimming.

11.1.3 Recreational Opportunities on State Lands

Kentucky's State Parks System is comprised of 52 total parks, 17 resort parks, 24 recreation parks, 11 historical sites, 19 golf courses, over 250 miles of trails, 15 marinas, 2,600 improved campsites, 24 swimming pools, and 11 outdoor swimming beaches on rivers and/or lakes (Kentucky Department of Travel, 2012). The economic impact of each park illustrates that more than $840 million was contributed in 2008 to the state's economy directly due to the Kentucky State Park System (Kentucky State Parks, 2010).

Kentucky Division of Forestry owns and manages nine state forests with a combined total of 41,183 acres. The parks are managed using an ecosystem approach to ensure biological diversity and sustainable use. The forests are open for hiking, wildlife viewing, hunting and other activities. For a map of these areas and specifics, visit https://eec.ky.gov/Natural-Resources/Forestry/ky-state-forests/Pages/default.aspx

State lands also afford many hunting opportunities, with more than 85 Wildlife Management Areas (WMAs) open to the public primarily for this activity. Most WMAs are managed by the Kentucky Department of Fish and Wildlife Resources. For more information about WMAs, visit fw.ky.gov/More/Pages/Wildlife-Management-Areas-and-Public-Hunting-Areas.aspx.

11.1.4 Recreational Opportunities on Federal Lands

Federal public lands add substantial acreage on which Kentuckians can pursue various leisure activities. There are more than 1.5 million acres of federally owned land in the state. Many of these areas are available for public recreation activities. Some of the larger areas are listed below.

- **Daniel Boone National Forest (DBNF)** - www.fs.fed.us/r8/boone

  The Daniel Boone National Forest manages over 707,000 acres within a proclamation boundary of nearly 2.1 million acres. The DBNF is one of the most heavily used forests in the South, with over 5 million visitors annually. ATV trails, biking, boating, swimming, camping, horseback riding, trails, and fishing are just some of the amenities offered to DBNF users.

- **Land Between The Lakes National Recreation Area (LBL)** - www.landbetweenthelakes.us

  The Land Between the Lakes (LBL) offers multiple uses and recreational resources, including camping, mountain biking, ATV trails, horseback riding, boating, and swimming. LBL is managed by the USDA Forest Service, in partnership with Friends of LBL, to provide public lands, outdoor recreation, and environmental education.

- **The National Park Service** - www.nps.gov/state/ky/index.htm

  The National Park Service manages three national parks and one national recreation area in Kentucky. In 2017, 2.3 million recreation visits were made to these four parks. Abraham Lincoln Birthplace National Historic Park received 269,580 visitors; Big South Fork National Recreation Area received 761,200 visitors; Cumberland Gap National Historic Park received 737,547 visitors; and Mammoth Cave National Park received 587,853 visitors during this time frame (National Park Service, 2017).

- **US Army Corp of Engineers (USACE)** - www.lrl.usace.army.mil/Locations/Lakes/

  The US Army Corp of Engineers is actively involved in the management of 26 lake recreation areas in Kentucky, many of which offer numerous activities and facilities for visitors, including camping, boating (including boat ramps and marina with gas pumps), swimming areas, fishing facilities, trails, and golf courses.

11.2 DOW Strategy

The Kentucky Division of Water (DOW) works with local, state, and national partners to provide information on water quality assessments and technical assistance regarding recreational impacts. The DOW reviews and comments on legislation that has the potential to affect water quality in the Commonwealth. The DOW encourages watershed planning in areas potentially

impacted by recreation. These areas can be formally established or user-made and have both land and water based impacts.

11.2.1 Partner Strategy

The Kentucky Division of Water engages in nonpoint source pollution control efforts that can be successfully implemented only through effective partnerships with other Kentucky entities that have similar goals. The DOW encourages watershed planning and demonstration of innovative technologies in areas potentially impacted by recreation. These areas can be formally established or user-made, and have both land and water based impacts. The Division of Water works with a variety of public land owners to try and lessen these impacts by providing technical assistance. The US Forest Service is one of the largest owners of recreational lands in the state and the Division NPS staff have a long-term working relationship with them to assess and minimize recreational impacts.

Our partners include some entities in the Commonwealth who own or manage public lands with large numbers of visitors annually. These groups are listed below.

- **Daniel Boone National Forest (DBNF)** - www.fs.fed.us/r8/boone/documents/planning/revplan/forest_plan/plan_whole_doc.pdf

  The Daniel Boone National Forest provides a variety of dispersed and developed recreational opportunities to five million visitors each year. Growth in demand for recreational opportunities is likely to continue and new types of recreation may be introduced. The forest plan revision should develop an appropriate mix of recreational opportunities that responds to increasing and changing demands and also provides adequate ecosystem protection.

- **Kentucky Department of Fish and Wildlife Resources (KDFWR)** - fw.ky.gov

  The mission of KDFWR is to conserve and enhance fish and wildlife resources and provide opportunity for hunting, fishing, trapping, boating, and other wildlife related activities.

  - **Wildlife Management Areas (WMAs)** - fw.ky.gov/More/Pages/Wildlife-Management-Areas-and-Public-Hunting-Areas.aspx

    The KDFWR has rules governing the use of all Wildlife Management Areas owned, leased, or managed by them. These rules pertain to many recreational impacts including horseback riding, camping, and a prohibition of all-terrain vehicles on all WMAs.

  - **Kentucky Boating Laws** - fw.ky.gov/Boat/Pages/default.aspx

    Enforcement of boating laws and regulations (including waste disposal) is the responsibility of the Kentucky Department of Fish & Wildlife Resources through KRS Chapter 235 and KAR Title 301. Some of the waters of the state are also patrolled by other agencies such as the US Coast Guard and the USACE.

- **Kentucky Statewide Comprehensive Outdoor Recreation Plan (SCORP)** - kydlgweb.ky.gov/Documents/LWCF/FINAL%202014%20SCORP.pdf

  The Division of Federal Grants, with extensive input from other government agencies, state universities, nonprofit organizations, and public participation, created the 2014 Kentucky Statewide Comprehensive Outdoor Recreation Plan. The 2014 SCORP outlines strategies and recommendation for addressing many issues affecting outdoor recreation in Kentucky. It promotes an active, outdoor lifestyle and ensures that Kentucky remains eligible to receive federal Land and Water Conservation Funds for recreational projects.

- **US Army Corp of Engineers (USACE)** - www.swl.usace.army.mil/Portals/50/docs/planningandenvironmental/Recreation%20Strategic%20Plan%20FINAL%201Apr2011.pdf

  Changes in the federal budget and increased demand for recreation resources compel the USACE to transform and reposition their recreation program. The Recreation Strategic Plan (April 2011) provides guidance for their recreation program to ensure the USACE continues to provide safe, quality outdoor recreation. Water based recreation is the major attraction of USACE recreation areas.

11.2.2 Education and Outreach

Education and outreach is one of the most important tools the DOW and our partners have for abating, protecting, and restoring the quality of Kentucky's surface and groundwater resources from nonpoint source pollution. Outlined below are some of the programs and mechanisms used to achieve this goal.

- **The Audubon Cooperative Sanctuary Program for Golf Courses** - www.audubonintenational.org/acspgolf

  This Audubon Program is an award winning education and certification program that helps golf courses protect our environment and preserve the natural heritage of the game of golf. By helping people enhance the valuable natural areas and wildlife habitats that golf courses provide, improve efficiency, and minimize potentially harmful impacts of golf course operations, the program serves as a vital resource for golf courses.

- **Cave Run Non-motorized Trails Initiative** - www.fs.usda.gov/detail/dbnf/recreation/?cid=stelprd3793019

  The Cumberland Ranger District of the Daniel Boone National Forest initiated a process on January 31, 2008 called the Cave Run Non-motorized Trails Initiative. The initiative is intended to bring together various non-motorized trail users to work in a collaborative manner to develop a consensus proposal for the improvement of the trail system around the Cave Run Lake area. The trail system surrounding Cave Run Lake has experienced a tremendous increase in use over the past several years. Initially these trails were designed and constructed for foot travel only, but most of the current users are equestrian and bicycling enthusiasts. As a result of increased use, user conflicts and accelerated maintenance needs are occurring.

- **Cumberland River Basin Clean Marina Program** - www.lrn.usace.army.mil/Missions/Recreation/Clean-Marina-Program/

  This program is a voluntary program implemented by US Army Corps of Engineers Nashville District and its watershed partners to promote environmentally responsible marina and boating practices. It is designed as an ongoing program to reduce water pollution and erosion in the Cumberland River watershed. A guidebook to support marina operators and owners has been produced as part of this program.

- **Leave No Trace (LNT)** - www.lnt.org

  Leave No Trace is a national and international program designed to assist outdoor enthusiasts with their decisions about how to reduce their impacts when they hike, camp, picnic, snowshoe, run, bike, hunt, paddle, ride horses, fish, ski, or climb. The program strives to educate all those who enjoy the outdoors about the nature of their recreational impacts as well as techniques to prevent and minimize such impacts. Leave No Trace is best understood as an educational and ethical program, not as a set of rules and regulations.

- **Limits of Acceptable Change (LAC)** - www.fs.usda.gov/detail/dbnf/home/?cid=stelprdb5346360

  The Daniel Boone National Forest (DBNF) conducted a public outreach program for the Red River Gorge called Limits of Acceptable Change (LAC). The LAC process focuses on human-induced impacts to the environment. Recreation researchers developed this process to determine how much human-induced change is acceptable. The process relies on a strong relationship between the US Forest Service and interested citizens. The objective of LAC is to address impacts of public use and to preserve the environmental setting and resources for future recreational use. To address this issue the DBNF started a process in 2004 to identify the problems in the area, develop actions to reduce impacts, and monitor how well the actions are working.

- **National Management Measures to Control Nonpoint Source Pollution from Marinas and Recreational Boating** - www.epa.gov/nps/marinas-and-boating-national-management-measures

  This US EPA publication is a technical guidance and reference document for use by state, local, and tribal managers in the implementation of nonpoint source pollution management programs. It contains information on the best available, economically achievable means of reducing pollution of surface water runoff from marinas and recreational boating.

- **Tread Lightly!** - www.treadlightly.org

  Tread Lightly! is a national nonprofit organization with a mission to promote responsible outdoor recreation through ethics education and stewardship. Tread Lightly! is the nation's only source for a full line of motorized and non-motorized outdoor ethics training and education. Tread Lightly!'s educational materials include: guidebooks, quick-tip brochures, a hunting education curriculum, an online awareness course, how-

to videos, teaching materials, and a line of children's materials based on Tread Lightly!'s squirrel mascot, Lightfoot.

- **Wolf Creek National Fish Hatchery (NFH)** - www.fws.gov/wolfcreek

  Wolf Creek National Fish Hatchery (NFH) provides a great place to connect with the outdoors. There's no charge to visit and tour, and the hatchery grounds are open 365 days a year while the Visitor/Environmental Education Center remains open 364 days annually (only closing on Christmas Day). Visit their website to read more about the educational resources they provide including the Biologist in Training (BiT) program.

11.2.3 Funding

Funding available for abatement of recreational impacts through the DOW includes the 319(h) grant award program. Several other sources of funding are available through nonprofit groups or federal agencies. The following websites provide information on these opportunities.

- **319(h) NPS Grants** - https://eec.ky.gov/Environmental-Protection/Water/Protection/Pages/Section-319(h)-Grant-Program-Funding.aspx

  319(h) is the section of the Clean Water Act dealing with nonpoint source pollution. Each year the DOW applies to the EPA to receive 319(h) funding. The DOW distributes a majority of the monies received through a competitive grant award process to communities, citizen groups, and organizations throughout Kentucky. The DOW supports watershed planning efforts in recreationally impacted areas and demonstrations of innovative technologies to remediate impacts. To find out more about the 319(h) grant process, please visit the DOW website or see Appendix A.

- **Clean Water State Revolving Fund (CWSRF)** - https://eec.ky.gov/Environmental-Protection/Water/Funding/CWSRF/Pages/default.aspx
  The Clean Water State Revolving Fund (CWSRF), also referred to as Fund A, is a 20 year loan program for planning, design, and construction of wastewater infrastructure projects, stormwater projects, and nonpoint source projects. Fund A1 provides assistance to small communities in financing the preliminary costs prior to construction. It is a five year loan for planning, design, and sanitary sewer evaluation studies (SSES).

- **Land and Water Conservation Fund (LWFC)** - www.nps.gov/subjects/lwcf/index.htm
  The Land and Water Conservation Fund (LWCF) Program provides matching grants to states and local governments for the acquisition and development of public outdoor recreation areas and facilities. The program is intended to create and maintain a nationwide legacy of high quality recreation areas and facilities and to stimulate non-federal investments in the protection and maintenance of recreation resources across the United States.

- **Recreational Trails Program (RTP)** - kydlgweb.ky.gov/FederalGrants/16_RTP.cfm
  The Recreational Trails Program (RTP) is funded by the Federal Highway Administration (FHWA). It can be used to provide assistance for acquisition of easements, development and/or maintenance of recreational trails and trailhead facilities for both motorized and non-motorized use. The Recreational Trails Program benefits communities and

enhances quality of life. RTP does not fund equipment such as mowers, gators, or trucks. All trails that have received FHWA funding must remain open to the public and maintained for perpetuity.

- **US EPA Catalog of Federal Funding Sources for Watershed Protection** - www.epa.gov/waterdata/catalog-federal-funding
  The Catalog of Federal Funding Sources for Watershed Protection website is a searchable database of grants, loans, and cost-sharing available to fund a variety of watershed protection projects. The search includes the ability to sort by the type of organization applying for the grant or by keyword (such as wildlife habitat or agriculture).

11.3 Objectives and Action Items

The DOW endeavors to reduce nonpoint source pollution across the Commonwealth. To achieve the stated goal of restoring nonpoint source impaired waters in Kentucky, the DOW has developed an objective and three actions related to reducing NPS pollution resulting from recreation.

Long Term Goal 1: Restore Nonpoint Source Impaired Waters.

Objective 10: Protect and restore waters at risk from recreational impacts.

Action 1: **Provide technical and/or financial support for Kentucky's Volunteer Lakes Monitoring Program (for the identification of harmful algal blooms (HABs)).**

Action 2: **Provide technical and/or financial support for projects that implement BMPs in watersheds with recreation use impairments.**

Action 3: **Provide technical and/or educational support for Harmful Algal Bloom issues.**

See Appendix B for a complete list of Kentucky's NPS Pollution Program goals, objectives, activities and tracking measures with anticipated completion time frames.

12. Resource Extraction

12.1 Summary

Kentucky is a state with abundant natural resources, including several that are extracted for commercial use. As the landscape is altered with the extraction of oil and gas, minerals and limestone, sand and gravel, and coal, there is the potential for streams to be impacted by nonpoint source pollution. Runoff from newly exposed soil and rock, along with the materials used in processing, can impact stream systems if not properly managed. The following sections detail some of the resources that are extracted across the Commonwealth.

12.1.1 Coal Production

Coal mining began in Kentucky as early as 1820 in Muhlenberg County. Kentucky has been one of the top three coal producing states in the United States for decades. Currently, Kentucky ranks third in national coal production. According to the Kentucky Department of Mines and Minerals, more than 8.36 billion tons of coal has been produced from the two Kentucky coal fields for the past 200 years. The Eastern Kentucky Coal Field has produced more than 5.78 billion tons and the Western Kentucky Coal Field has produced more than 2.58 billion tons. In 2006, Kentucky had more than 400 mines and produced almost 126 million tons of bituminous coal (Kentucky Geological Survey (KGS), 2008). According to the federal Surface Mining Control and Reclamation Act of 1977, land must be reclaimed in a manner to make it as useful as before mining. Land mined after 1977 is not eligible for 319(h) funds since the money would be used to meet a permit requirement.

Coal mining is often considered a regional impact, but has occurred in 56 of Kentucky's 120 counties (Figure 12.1). In the early history of Kentucky, nearly all mining was by underground

Figure 12.1. Kentucky coal field counties.

methods. Dragline mining significantly increased after 1940 in the low-relief areas of Western Kentucky to produce the abundant near-surface reserves. In Eastern Kentucky, dragline methods were originally not as feasible because of the steep topography, and surface-mining

techniques for contour stripping and mountaintop removal were not efficiently applied until after 1970. Surface production in Eastern Kentucky increased dramatically after 1970, and high levels of surface production continue in this area. However, by 2005, there were no active draglines in Eastern Kentucky. Currently, 43% of Eastern Kentucky production is by surface methods, and today Eastern Kentucky produces nearly 80% of Kentucky's coal (KGS, 2008).

12.1.2 Oil and Gas Production

Oil and gas exploration began in 1818 in Kentucky in McCreary County. The record of Kentucky oil production data begins in 1883. Statewide gas production data were recorded beginning in 1950. In 1912, the first commercial oil well in western Kentucky was completed in Ohio County. The first major oil boom occurred as a result of drilling to supply fuel for our European allies in World War I. Discovered in 1918, the Big Sinking Field, located mostly in Lee County, eastern Kentucky, is the commonwealth's only giant oil field.

Drilling and production generally increased until 1959, when 10 million barrels of oil were produced from the Greensburg Pool, Green and Taylor Counties, west-central Kentucky. The 1960s was the heyday of water flooding with production of more than 1 million barrels of oil per year from the Big Sinking Field, Lee County. In 1967, natural gas production exceeded oil production on a Btu basis. With increased drilling in the Ordovician Knox Group in south-central Kentucky and the Devonian Ohio Shale in eastern Kentucky, the 1980s saw an unprecedented number of wells completed. The era of horizontal drilling opened in 2007 with the Ohio Shale in eastern Kentucky (leading to record gas production) and in 2011 with oil production in the Devonian Berea Sandstone of northeastern Kentucky. The leading oil-producing county is now Lawrence County (Lynch, 2018).

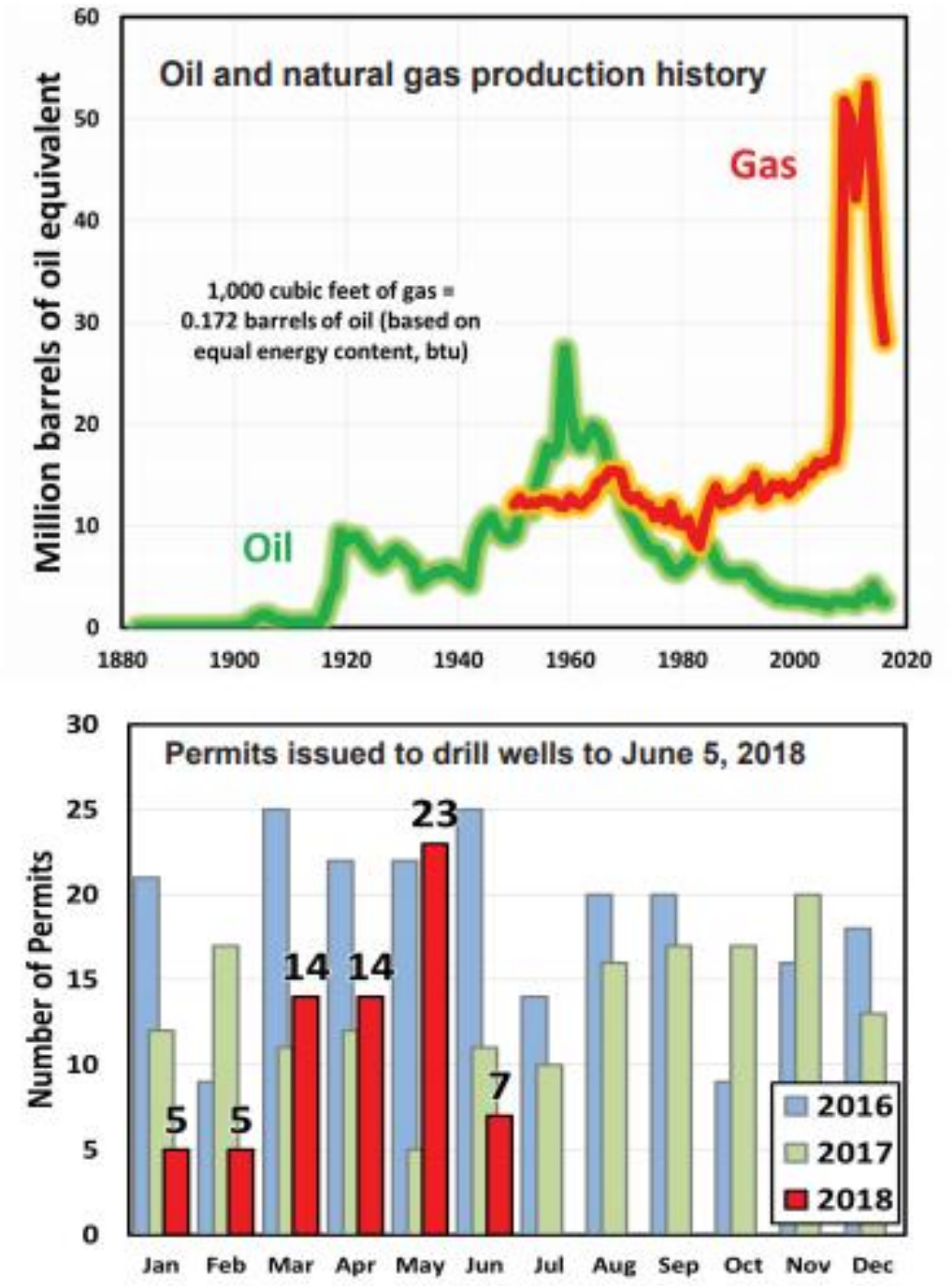


Figure 12.2. Kentucky's Historic Oil and Gas Production, from Kentucky Geological Survey (Lynch, 2018).

12.1.3 Quarries

A smaller portion of the resources extracted in Kentucky are obtained through quarrying. The total acreage of the state that is categorized as non-coal activity is just over 50,000 acres. More

than 50% of the surface rocks in Kentucky are limestone, and these account for just over 50% of the active quarry permits in the state. The remaining half of these permits are distributed among sand and gravel and various other mineral quarries.

12.2 DOW Strategy

Much of the land use related to resource extraction requires a permit issued by the Kentucky Division of Water or one of our partners. The Division investigates all complaints of water quality impacts from resource extraction of all kinds. In the instance that an impact is found, the complaint is referred to the regulatory agency for further investigation and remediation. The Division has supported projects with our partner agencies through funding or technical support to address things such as pre-law mining or diffuse acid mine drainage.

12.2.1 Partner Strategy

Numerous partners across Kentucky help address nonpoint source pollution from resource extraction impacts. The political nature of resource extraction often makes it a challenging area to address, but working with partners provides the DOW with opportunities to collaborate on priority resource extraction issues across the Commonwealth. The overlap with so many different regulatory programs can make it difficult to see what agency is best suited to address the pollution which makes communication between state programs critical to proper pollution management strategies. NPS staff continue to work with pre-law mining programs when possible to address these concerns.

The following state agencies are critical partners in addressing resource extraction issues in the Commonwealth.

- **Kentucky Brownfield Program** - https://eec.ky.gov/Environmental-Protection/brownfields/Pages/default.aspx
  Brownfields are areas where expansion, redevelopment, or reuse may be complicated by the presence or perceived presence of a hazardous substance. Cleaning up and utilizing these properties protects the environment, reduces blight, and takes development pressures off greenspaces and working lands. The Kentucky Brownfield Program is housed in the Division of Compliance Assistance. The program seeks to help redevelop and revitalize properties that are abandoned or underutilized due to real or perceived contamination. There are an estimated 8,000 brownfields across the Commonwealth. They include sites such as old gas stations, mine-scarred lands, abandoned factories, old schools, retired hospitals, and meth labs. The Kentucky Brownfield Program offers comprehensive services to help with these problem properties.
- **Kentucky Department for Natural Resources (DNR)** - https://eec.ky.gov/Natural-Resources/Pages/default.aspx
  Chapter 350 of the Kentucky Revised Statutes governs the environmental regulation of surface mining of coal and other minerals and the surface effects of underground mining. It assigns the Energy and Environment Cabinet the responsibility for

administering the statutes and adopting necessary regulations. The Kentucky Department for Natural Resources (DNR) is the agency with front-line responsibility for carrying out the statutes and regulations adopted under KRS Chapter 350.

- **Kentucky Division of Mine Permits (DMP)** - https://eec.ky.gov/Natural-Resources/Mining/Pages/default.aspx

  The Division of Mine Permits (DMP), along with the Division of Abandoned Mine Lands (AML) and the Division of Mine Reclamation and Enforcement (DMRE), administer the surface coal mining regulatory program in Kentucky. The DMP evaluates applications, including mining and reclamation plans, and issues permits to ensure that all surface coal mining operations in Kentucky meet the minimum performance standards for environmental and public protection and reclamation as required by the federal Surface Mining Control and Reclamation Act (SMCRA) of 1977. The Division of Mine Permits also maintains a database of water quality data submitted as part of an application for a permit.

- **Kentucky Division of Oil and Gas** - https://eec.ky.gov/Natural-Resources/Oil-and-Gas/Pages/default.aspx

  The mission of the Division of Oil and Gas is to regulate the crude oil and natural gas industry in the Commonwealth; protect the correlative rights of mineral owners, fresh water zones and minable coal seams; and conserve and protect oil and gas reserves in Kentucky. The Division of Oil and Gas maintains a well history database for each well containing data relative to the permit, operator, well location, pertinent dates and well completion. This information is shared with the Kentucky Geological Survey to assist in the compilation of oil and gas data. This database can be found online at kgs.uky.edu/kgsweb/DataSearching/OilGas/OGSearch.asp.

12.2.2 Education and Outreach

The DOW, along with federal agencies and state associations, have many sources of information pertaining to resource extraction. The following websites and organizations provide resources to better inform interested parties about resource extraction.

- ***Coal in Kentucky* Documentary** - http://www.vis.uky.edu/coal/

  The Media Research Lab within the Vis Center and the Department of Mining Engineering, College of Engineering at the University of Kentucky received funding from the Kentucky Energy and the Environment Cabinet for a video documentary project with supporting online materials and educational events exploring the enduring significance of coal mining in Kentucky. The intent of this project is to present a balanced picture of coal in Kentucky.

- **Department of Energy (DOE) on Fossil Fuels** - energy.gov/fossil

  The mission of the DOE is to ensure America's security and prosperity by addressing its energy, environmental, and nuclear challenges through transformative science and technology solutions. This website provides statics and other information on fossil fuel use in the United States.

- **Mountain Association for Community Economic Development (MACED) Reports** - https://maced.org/

  Kentucky is approaching a critical crossroads in its relationship to coal. Rapid and dramatic changes in the world's approach to energy will have major implications for the industry and the Commonwealth. At the same time, there are challenging questions about the role and impacts of coal within the state and its coal producing communities.

  Kentucky should approach choices about its future with a thorough understanding of the costs and benefits of various options. Too often missing, however, is factual research and analysis of the benefits and costs of coal in those places to enrich the decision making. To help fill in some of the missing research gaps, MACED has researched and produced two insightful reports.

  - *The Impact of Coal on the Kentucky State Budget* report compares the tax revenues generated by the coal industry in Kentucky with the state expenditures associated with supporting the industry.
  - *The Economics of Coal in Kentucky: Current Impacts and Future Prospects* report provides an overview of the current economic role and significance of the industry in Kentucky and the challenges that coal in Kentucky will face in future years.
- **Kentucky Resources Council (KRC)** - www.kyrc.org

  The Kentucky Resources Council (KRC) is Kentucky's only environmental advocacy organization offering legal and strategic assistance without charge to individuals, community groups, and local governments statewide. As a nonprofit 501(c)(3) corporation, KRC accepts neither corporate nor government funding, and is supported solely by donations from individual and group members, individual donors, and charitable foundation grants. KRC's mission is to protect Kentucky's natural resources and promote healthy communities by providing legal and technical guidance and assistance to individuals, communities, and organizations with environmental concerns. Using an array of strategies and tools, including litigation, advocacy before state and federal legislatures and agencies, and public education, KRC seeks to protect Kentucky and its citizens from harm and to foster environmental responsibility.

12.2.3 Funding

Funding available through the DOW for resource extraction related issues includes some of the implementation or demonstration projects funded through the 319(h) grant award program. Several other sources of funding are available through federal agencies. The following websites provide information on these opportunities.

- **319(h) NPS Grants** - https://eec.ky.gov/Environmental-Protection/Water/Protection/Pages/Section-319(h)-Grant-Program-Funding.aspx

  The 319(h) is the section of the Clean Water Act dealing with nonpoint source pollution. Each year, the DOW applies to the EPA to receive 319(h) funding. The DOW distributes a majority of the monies received through a competitive grant award process to

communities, citizen groups, and organizations throughout Kentucky. To address resource extraction issues, 319(h) funding has been used to remediate acid mine drainage and other issues through watershed planning efforts. This funding could also be utilized for innovative demonstration projects related to resource extraction issues. To find out more about the 319(h) grant process, please visit the DOW website or see Appendix A.

- **Brownfields Grants** - www.epa.gov/brownfields/grant_info/index.htm

  The EPA's Brownfields Program provides direct funding for brownfields assessment, cleanup, revolving loans, and environmental job training. To facilitate the leveraging of public resources, the EPA's Brownfields Program collaborates with other EPA programs, other federal partners, and state agencies to identify and make available resources that can be used for brownfields activities. In addition to direct brownfields funding, the EPA also provides technical information on brownfields financing matters.

- **Abandoned Mine Lands Grants** - https://www.osmre.gov/programs/aml.shtm

  The Abandoned Mine Lands program is authorized in Title IV of the Surface Mining Law. States with an approved program, or specific Indian tribes, are eligible for Abandoned Mine Lands Grants. The funds come from fees paid on each ton of coal mined by active coal mine operators.

12.3 Objectives and Action Items

The Kentucky Division of Water endeavors to reduce nonpoint source pollution across the Commonwealth. To achieve the stated goal of restoring nonpoint source impaired waters in Kentucky, the DOW has developed an objective and one action related to NPS pollution from resource extraction.

Long Term Goal 1: Restore Nonpoint Source Impaired Waters.

Objective 11: Decrease nonpoint source pollution from resource extraction.

Action 1: Provide technical and/or financial support for reducing nonpoint source pollution due to resource extraction activities.

See Appendix B for a complete list of Kentucky's NPS Pollution Program goals, objectives, activities and tracking measures with anticipated completion time frames.

13. Riparian Areas, Wetlands and Stream Modification

13.1 Summary

Riparian refers to anything connected with or immediately adjacent to the banks of a stream or other body of water. Streamside forests are riparian forests (see Figure 13.1). The riparian areas which encompass the floodplain and a portion of the adjacent upslope area are complex ecosystems. Riparian areas connect aquatic systems to land use activities. The ability of these areas to function naturally is crucial to the protection of the water resources.

Figure 13.1. Streamside riparian area near Lilley Cornett Woods in Letcher Co., Kentucky. Photo © Michelle Shane, 2011.

Various land activities in Kentucky, watershed changes, and direct manipulation of streams have led to altered channel geometry. These changes are responsible for increased sediment transport capacity, decreased frequency of floodplain inundation, reduced variability of habitat, reconfiguration or disruption of the groundwater-stream interaction, and a decrease in riparian vegetation. Bank and bed erosion in unstable channels produces sediments that overwhelm the capacity of streams to transport them. Siltation occurs where the sediments are deposited. Stream channel alterations are responsible for the disruption of stable bedforms, such as pools and riffles. Physical alterations of stream channels are a significant source of stream habitat degradation and impairment and a major source of nonpoint source pollution in watersheds in Kentucky.

Wetlands and riparian areas occur as natural buffers between uplands and adjacent water bodies. They act as natural filters of nonpoint source pollutants, such as sediment, nutrients, pathogens, and metals to water bodies. Kentucky's wetlands are most common on the floodplains along rivers and streams, in low-lying areas where groundwater meets the soil surface or where precipitation sufficiently saturates the soil in isolated depressions. Many of these wetlands are only wet during certain seasons of the year, but provide storage for large rain events and a critical habitat for wildlife adapted to these areas. Wetland function has not always been well understood and more than half of America's wetlands have been destroyed (US EPA, 2012).

According to the 2016 Integrated Report to Congress on the Condition of Water Resources in Kentucky, of the stream miles assessed (12,753 miles) in Kentucky, bacteria is listed as the major cause of stream impairment (4,422 miles). The second leading probable source of impairment is listed as sedimentation/siltation (DOW, 2016).

13.2 DOW Strategy

Stream channel geometry is a product of many complex watershed processes. Direct modifications, such as straightening or relocation of a stream, and changes to the watershed imposed by land use activities such as development, livestock grazing, land clearing, and road construction, have contributed to the deposition of fine-grained sediments in streams and are one of the primary causes of stream impairment in Kentucky. Because these and other similar impairments are so closely related to channel geometry, evaluation of geomorphic characteristics is important not only for assessing stream conditions but also for identifying stream impairment sources and practical mitigation strategies. The Kentucky Division of Water (DOW) has funded several projects that resulted in the development of regional curves through an extensive examination and collection of stream geomorphic characteristics in each of the five major physiographic regions of Kentucky: the Mississippi Embayment, Bluegrass, Eastern Kentucky Coal Field, Western Kentucky Coal Field, and the Eastern rim of the Mississippian Plateau. Information about those studies and links to each of the curves can be found in the Division's Publications Database.

13.2.1 Kentucky Water Quality Certification Program

Anyone proposing to conduct activities that result in physical disturbances to wetlands or streams may need a Water Quality Certification (WQC) to ensure Kentucky Water Quality Standards will not be violated. Projects that involve the discharge of dredged or fill materials into waters of the United States, including wetlands, are regulated by the US Army Corps of Engineers under Clean Water Act Section 404 and require Section 401 Certification. Although the USACE issues the Section 404 Permits, the DOW issues Section 401 Certifications. Examples of activities that may require a Section 404 Permit and Section 401 WQC are stream relocations, road crossings, stream bank protection, construction of boat ramps, placing fill, grading, dredging, ditching, mechanically clearing a wetland, building in a wetland, constructing a dam or dike, and stream diversions. For more information about obtaining a WQC and other program requirements visit the 401 Water Quality Certification Page.

13.2.2 Dam Construction

A dam is defined as any impounding structure that is either 25 feet in height, measured from the downstream toe to the crest, or has a maximum impounding capacity of 50 acre-feet or more of water. Structures that fail to meet these criteria but have the potential to cause significant property damage or pose a threat to life in the downstream area are regulated in the same manner as dams. All such structures except federal dams and those permitted by the Division of Mine Reclamation and Enforcement must be reviewed, and a stream construction permit must be issued by the DOW pursuant to KRS 151.250.

13.2.3 Kentucky Wetland Rapid Assessment Method (KY-WRAM)

The Kentucky Division of Water, partnered with Eastern Kentucky University, is developing a rapid wetland assessment method to assess the functions and ecosystem services of Kentucky wetlands. The KY-WRAM will be designed as a functional assessment tool, and it will mirror that of other states by modifying existing methods. Within each wetland type found in Kentucky, we will compare reference and impaired sites to calibrate the method for rapidly assessing wetland quality. After the KY-WRAM has been field tested by the project team, we will conduct training workshops for agency personnel and private sector consultants. Once in place, we expect the KY-WRAM will be used to evaluate potential dredge and fill impacts, assess mitigation and restoration success, assist in watershed planning, and support the development of regulations protecting unique or high quality wetlands. By first adapting existing rapid assessment methods, we will shorten the development process, allowing us to initiate validation using biocriteria. Please visit the DOW website for more information on KY-WRAM. To find out more about rapid wetland assessment methods visit www.epa.gov/wetlands/wetlands-monitoring-and-assessment.

13.2.4 Partner Strategy

The impacts from our lack of floodplains, intact riparian zones, wetlands, and natural stream process capabilities pose significant challenges to restoring the waters of the Commonwealth, and the DOW does not have the resources to manage these issues alone. In projects where large and small-scale stream restoration has been required, the DOW has partnered with organizations like the University of Louisville Stream Institute to engineer scientific solutions to address stream and wetland degradation. Many of our conservation partners have goals that converge with NPS goals for riparian zone, wetland, and stream restoration, and in the next 5 years it will be a strategy to form more active partnerships with organizations where these occur.

Below is a list of some of the organizations assisting with these efforts and the work they are performing throughout the Commonwealth:

- **Department for Natural Resources – Water Quality Certification for Surface Coal Mining Operations** – dnr.ky.gov/Pages/default.aspx

  The Department for Natural Resources reviews applications for Clean Water Act Section 401 WQC associated with activities related to surface coal mining operations. Examples include, but are not limited to, surface coal mining operations, improvements to local roads for the purposes of hauling coal, restoration of abandoned mine lands, and off-site stream or wetland restoration activities intended solely to offset impacts resulting from surface coal mine activities. Visit the Department for Natural Resources Web site for further information on this process.

- **Kentucky Department of Fish and Wildlife Resources (KDFWR)** - fw.ky.gov/Fish/Pages/Stream-Team-Program.aspx

  The Kentucky Department of Fish and Wildlife Resources (KDFWR) runs an ambitious program to conserve and restore streams and wetlands in our home state. The KDFWR

recognizes that healthy, clean streams and aquatic habitat are vital to the quality of life for all Kentuckians and the fish and wildlife in the state. The loss of wetland and stream habitat both in quality and quantity is well documented. The KDFWR Stream Team Program is committed to addressing the continued loss of these important resources by offering landowners free repairs to eroding and unstable streams and wetlands. The team consists of a group of stream restoration specialist in KDFWR whose jobs are to identify and undertake stream restoration projects statewide.

In July 2000, the Kentucky Legislature passed KRS 150.255 which established The Kentucky Wetland and Stream Mitigation Fund. The KDFWR Stream Team Program manages this fund to provide a consistent and successful approach to fulfill compensatory mitigation requirements associated with Section 404 and 401 requirements of the USACE and the DOW. Additionally, the KDFWR administers the In-lieu Fee Mitigation Program for the Commonwealth, excluding the counties covered by Northern Kentucky University.

- **Northern Kentucky University (NKU) Center for Applied Ecology (CAE)** - inside.nku.edu/environmentalrestoration/program.html

  The Northern Kentucky Stream Restoration Program (NKSRP), administered by the Center for Applied Ecology, is the In-lieu Fee (ILF) Mitigation Program serving nine northern Kentucky counties: Boone, Kenton, Campbell, Carroll, Gallatin, Grant, Pendleton, Bracken and Mason. ILF mitigation for the remainder of the Commonwealth is administered by Kentucky Fish and Wildlife. The CAE employs fees paid by public and private entities that have impacted aquatic ecosystems to implement stream and wetland restoration and preservation projects in the region. The purpose of the program is to replace aquatic ecosystem functions and services lost to development (no net loss), such as stream, wetland, and riparian habitat, water quality protection, pollutant removal, floodwater and energy dissipation, and natural area aesthetics and recreation opportunities. All NKSRP restoration projects are permanently protected by conservation easement or deed restriction for the benefit of current and future generations. NKSRP also seeks to advance the practice of restoration with improved project outcomes at reduced mitigation costs and by promoting practical methods that can be readily adopted by other practitioners.

- **U of L Stream Institute** - louisville.edu/speed/research/groups/Stream%20Institute

  The University of Louisville Stream Institute is an applied research group of faculty, staff, and students who design and restore stream and wetland ecosystems; study how streams, wetlands, and watersheds have been affected by human activity; provide training to improve techniques used in restorations; and assist public agency personnel who work on restorations. The team of students, staff, and faculty who make up the Stream Institute employ a multidisciplinary approach to the restoration of self-sustaining stream-and-wetland complexes. Through collaboration with engineering and construction firms, geomorphologists, biologist, and ecologist, the Stream Institute has pioneered numerous methods for assessment, design, construction, and monitoring of stream and wetland restoration projects. One of the fundamental components of the

design approach employed by the institute has been the use of two-dimensional hydrodynamic modeling to design the floodplain topography and the planform characteristics of channels. A second fundamental component of the design approach has been to restore both groundwater and surface water processes in the floodplain and channel. By reestablishing groundwater retention in valley aquifers, the Stream Institute has been able to restore hydrologic conditions that support extensive riparian wetlands and habitat for resident aquatic organisms, including threatened and endangered species.

The U of L Stream Institute's main objectives are to develop restoration methods and technical expertise to restore degraded streams while improving the capacity of the surrounding land for human use; develop practical methods of incorporating sediment transport assessment techniques into stream restoration; develop and provide tools, methods, and information to improve stream and watershed assessment, monitoring, and restoration design; and to develop and provide practical and reliable training and technical assistance (e.g., information exchange, advice) to water resource personnel who design, implement, manage, or regulate stream restoration and/or watersheds.

The Kentucky Division of Water works with the University of Louisville Stream Institute on numerous issues involving in-stream sedimentation and stream restoration. Although no agency level memorandum of understanding exists between the two parties, the U of L Stream Institute is working on several Nonpoint Source Program projects, 401 Certification Program research, and they are seeking permits from the Division of Water for in-stream work for other state, federal, and local agencies. The NPS Management Program and U of L Stream Institute have worked together for many years to further the science behind stream sedimentation issues and to coordinate the efforts of all government agencies, universities, and private industry to improve stream function.

13.2.5 Education and Outreach

Education and outreach efforts are fundamental aspects in engaging citizens and communities to understand their impacts and change their behaviors. There are a number organizations and tools available to assist with education and outreach efforts with stream or wetland restoration. Listed below are general educational resources for stream and wetland restoration and the importance of these resources in stream function. Please see the Education and Outreach Section of this report for more information on other water education resources.

- **Wetland Restoration and Training** - www.wetlandrestorationandtraining.com
  Wetland Restoration and Training LLC (previously the Center for Wetland and Stream Restoration) is a partnership of agencies, organizations and businesses working together to restore wetlands and streams, improve techniques for their restoration, and train individuals on how they can bring back these ecosystems.

- **National Management Measures to Control Nonpoint Source Pollution from Hydromodification (July 2007)** - www.epa.gov/sites/production/files/2015-09/documents/hydromod_all_web.pdf

  The primary goal of this guidance document is to provide technical assistance to states, territories, tribes, and the public for managing hydromodification activities and reducing associated NPS pollution of surface and ground water. The document describes examples of the implementation of practices that can be used to reduce NPS pollution from activities associated with channelization and channel modification, dams, and streambank and shoreline erosion.

- **US EPA Fact Sheets** - www.epa.gov/wetlands/wetlands-factsheet-series

  The EPA has developed a series of fact sheets that provide technical and educational information on a variety of topics related to wetlands conservation.

- **US EPA Wetlands Education Materials** - www.epa.gov/wetlands/wetlands-education-students-and-teachers

  This website will help you find activities, curriculum/guides, education programs, teaching tools, and other links related to Wetlands Education.

- **Wetland 101: Online Course and Quiz** - www.wetland.org/education_wetland101.htm

  This online course has been designed to give you a basic understanding of wetland ecology, types, functions and management. It is the perfect first step for anyone interested in learning more about wetlands.

13.2.6 Funding

Funding is often a major barrier for communities addressing natural stream and wetland function restoration. The following provides information about funding resources available for riparian, wetland, or stream process related projects. Many of these sites are updated as funding becomes available, therefore it is important to check these locations on a regular basis.

- **319(h) NPS Grants** - https://eec.ky.gov/Environmental-Protection/Water/Protection/Pages/Section-319(h)-Grant-Program-Funding.aspx
  319(h) is the section of the Clean Water Act dealing with nonpoint source pollution. Each year the DOW applies to the EPA to receive 319(h) funding. The DOW distributes a majority of the monies received through a competitive grant award process to communities, citizen groups, and organizations throughout Kentucky. Geomorphic assessments and riparian or wetland restoration as best management practices are eligible for funding in areas identified as impacted in a watershed based plan. To find out more about the 319(h) grant process, please visit the DOW website or see Appendix A.

- **Natural Resources Conservation Service (NRCS)** - www.nrcs.usda.gov

  The Natural Resources Conservation Service (NRCS) has offices in nearly every county across the United States. They work with communities to improve soil, water, air, plants, wildlife, and energy use. Their vision is to ensure productive lands in harmony with a

healthy environment. They administer the Farm Bill programs including the Conservation Reserve Program (CRP), the Environmental Quality Incentives Program (EQIP), Conservation Innovation Grants (CIG), Wetlands Reserve Program (WRP), and the Wildlife Habitat Incentive Program (WHIP).

- **State Flood Control Matching Grant Program** - kydlgweb.ky.gov/FederalGrants/16_Flood.cfm

  The Flood Control Program uses state bond funds as grants to help meet cost-share match requirements associated with projects funded by the USACE, the Federal Emergency Management Agency, and the Natural Resources Conservation Service. The type of projects previously funded included small dam reconstruction, acquisition and relocation of homes from flood prone areas, debris removal created by tornadoes and construction of floodwalls and elevation of structures about the floodplain. The fund has also been used to participate in flood studies for future projects.

- **Partners for Fish and Wildlife Program** - www.fws.gov/partners

  Partners for Fish and Wildlife is a national US Fish and Wildlife program that works with private landowners and other organizations to protect, enhance, and restore important fish and wildlife habitats on private lands. Through voluntary agreements the Partners, this program provides expert technical assistance and cost-share incentives directly to private landowners to restore fish and wildlife habitats. Money can be used to restore wetlands.

13.3 Objectives and Action Items

The Kentucky Division of Water endeavors to reduce nonpoint source pollution across the Commonwealth. To achieve the stated goal of restoring nonpoint source impaired waters in Kentucky, the DOW has developed an objective and two action related to reducing NPS pollution from stream modifications.

Long Term Goal 1: Restore Nonpoint Source Impaired Waters.

Objective 12: Decrease the negative impacts of excessive sedimentation in Kentucky's Streams.

Action 1: Provide financial, technical, and/or educational support for projects that implement sediment control BMPs.

Action 2: Target additional sources of funding for stream restoration projects that will positively address sediment impaired streams.

See Appendix B for a complete list of Kentucky's NPS Pollution Program goals, objectives, activities and tracking measures with anticipated completion time frames.

14. Water Supply

14.1 Summary

Kentucky is generally a water-rich state, and for many people water supply is only a consideration during drought conditions. However, pollution can lead to significant impacts to the quantity of water available to meet the Commonwealth's designated uses for water. One way in which nonpoint source pollution can affect public health is through impacts to the quality of drinking water available. Excess nutrient pollution through nonpoint source impacts can cause taste and odor problems in drinking water or make it more expensive or difficult to treat. Toxic or harmful pollutants introduced into a water source can greatly impact the quantity of water available for use in the drinking water supply. Other pollutants can lead to health problems when found in water used for irrigation of crops for human consumption. The Kentucky Division of Water (DOW) has signs posted, such as the one in Figure 14.1, to raise awareness about water supply and protection efforts by the Division. The following programs are currently in place to protect water supplies from nonpoint source pollution.

Figure 14.1. Water supply protection signage.

14.2 DOW Strategy

The DOW has several programs that address water supply issues in the state, and these programs generally include water quality components. The Source Water Assessment and Protection Program (SWAPP) and the Wellhead Protection programs are implemented through the DOW and several 319(h) grant funded projects have included planning for water supply sources as part of their holistic watershed planning project.

- **Source Water Assessment and Protection Programs (SWAPP)** - https://eec.ky.gov/Environmental-Protection/Water/Protection/Pages/SWP.aspx
  The Safe Drinking Water Act (SDWA) Amendments of 1996 required states to develop and implement SWAPPs to analyze existing and potential threats to the quality of the public drinking water throughout the state. All 120 counties in Kentucky were required

to assess their water availability and security and plan for the next 20 years. Many of the counties did this planning in conjunction with their local Area Development Districts.

- **Wellhead Protection Program (WHPP)** - https://eec.ky.gov/Environmental-Protection/Water/Protection/Pages/SWP.aspx
  The Wellhead Protection Program is a pollution prevention and management program used to protect groundwater sources of drinking water. The national WHPP was established under Section 1428 of the 1986 SDWA amendments. It is incorporated in state regulations under 401 KAR 4:220. Management plans must be written for each public water source utilizing groundwater and updated every five years.

14.2.1 Partner Strategy

Working with partners provides the DOW with opportunities to collaborate on priority water supply issues across the state. Regional agencies, state agencies, and organizations are critical partners in providing developmental and technical assistance for water supply issues. Outside of the Division, there is potential for increased cooperation between the NPS program Kentucky Infrastructure Authority (KIA) on implementation of green infrastructure programming. The Ohio River Valley Sanitation Commission (ORSANCO) has also been a valuable partner in the past, and future NPS programming will include working with them on technical assistance and project management of the Gunpowder TMDL-Alt Plan.

There has recently been a national effort to include source water into nonpoint source planning. Within the Division, the source water and groundwater protection programs are within the same branch of the Division of Water and work together on a daily basis. Although few protection plans have been developed for drinking water sources, the DOW plans to develop a list of watersheds with known nonpoint source threats to prioritize for straight-to-implementation plans to complement their Source Water Protection Plans.

- **Kentucky Infrastructure Authority (KIA)** - https://kia.ky.gov/Pages/index.aspx
  The KIA provides funding for construction of local public works projects. The Water Resource Information System (WRIS) was designed by KIA to give access to information needed in all aspects of water planning and emergency management decision making. It is linked to multiple state agency databases in order to bring together all of the useful water resource information into one easy to use application.
- **Kentucky Rural Water Association (KRWA)** - www.krwa.org
  The KRWA provides training and technical assistance to improve regulatory compliance. The KRWA promotes creation and implementation of water management strategies to its member public water systems.
- **Ohio River Valley Sanitation Commission (ORSANCO)** - www.orsanco.org
  The ORSANCO is an interstate organization created to utilize water management strategies to assist in pollution control within the Ohio River. This would include

assisting states to develop and implement SWAPs to protect public drinking water supplies.

14.2.2 Education and Outreach

The DOW, along with federal agencies and state associations, has many sources of information pertaining to water supply protection and management. The following websites and organizations provide resources to better inform interested parties about water supply issues.

- **Kentucky Rural Water Association (KRWA)** - www.krwa.org

  The KRWA assists systems and communities with developing, implementing, and updating source water protection plans. Currently, there is no charge to systems or communities for their assistance. The KRWA also gives talks about wellhead and source water protection at their own trainings, public events, and meetings.

- **Wellhead and Source Water Protection Information** - water.epa.gov/infrastructure/drinkingwater/sourcewater/protection/epastateandtribalprograms.cfm#wellhead

  General and state specific information about Wellhead and Source Water Protection Programs can be found at the above link. There are links to the EPA and non-EPA publications and resources, state groundwater information, watershed based protection programs and other EPA, federal and non-government programs geared toward source water protection.

  The Wellhead Protection staff hosts public meetings before a new or an updated Wellhead Protection Plan is approved. At these meetings, information about groundwater protection plans and agricultural programs to reduce pesticide/herbicide runoff is discussed with those in attendance. These meetings include water professionals, local officials, and citizens.

14.2.3 Funding

Funding available for onsite wastewater management through the DOW includes the Clean Water State Revolving Fund and some of the implementation or demonstration projects funded through the 319(h) grant award program. Several other sources of funding are available through state nonprofit groups or federal agencies. The following websites provide information on these opportunities.

- **319(h) NPS Grants** - https://eec.ky.gov/Environmental-Protection/Water/Protection/Pages/Section-319(h)-Grant-Program-Funding.aspx

  319(h) is the section of the Clean Water Act dealing with nonpoint source pollution. Each year, the DOW applies to the EPA to receive 319(h) funding. The DOW distributes a majority of the monies received through a competitive grant award process to communities, citizen groups, and organizations throughout Kentucky. Past and current 319(h) grant funded projects have included planning for water supply sources as part of their holistic watershed planning project. Innovative projects to protect water sources

from impacts due to nonpoint source pollution are also potential candidates for 319(h) funding. To find out more about the 319(h) grant process, please visit the DOW website or see Appendix A.

- **Drinking Water State Revolving Fund** - https://eec.ky.gov/Environmental-Protection/Water/Funding/CWSRF/Pages/default.aspx

  Funding is available through the Drinking Water State Revolving Fund. The Intended Use Plan, developed through a partnership between the Energy and Environment Cabinet and the Kentucky Infrastructure Authority, describes how the money will be distributed and who or what type of projects are eligible.

- **Drinking Water Source Assessment and Protection** - https://eec.ky.gov/Environmental-Protection/Water/Drinking/Pages/Drinking%20Water.aspx

  The Division of Water webpage for Drinking Water Source Assessment and Protection maintains many links for funding available through grants and loans. Funding information through the Kentucky Infrastructure Authority, the KRWA, and many others is available through this site.

- **University of Kentucky Cooperative Extension Service** - ces.ca.uky.edu/ces

  The UK Cooperative Extension Service has funding information available by county through their main website. Programs vary in availability from county to county but can include fencing incentives, pesticide/herbicide reduction programs, and high-use area grants.

14.3 Objectives and Action Items

The Kentucky Division of Water endeavors to reduce nonpoint source pollution across the Commonwealth. There has recently been a national effort to include source water into nonpoint source planning. In Kentucky, the source water and groundwater protection programs are within the same branch of the Division of Water and work together on a daily basis. Although few protection plans have been developed for drinking water sources, the DOW plans to develop a list of watersheds with known nonpoint source threats to prioritize for straight-to-implementation plans to complement their Source Water Protection Plans. In an effort to achieve the stated goal of protecting waters currently meeting designated uses in Kentucky, the DOW has developed an objective and three actions related to the reduction of NPS pollution in our water supply.

Long Term Goal 2: Protect waters currently meeting designated uses.

Objective 2: Prioritize Source Water and Wellhead Protection areas for protection from nonpoint sources of pollution.

Action 1: **Coordinate with the Division's Source Water Protection Program to identify and reduce nonpoint source pollution in source water protection areas.**

Action 2: **Provide technical assistance for projects protecting source water and promoting groundwater recharge.**

Action 3: Coordinate with the Division's Wellhead Protection Program to identify and reduce nonpoint source pollution in wellhead protection areas.

See Appendix B for a complete list of Kentucky's NPS Pollution Program goals, objectives, activities and tracking measures with anticipated completion time frames.

15. Education and Outreach

15.1 Summary

15.1. Streamside field day, Bowling Green, KY.

Nonpoint source education and outreach is an essential component of realizing improvements in Kentucky's watersheds. Every citizen in the Commonwealth is a contributor to nonpoint source pollution, thereby impacting water quality. By helping citizens and businesses link their lifestyles and activities directly to our waters, we raise awareness and concern, affecting improvements in watershed health. Through a diverse array of tools, DOW aims to extend water knowledge to every citizen in the Commonwealth (see Figure 15.1), and to build and strengthen partnerships with businesses, citizen groups, schools, and local governments. Together we can increase understanding in our communities, reduce nonpoint source pollution, and positively transform the way we all interact with our watersheds.

15.2 DOW Strategy

DOW reaches out to communities, volunteer organizations, businesses, and government across the Commonwealth through a variety of means, including the international program Project WET, educational websites, annual outreach and education events, and targeted educational focus areas. In addition, annual 319(h) grants require significant education and outreach components as a condition of each award package.

15.2.1 Project WET

In 2012, the Kentucky Division of Water became the official Host Institution of Project WET in the Commonwealth. Since 1984, Project WET, an award-winning 501(c)(3) nonprofit organization, has dedicated itself to the mission of reaching children, parents, teachers and community members of the world with water education. Project WET achieves its mission of worldwide water education through publications, training workshops, global network and community events that are grounded in Project WET's core beliefs:

- Water connects us all: Water moves through living and nonliving systems and binds them together in a complex web of life.
- Water for all water users: Water of sufficient quality and quantity is vital for all water users (energy producers, farmers and ranchers, fish and wildlife, manufacturers, recreationists, rural and urban dwellers).

- Managing water sustainably: Water resources management is crucial for providing tomorrow's children with social and economic stability in a healthy and sustainable environment.
- Personal responsibility for water resources: Awareness of and respect for water resources can encourage a personal, lifelong commitment of responsibility and positive community participation.

Through an innovative partnership between the DOW and the Kentucky Association for Environmental Education (KAEE), Project WET daily activities will now be provided by KAEE. DOW continues to serve as the Host Institution of Project WET and provide essential funding for the program as well as a limited number of teacher stipends and curricula guides.

Questions about Project WET in Kentucky should be directed to Brittany Wray (brittany@kaee.org). Interested individuals may also visit the DOW Project WET website for more information on the program in Kentucky and to find out about upcoming workshops.

15.2.2 Water Watch and Watershed Watch

The Kentucky Division of Water established the Water Watch program in 1985 as a way of encouraging the public to become interested and engaged in water quality issues around the state. Water Watch is a program that provides water education materials to interested schools and teachers, and encourages the public to monitor the water quality in their local streams. The Watershed Watch program grew out of this effort and became established as a non-profit organization in 1997. The Division of Water provides staff administrative and technical assistance as well as periodic financial support for the volunteer monitoring organization.

The in-stream water quality data that Watershed Watch volunteers gather at the three annual sampling events is not collected under a Quality Assurance Project Plan (QAPP), and therefore cannot be used for assessment purposes or watershed plan development. However many Watershed Watch volunteers are highly skilled in water quality sampling procedures, and frequently participate in collecting data under a QAPP for specific projects such as a watershed plan development project in their community.

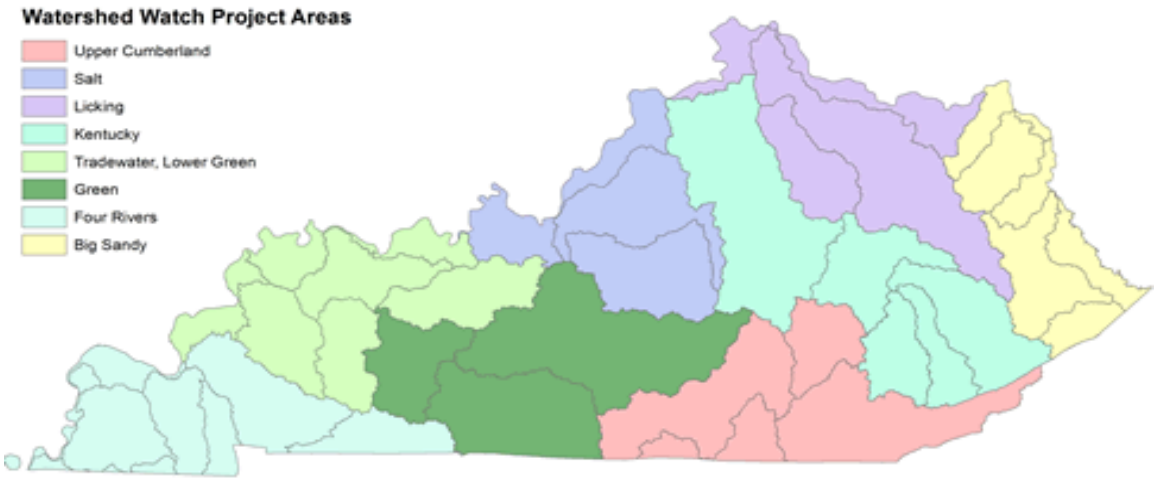


Figure 15.2. Watershed Watch project areas by Basin Group. Each Basin has a local group that collects water samples throughout the region in order to provide data on watershed health.

Watershed Watch has provided a starting point for numerous local watershed groups that are now working to develop and implement nine-key element watershed plans. Additional information regarding Kentucky Water Watch and Watershed Watch in Kentucky can be found at the following here on the DOW website.

15.2.3 Educational Websites

Internet sites offer a readily available forum for education and outreach, as most citizens now have access to the web in their homes or on their phones, in public libraries and schools. Websites highlighted in this section are those which offer a foundational resource base for all constituents.

- **Kentucky Association for Environmental Education (KAEE)** - www.kaee.org/

  The Kentucky Association for Environmental Education's (KAEE) mission is to promote excellence in environmental Education by providing support, resources, and networking opportunities to Kentucky's community of educators. Through an innovative new partnership with the DOW, KAEE provides administration of the daily operational activities of Project WET in Kentucky while DOW maintains the essential funding role as the host institution.

- **Association of Fish and Wildlife Agencies** - https://www.fishwildlife.org/projectwild/aquatic-wild

  The Association of Fish & Wildlife Agencies represents North America's fish and wildlife agencies to advance sound, science-based management and conservation of fish and wildlife and their habitats in the public interest. The Association also provides member agencies with coordination services on cross-cutting as well as species-based curriculum programs for k-12 that range from birds, fish habitat and energy development to climate change, wildlife action plans, conservation education, leadership training and international relations. The DOW works with curriculum from their Project Aquatic Wild Program. Information can be found here.

- **Environmental Education Equipment** - https://eec.ky.gov/Environmental-Protection/Water/Outreach/Pages/default.aspx

  The DOW's Water Watch Program has educational equipment that may be checked out by an individual, school or organization. This equipment is used to demonstrate how pollutants affect our water sources and the measures that we can take to prevent water pollution. The Water Watch Program also has display boards or the program's mascot, Ollie the Otter that may be checked out for an environmental education event. To request an item available for loan, simply fill out the request form on the website.

- **Greening Kentucky** - greeningkentucky.ky.gov

  Greening Kentucky offers visitors a look at how Kentucky state government is saving money while implementing processes and programs that are environmentally sustainable. Website users can select a cabinet within state government to view both completed and ongoing green initiatives. Visitors may also find information on efforts they can join, such as the Kentucky Department for Environmental Protection's 10-10-10-Challenge.

- **Integrated Report to Congress on the Condition of Water Resources in Kentucky** - https://eec.ky.gov/Environmental-Protection/Water/Monitor/Pages/Assessments.aspx

  The National Water Quality Inventory Report to Congress (305(b) report) is the primary vehicle for informing Congress and the public about general water quality conditions in the United States. This document characterizes our water quality, identifies widespread water quality problems of national significance, and describes various programs implemented to restore and protect our waters. Every two years Kentucky sends an Integrated 305(b)/303(d) Report to US EPA. The report assesses monitoring data from selected watersheds around the Commonwealth and determines if monitored streams are meeting designated uses.

- **Kentucky Environmental Education Master Plan (2015)** –

  https://keec.ky.gov/Documents/Master%20Plans%20and%20Surveys/Land,%20Legacy%20and%20Learning%20IV%20(2015).pdf

  Every five years the Kentucky Environmental Education Council (KEEC) convenes representatives of agencies and organizations from across the state. The representatives collaborate to create a plan to improve environmental education in Kentucky. The first plan, *Land, Legacy, and Learning*, was completed in 1999. The newest version, *Land, Legacy, and Learning III,* was completed in 2015. The Master Plan for Environmental Education in Kentucky consists of a list of recommendations for the KEEC, local government, and other EE organizations to improve environmental literacy in Kentucky. If you would like to be involved in creating the next master plan, please contact the KEEC. For more information on KEEC, please see the Partner Strategy Section below.

- **National Pollutant Discharge Elimination System (NPDES) Permit Program Basics** - https://www.epa.gov/npdes/npdes-permit-basics

  Water pollution degrades surface waters, making them unsafe for drinking, fishing, swimming, and other activities. As authorized by the Clean Water Act, the National

Pollutant Discharge Elimination System (NPDES) permit program controls water pollution by regulating point sources that discharge pollutants into waters of the United States. Point sources are discrete conveyances such as pipes or man-made ditches. Individual homes that are connected to a municipal system, use a septic system, or do not have a surface discharge do not need an NPDES permit; however, industrial, municipal, and other facilities must obtain permits if their discharges go directly to surface waters. In most cases, the NPDES permit program is administered by authorized states. Since its introduction in 1972, the NPDES permit program has been responsible for significant improvements to our Nation's water quality.

- **NPDES Training Courses and Workshops** - https://www.epa.gov/npdes/npdes-training

  The NPDES Permitting program offers training courses, workshops, and webcasts to explain the regulatory framework and technical considerations of the NPDES Permit program. These courses are designed for permit writers, dischargers, US EPA officials, and other interested parties.

- **Nonpoint Source Pollution (NPS) Outreach Toolbox** - www.epa.gov/nps/toolbox

  The US EPA Outreach Toolbox is a great place to get started and learn how to develop effective outreach. The series includes US EPA's flagship publication, ***Getting in Step: A Guide for Conducting Watershed Outreach Campaigns***, which presents the outreach development process as a logical, easy-to-apply sequence of steps. Information is also provided on related resources, including a free video companion guide and training workshop opportunities.

- **Risk Mapping, Assessment and Planning (MAP)** - https://www.fema.gov/risk-mapping-assessment-and-planning-risk-map

  Risk MAP is a program run by the Federal Emergency Management Agency (FEMA). The vision for Risk MAP is to deliver quality data that increases public awareness and leads to action that reduces risk to life and property. Risk MAP builds on flood hazard data and maps produced during the Flood Map Modernization (Map Mod) program. One of FEMA's five goals of the Risk MAP program is public awareness and outreach, ensuring that a measurable increase of the public's awareness and understanding of risk results in a measurable reduction of current and future vulnerability. FEMA works with DOW to develop the Risk MAP program in Kentucky. Educational modules from the Kentucky program can be found online at www.youtube.com/user/kyriskmap.

- **Scorecard** - scorecard.goodguide.com

  The Scorecard website allows citizens to look up pollution information specific to their county or region. Typing in a zip code gives a "Pollution Report Card" for the areas of toxics, air, water, agriculture, environmental justice, and health hazards. This site is funded by the Green Media Toolshed, an organization committed to providing tools and improving the effectiveness of communications among environmental groups and the public.

- **Surf Your Watershed** - cfpub.epa.gov/surf/locate/index.cfm

US EPA hosts the Surf Your Watershed website to allow citizens to locate the watersheds in which they live, work or simply have an interest. A simple form allows anyone to find their watershed. Once you locate your watershed, you can also click on the "Citizen-based groups at work in this watershed" link to find a listing of organizations that are working to protect water quality. Contact organizations in the list to find out about cleanups, monitoring activities, restoration projects and other activities in the watershed.

- **TMDL Health Reports** - https://eec.ky.gov/Environmental-Protection/Water/Protection/TMDL/Pages/default.aspx

  DOW's Total Maximum Daily Load (TMDL) Section publishes pre- and post-monitoring reports that seek to educate people about the Clean Water Act and relay scientific information about water quality to communities that are within studied watersheds. The TMDL process begins with a list of waters that do not meet their designated uses, for example, swimming, domestic water supply or aquatic habitat, and are thereby designated "impaired." Waters on this list require a year-long study to collect the necessary data for TMDL development. If a stream is selected for TMDL development, the pre-monitoring process is described in the Initial Watershed Report. Once the study is complete, the post-monitoring process is described in the Watershed Health Report, which not only highlights where improvement is needed within the watershed, but also highlights the strengths of the watershed in hopes of protecting areas that are not yet impaired.

- **United States Geological Survey (USGS)** - education.usgs.gov

  The USGS is a science organization that provides impartial information on the health of our ecosystems and environment, the natural hazards that threaten us, the natural resources we rely on, and the impacts of climate and land use change. This site provides information for students in all grade categories.

- **WaterSense** - www.epa.gov/WaterSense

  WaterSense, a partnership program by the US Environmental Protection Agency, seeks to protect the future of our nation's water supply by offering people a simple way to use less water with water-efficient products, new homes, and services. WaterSense brings together a variety of stakeholders to:

  - Promote the value of water efficiency,
  - Provide consumers with easy ways to save water, as both a label for products and an information resource to help people use water more efficiently,
  - Encourage innovation in manufacturing, and
  - Decrease water use and reduce strain on water resources and infrastructure.

  The program seeks to help consumers make smart water choices that save money and maintain high environmental standards without compromising performance. Products and services that have earned the WaterSense label have been certified to be at least

20% more efficient without sacrificing performance. If one in every ten homes in the United States were to install WaterSense labeled faucets or faucet accessories in their bathrooms, it could save 6 billion gallons of water per year and more than $50 million in the energy costs to supply, heat, and treat that water!

- **Watershed Academy** - water.epa.gov/learn/training/wacademy

  The Watershed Academy is a focal point in US EPA's Office of Water for providing training and information on implementing watershed approaches. US EPA's Watershed Academy provides training and information on how to implement watershed approaches to local, state, tribal and federal officials and private practitioners of watershed management. The academy's self-paced training modules, webcast seminars and live training courses provide current information from national experts across a broad range of watershed topics. The Watershed Academy consists of three key components: 1) *Training Courses*, on topics ranging from basic watershed management principles to the application of more complex technical tools; 2) *Training Materials*, which include an information transfer series with numerous documents that highlight institutional/organizational/technical aspects of implementing watershed approaches; and 3) *Web-Based Training*, at Watershed Academy Web (www.epa.gov/watertrain/), through which US EPA offers more than fifty free, self-paced training modules and a watershed management training certificate.

- **Watershed Planning Guidebook for Kentucky Communities -** https://eec.ky.gov/Environmental-Protection/Water/Protection/Pages/WatershedPlanningGuidebook.aspx

  Effective watershed planning requires participation from people who do not necessarily have technical expertise. The Watershed Planning Guidebook for Kentucky Communities was created to help Kentuckians work together to improve the waterways they appreciate and use. It provides a step-by-step process that Kentucky communities may use to create an effective watershed plan. The guidebook provides explanations for those who are not familiar with waterway and water use terms and dynamics. By increasing the understanding of what is happening to and in a citizen's watershed, using this guidebook will change how they think about their stream, how they talk about it to others, and how they and their community act towards water.

15.2.3 Annual Outreach Events

DOW representatives participate in annual events across the Commonwealth. Division staff often set up interactive and informational booths promoting understanding of water and watersheds, and the efforts being made to protect and improve water quality. Staff also serve as judges at various environmental competitions. The number of environmental education events in Kentucky is large, and new requests for appearances are received frequently. Because of limited staffing and scheduling availability, we are unfortunately unable to fulfill all requests. However, we do our best to attend as many events as possible, and provide supporting

education materials for those we cannot attend. Highlighted below are some events DOW strives to participate in on an annual basis.

- **Canon Envirothon** - www.envirothon.org

  Canon Envirothon is a 501(c)(3) not-for-profit organization established to coordinate the delivery of an environmental education program for high school students throughout North America. The environmental education program consists of the annual Canon Envirothon Competition in which winning teams from participating states and Canadian provinces compete for recognition and scholarships by demonstrating their knowledge of environmental science and natural resource management. The competition is centered on four universal testing categories (i.e., soils/land use, aquatic ecology, forestry, and wildlife) and a current environmental issue. Kentucky runs regional and state level trainings and competitions to prepare and ultimately select one outstanding team to represent the Commonwealth at the national level.

- **Earth Day** - www.earthday.org

  The first Earth Day, on April 22, 1970, activated 20 million Americans from all walks of life and is widely credited with launching the modern environmental movement. The passage of the landmark Clean Air Act, Clean Water Act, Endangered Species Act and many other groundbreaking environmental laws soon followed. More than 1 billion people now participate in Earth Day activities each year, making it the largest civic observance in the world.

- **Governor's Conference on Energy and the Environment**

  Each year the governor highlights a pertinent environmental topic and hosts a keynote speaker. The two day event features breakout sessions where expert panelists discuss current research, legislation, and trends in environmental issues facing Kentucky and the nation.

- **Jim Claypool Art and Conservation Contest** - https://eec.ky.gov/Natural-Resources/Conservation/Pages/Art-and-Writing-Contest.aspx

  Thousands of students have participated in the Jim Claypool Art and Conservation Writing contests. Introduced in 1944 and 1974, respectively, the contests educate students on soil, water, forestry and wildlife conservation. Students take the knowledge they have gained and transform it into creative art work and essays. Students can earn monetary prizes on the county, regional and state levels. They are also recognized each year by conservation districts around the state.

- **Kentucky Association for Environmental Education (KAEE) Annual Conference** - kaee.org

  Since 1976, the Kentucky Association for Environmental Education has worked to build a sustainable environment through education. The year 2013 marks the 37th year that KAEE has hosted an annual conference to bring together formal and nonformal environmental educators across the state. See more information on this organization in the Partner Strategy Section below.

- **World Water Day (WWD)** - http://www.un.org/en/events/waterday/

  The international observance of World Water Day is an initiative that grew out of the 1992 United Nations Conference on Environment and Development (UNCED) in Rio de Janeiro. The United Nations General Assembly designated March 22nd of each year as the World Day for Water by adopting a resolution. This world day for water was to be observed starting in 1993, in conformity with the recommendations of the United Nations Conference on Environment and Development contained in Agenda 21, Chapter 18, Fresh Water Resources. States were invited to devote the day to implement the UN recommendations and set up concrete activities as deemed appropriate in the national context. Each year a new water focus is selected as a theme for which annual campaign materials can be found at the UN water site.

15.2.4 Events Educating Teachers and College Students

DOW partners with colleges across Kentucky to extend common messages to our educators and higher education students about water, watersheds, water quality monitoring, and ways citizens can make a positive impact on water quality in our communities.

15.2.5 Targeted Educational Focus Areas

Educational initiatives are often separated into a variety of focus areas. While the environmental impacts of these focus areas often overlap, DOW has found these focus areas to be proven methods for best reaching specific target audiences, disseminating large bodies of knowledge, and realizing sustainable behavior modifications. Targeted messaging has been developed in the following categories. Please see the appropriate sections in the full NPS Management Plan as indicated below for more information on each of these efforts.

- Agriculture – Section 5
- Developed Lands – Section 6
- Forestry – Section 7
- Groundwater – Section 8
- Onsite – Section 9
- Protection – Section 10
- Recreation – Section 11
- Resource Extraction – Section 12
- Riparian Areas and Stream Restoration – Section 13
- Water Supply – Section 14

15.2.6 Partner Strategy

Environmental education and outreach is the foundation for change in attitudes and behaviors toward watersheds and water quality in the Commonwealth. DOW aims to strengthen existing

partnerships, build new relationships, and increase efforts in providing knowledge to citizens, businesses and local governments. DOW works as the host institution for Project WET for the state and maintains a large network of environmental educators through that program as well as our partnership with Kentucky Environmental Education Council. Additionally, the shared mission with the land grant universities has resulted in a partnership with the University of Kentucky and a developing relationship with Kentucky State University for education of formal and non-formal students, particularly related to agriculture. Helping people understand NPS is the main avenue to foster the changes we know are necessary to see sustainable improvements in watersheds across Kentucky.

Working with partners is crucial to providing citizens with scientifically valid and consistent information. There are many national, state and regional resources available to aid with education and outreach about water and NPS pollution. Listed below by national, state and regional areas are some of the resources accessible to citizens, schools, local governments and businesses alike.

National

- **Center for Watershed Protection** - www.cwp.org

  The Center for Watershed Protection works to protect, restore, and enhance our streams, rivers, lakes, wetlands, and bays. They create viable solutions and partnerships for responsible land and water management so that every community has clean water and healthy natural resources to sustain diverse life. The Center for Watershed Protection's vision is a nation that has significantly improved the ecological and hydrologic condition of its degraded water bodies and has stemmed further degradation of clean water and healthy watersheds. Their vision is built upon a unique ability to advance, synthesize and widely disseminate watershed science by translating this knowledge into practical tools and techniques.

- **Green Teacher** - www.greenteacher.com

  Green Teacher is a nonprofit organization that publishes resources to help educators, both inside and outside of schools, to promote global and environmental awareness among young people from elementary through high school. The organization's primary activity is the publication of *Green Teacher*, a quarterly magazine full of teaching ideas from successful "green" educators. Each issue of *Green Teacher* offers perspectives on the role of education in creating a sustainable future, practical cross-curricular activities for various grade levels, and reviews of the latest teaching resources. Other Green Teacher publications include resource books and a series of webinars about environmental education.

- **Izaak Walton League of America** - www.iwla.org

  Founded in 1922, the Izaak Walton League is one of the nation's oldest and most respected conservation organizations. With a powerful grassroots network of nearly 270 local chapters nationwide, the League takes a common-sense approach toward protecting our country's natural heritage and improving outdoor recreation opportunities for all Americans. The Izaak Walton League recognizes that citizen

involvement in watershed protection and conservation activities is critical to the protection and restoration of America's waters. They provide tools and resources to help conserve local waterways.

- **North American Association for Environmental Education (NAAEE)** - www.naaee.net

  The North American Association for Environmental Education advances environmental education and supports environmental educators in Canada, the United States, and Mexico. They serve as the premier organization in North America providing environmental educators, and the organizations that train, employ, and support those educators with professional development, guidelines for excellence, networking, and advocacy.

- **Southeast Aquatic Resources Partnership (SARP)** - www.southeastaquatics.net

  The Southeast Aquatic Resources Partnership is a regional collaboration of natural resource and science agencies, conservation organizations and private interests developed to strengthen the management and conservation of aquatic resources in the Southeastern United States. SARP will, with partners, protect, conserve and restore aquatic resources including habitats throughout the Southeast for the continuing benefit, use and enjoyment of the American people. SARP's approaches include 1) support and facilitation of on-the-ground and in-the-water science based action to improve and protect aquatic habitats and resources; and 2) Focused habitat assessments, restoration actions, monitoring and evaluation of some of the nation's most economically and socially significant aquatic habitats.

- **Southeast Watershed Forum** - www.southeastwaterforum.org

  The Southeast Watershed Forum is a nonprofit organization dedicated to assisting communities and organizations to better protect their land and water resources through watershed-friendly growth. The Forum strives to be a regional clearinghouse for successful case studies in watershed protection, restoration and management.

- **Southern Instream Flow Network (SIFN)** - www.southeastaquatics.net/programs/sifn

  Housed at SARP, the Southern Instream Flow Network was created to address impacts to natural flow regimes in the region's aquatic ecosystems. Because instream flow policies are administered at the state level and lack national standards to protect national systems, SARP envisioned SIFN to leverage policy and technical experience within and among its state partners. SIFN also involves the participation of The Nature Conservancy, Auburn University, the Instream Flow Council, the American Fisheries Society, and others. The SIFN goal is to develop and improve protective instream flow policies by providing science-based resources and opening lines of communication.

State

- **Kentucky Association for Environmental Education (KAEE)** - kaee.org

  Since 1976, the Kentucky Association for Environmental Education has worked to build a sustainable environment through education. KAEE is one of the country's oldest

associations supporting environmental education and the first affiliate of the North American Association for Environmental Educators. KAEE includes people from all walks of life, including formal and non-formal educators, administrators, government and agency personnel, business and industry representatives, and private citizens.

The Division of Water and KAEE have a current Memorandum of Understanding for the promotion and implementation of Project WET. Both entities have an interest in expanding the number of Project WET Facilitators and Educators in the state, and are actively working to increase those numbers. The increased numbers of Project WET certified trainers will therein increase the number of trainings taking place and the overall number of children trained with Project WET educational materials.

- **University of Kentucky Cooperative Extension Service** - ces.ca.uky.edu/ces

  The Kentucky Cooperative Extension Service is the most comprehensive outreach and engagement program at the University of Kentucky. Their mission is to make a difference in the lives of Kentucky citizens through research-based education. Jointly with their other land grant partner, Kentucky State University, they take the university to the people in their local communities, addressing issues of importance of all Kentuckians. They have an office available as a resource in every county in the Commonwealth.

  The Division of Water and UK CES do not currently have a formal Memorandum of Understanding between the two agencies. However both agencies are working cooperatively to educate the public about water quality issues. UK CES maintains an Agriculture Water Quality Liaison position with the KY Division of Conservation to provide direct water quality education to the public and to assist with the daily operations of the Agriculture Water Quality Authority.

- **Kentucky Environmental Education Council (KEEC)** - keec.ky.gov

  The Kentucky Environmental Education Council is a state agency within the Education Cabinet. The agency's mission is to help Kentuckians develop the skills necessary to solve current environmental problems, prevent new ones, and maintain a balance between the economy and the environment for future generations. KEEC hosts the Kentucky Green and Healthy Schools initiative.

  The Division of Water and KAEE have a current Memorandum of Understanding for the promotion and implementation of Project WET. Both entities have an interest in expanding the number of Project WET Facilitators and Educators in the state, and are actively working to increase those numbers. The increased numbers of Project WET certified trainers will therein increase the number of trainings taking place and the overall number of children trained with Project WET educational materials.

- **Kentucky Excellence in Environmental Leadership (KY EXCEL) Program** - https://eec.ky.gov/Environmental-Protection/Compliance-Assistance/Pages/KY-EXCEL.aspx

  KY EXCEL is a voluntary leadership program open to any individual, organization, community or business that wishes to improve and protect Kentucky's environment in

ways that extend beyond Kentucky's environmental regulatory requirements. This prestigious recognition program aligns with the US EPA's National Environmental Performance Track program. KY EXCEL provides multiple membership levels, and offers incentives to encourage participation and growth within the program. Some membership benefits include:

- Training events on green topics,
- Application assistance and project identification,
- Help with reporting project results,
- Help with the development of environmental management plans,
- Coordination with the environmental compliance assistance program to help regulated entities with compliance issues, and
- Facilitation of partnerships between members.

Members of KY EXCEL experience enhanced access to agency personnel, recognition and marketing opportunities, networking and mentoring, as well as a 50% discount on continuing education opportunities. Master and leader members receive expedited permitting assistance.

- **Kentucky Department of Fish and Wildlife Resources (KDFWR)** - fw.ky.gov

  The Kentucky Department of Fish and Wildlife Resources is an independent agency of state government. KDFWR works to preserve, restore and protect Kentucky's natural resources. The department offers many education and outdoor activities. The Kentucky Aquatic Resource Education (KARE) program offers teacher's guides and posters, provides help for youth programs such as 4-H or scouts, and provides guidance for establishing fishing programs through the Community Based Fishing initiative. KDFWR hosts Project WILD and Project Aquatic WILD in Kentucky, both interdisciplinary conservation and environmental education programs emphasizing wildlife. KDFWR also maintains Salato Wildlife Center, where many educational programs and exhibits are available to the public.

- **Kentucky Green & Healthy Schools (KGHS)** - greenschools.ky.gov

  KEEC coordinates the Kentucky Green & Healthy Schools program. KGHS is a service learning and student-centered program that empowers students and staff to move their school toward becoming safer, healthier, and more environmentally sustainable. This inquiry-based program uses the entire school grounds as a learning laboratory for students. All grade levels of all existing (and even schools in the process of being built) are invited to join KGHS!

- **The Kentucky University Partnership for Environmental Education (KUPEE)** - www.kupee.eku.edu

  The Kentucky University Partnership for Environmental Education is a partnership of Centers for Environmental Education located at all eight major state universities in Kentucky. KUPEE's mission is to increase the environmental literacy of all citizens of the Commonwealth through environmental education to assure the protection and

sustainable development of Kentucky's natural and cultural resources. The KUPEE partnership exists to implement the higher education recommendations of the Kentucky environmental education master plan, *Land, Legacy and Learning: Making Education Pay for Kentucky's Environment*. The KUPEE centers promote coordination, collaboration and consistency in environmental education across the state.

- **Kentucky Water Resources Research Institute (KWRRI) at the University of Kentucky - a Center of Excellence for Watershed Management** - https://www.research.uky.edu/kentucky-water-resources-research-institute

  The Centers of Excellence for Watershed Management Program was started in 2007 by US EPA Region 4. The program utilizes the diverse talent and expertise of colleges and universities from across the Southeast to provide hands-on, practical products and services so communities can better identify watershed problems and develop viable solutions. Each US EPA designated center actively seeks out watershed-based stakeholder groups and local governments that need cost-effective tools for scientific studies, engineering designs, and computer mapping, as well as assistance with legal issues, project management, public education, and watershed planning. When needed, the watershed centers also provide assistance with issues involving permitting, contracting, financing, land use planning and resource management (US EPA, 2010).

  The Kentucky Water Resources Research Institute is one of 54 Institutes in the United States established under Public Law 88-379, the Water Research Act of 1964. At the KWRRI, their mission is four-fold:

  - Stimulate water resources and water-related environmental research,
  - Assist and stimulate academic units in the conduct of undergraduate and graduate education in water resources and water-related environmental issues,
  - Stimulate technology transfer on water resources and water-related environmental issues, and
  - Develop statewide interactions among faculty and research staff and the private and public sector.

  Since its inception, the institute has sponsored short courses and conferences, supported hundreds of students in many departments and colleges, and produced numerous research reports. Many journal articles have been published by faculty and research staff associated with the institute.

- **Kentucky Waterways Alliance (KWA)** - www.kwalliance.org

  Since 1993, Kentucky Waterways Alliance has been a leader in the fight against pollution in our waterways, winning stronger protections for over 90% of Kentucky's rivers, lakes and streams. KWA works with communities on local watershed issues and at the state and national levels advocating for the best regulations possible. With a mission to protect and restore Kentucky's waterways, KWA's work is making a difference in the quality of life for all Kentuckians one protected stream at a time.

- **Project WILD and Project WILD Aquatic** - www.projectwild.org

Project WILD is one of the most widely used conservation and environmental education programs among educators of students in kindergarten through high school. It is based on the premise that young people and educators have a vital interest in learning about our natural world. A national network of state wildlife agency sponsors ensures that Project WILD and Project WILD Aquatic are available nationwide, training educators in the many facets of the program. Emphasizing wildlife because of its intrinsic value, the program addresses the need for human beings to develop as responsible citizens of our planet. The Project WILD Aquatic K-12 Curriculum and Activity Guide emphasizes aquatic wildlife and aquatic ecosystems. It is organized in topic units and is based on the Project WILD conceptual framework. Project WILD is a program of the Council for Environmental Education.

- **Kentucky Water Watch** - https://eec.ky.gov/Environmental-Protection/Water/Outreach/Pages/KentuckyWaterWatch.aspx

  The Kentucky Water Watch program is dedicated to helping citizens protect Kentucky's streams, rivers, lakes and wetlands. The program accomplishes its goals through community education initiatives, community leadership, community action and water quality monitoring projects. Water Watch also has enviroscape equipment available for loan to the public for educational events. An equipment list and checkout forms are available at https://eec.ky.gov/Environmental-Protection/Water/Outreach/Education/Pages/default.aspx.

- **Watershed Watch in Kentucky** - kywater.org

  Watershed Watch in Kentucky is a statewide citizens monitoring effort to improve and protect water quality by raising community awareness, and supporting implementation of the goals of the Clean Water Act and other water quality initiatives. Beginning in the 1990s, Watershed Watch volunteers began sampling waterways throughout the state of Kentucky. More than 3,000 individuals have collected data at over 2,700 stations. Volunteers are trained on how to take a qualified water sample that will be analyzed by a professional lab. They are also trained on how to perform basic water quality field data tests, including tests for dissolved oxygen (DO), pH, temperature and conductivity. Volunteers can also be trained to perform biological and habitat assessments.

  Local watershed steering committees carry out the work of this project in the state's eight major river basins, listed below. Each of the local Watershed Steering Committee develops their own goals and operational plans based on the needs in their communities and unique conditions in their waterways. For more information on each of the organizations operating in these basins, see Section 15.3.3 Regional listings.

  - Big Sandy River
  - Four Rivers Basin (Lower Cumberland River, Tennessee River, Mississippi River, and Lower Ohio River)
  - Kentucky River
  - Licking River
  - Salt River

- Tradewater and Lower Green Rivers
- Upper Cumberland River
- Upper Green River

The local committees cooperate through the WWKY Board to develop scientific protocols, training resources, financial resources, data management, organizational support and leadership development to ensure the delivery of Watershed Watch services. Annual Watershed Watch Protection Conferences are held in each local watershed for citizens, scientific researchers and agency personnel to come together to discuss the condition of assessed waterways, as revealed by sampling results. Data can be reviewed online at http://kgs.uky.edu/wwky/main.htm.

The Division of Water's Nonpoint Source Program provides extensive technical and financial support for the Watershed Watch in Kentucky. The Division maintains one full time Water Watch/Watershed Watch Program Coordinator, and 5 River Basin Coordinators who provide extensive basin level support to the individual groups.

- **Wolf Creek National Fish Hatchery** - www.fws.gov/wolfcreek

  Over a century ago, it was recognized that conservation measures were necessary to maintain good fishing in our public waters. Constructed in 1975, Wolf Creek National Fish Hatchery is one of the most recently constructed hatcheries in the federal hatchery system. The primary responsibility of the Wolf Creek National Fish Hatchery is to raise rainbow and brown trout which will help preserve fishing as a tradition for all Americans. Throughout the year fish are harvested from the hatchery and distributed by truck for stocking in over 100 different streams, lakes and tailwaters in Kentucky, North Carolina and Georgia.

  In mid-September 2006, the Visitor/ Environmental Education Center opened to the public, the first of its kind for the US Fish and Wildlife Service's Southeast Region Hatcheries Program. The education center includes many fun and engaging learning opportunities for the entire family, and welcomes over 100,000 visitors per year. Wolf Creek National Fish Hatchery hosts numerous environmental education programs throughout the year at the education center, including courses like Biologist in Training (BiT), Project WET, Project WOW, Project Learning Tree, Project WILD, and many more.

Regional

- **Big Sandy Watershed Watch (BSWW)** – kywater.org

  The BSWW has volunteers in Kentucky, Virginia and West Virginia. The BSWW began training volunteers in August 1999 and has continued to sample for fecal coliform, *E.coli*, sulfates and other parameters in the Big Sandy River, Little Sandy River, Tug Fork and other streams or tributaries. The BSWW and the Big Sandy River Basin Coalition work together in an effort to protect the watershed.

  If you would like to help protect the waterways in the Big Sandy River Basin, you can register online or you can call 800-928-0045. You will be trained on how to collect a grab sample and perform basic field chemistry such as dissolved oxygen, pH, temperature

and conductivity. You will also be trained to perform habitat, physical and biological assessments on streams. The training is free, and the equipment is on loan to you for as long as you participate in the program.

- **Cumberland River Compact** - www.cumberlandrivercompact.org

  The Cumberland River Compact is a nonprofit that believes in a strong economy and a healthy environment. Formed in 1997, the Compact took on the role of educational organization after watching a film about a man named Vic Scoggin, who swam the entire length of the main stem of the Cumberland, a total of 697 miles, and witnessed all kinds of pollution along the way. The Compact believes that through education and cooperation long-term partnerships and solutions will be forged between citizens, government, local businesses, and community organizations.

- **Eastern Kentucky PRIDE** - www.kypride.org

  The PRIDE initiative promotes Personal Responsibility in a Desirable Environment in thirty-eight counties in Southern and Eastern Kentucky. The PRIDE initiative was launched in 1997 by Congressman Hal Rogers and the late General James Bickford, former Secretary of the Kentucky Natural Resources and Environmental Protection Cabinet. Their vision was to restore the natural beauty of their native region by encouraging citizens to take responsibility for protecting their environment and by providing the education and resources they need to do so. The PRIDE initiative is coordinated by Eastern Kentucky PRIDE, Inc., a nonprofit organization. The organization links citizens with the resources of local, state, and federal agencies to improve the region's water quality, clean up solid waste problems, and advance environmental education. Eastern Kentucky PRIDE has developed a variety of programs over the years, including PRIDE Community Grants for local cleanup projects, PRIDE SuperGrants for removing massive illegal dumps, PRIDE Wastewater Construction Grants for expanding sewer services, PRIDE Homeowner Septic System Grants for low-income homeowners, and PRIDE Environmental Education Grants for hands-on stewardship lessons.

- **Four Rivers Watershed Watch (FRWW)** - 4rww.jpf.org

  The Four Rivers Basin unit includes Kentucky drainage into the Lower Cumberland, Tennessee, Mississippi and Ohio rivers. FRWW consists of a group of volunteers in the Commonwealth of Kentucky who are giving their time in an effort to improve our waterways through a coordinated campaign of water quality monitoring, skills development, and advocacy. FRWW delivers science to the people then delivers the people to the water's edge. The volunteers learn first-hand the condition of their streams, who in their community shares their concerns, and the power they have to affect change. FRWW provides collected data to all project participants and any interested party who requests it. They provide technical assistance to local watershed groups on dealing with the issues raised by their monitoring and assessment efforts. They also conduct fall Watershed Protection Conferences in each local watershed where individuals, community organizations, scientific researchers and agency personnel discuss the condition of waterways as revealed by monitoring. If you are interested in

becoming a Watershed Watch volunteer you may register online or by calling 1-800-928-0045.

- **Kentucky River Watershed Watch (KRWW)** - www.uky.edu/OtherOrgs/KRWW

  Kentucky River Watershed Watch is a tax-exempt, nonprofit organization formed in 1997 through the cooperation of the Sierra Club, the Kentucky Waterways Alliance, and the Division of Water's Water Watch program. Its membership focuses water quality monitoring and improvement efforts within the Kentucky River Basin. The basin extends over much of the central and eastern portions of the state and is home to approximately 710,000 Kentuckians. The watershed includes all or parts of 42 counties and drains over 7,000 square miles, with a tributary network of more than 15,000 miles. If you are interested in becoming a Watershed Watch volunteer, you may register online or by calling 1-800-928-0045.

- **Licking River Watershed Watch (LRWW)** - www.lrww.org

  The Licking River Watershed Watch, Inc, established in 1998 as part of the Kentucky Watershed Watch Program, is a 501(c3) nonprofit organization that spans 19 counties from Eastern Kentucky to Northern Kentucky. LRWW works to protect, improve and restore the waters of the Licking River Basin by promoting water quality monitoring, public education, and citizen action.

  LRWW volunteers monitor streams throughout the watershed, conducting synoptic sampling three times each year, during high flow (spring), normal flow (summer), and low flow (fall) conditions. A variety of data have been collected since 1998. These data include dissolved oxygen, pH, conductivity, temperature, nutrients, fecal coliform (including *E. coli*), flow conditions, habitat assessments, and biological macroinvertebrate assessments. Water quality information is used by the state and others to improve the health of streams. If you are interested in becoming a Watershed Watch volunteer you may register online or by calling 1-800-928-0045.

- **Reforest the Bluegrass (RTB)-** https://www.lexingtonky.gov/reforest-bluegrass

  The Reforest the Bluegrass program was started in March 1999. It is a cooperative effort between the Lexington-Fayette Urban County Government's Water Quality, Urban Forestry, and Parks & Recreation management programs. Its purpose is to recreate pre-settlement, streamside forests that were once native to the Inner Bluegrass Region of Kentucky. Today, through the efforts of thousands of volunteers, Lexington is progressively restoring those long-lost benefits of streamside forests (riparian buffers) for generations to come. This is a crucial step to protecting valuable water resources and enhancing living standards for all Kentuckians.

- **Salt River Watershed Watch (SRWW)**- srww.org

  Trained volunteers are needed for the Salt River Watershed Watch to conduct biological and chemical tests for water quality. The training class is free and open to the public. No prior experience is necessary. "Even if you know almost nothing about water quality, we can train you to understand the fundamentals of assessing water quality," said Russell Barnett, chair for the Salt River Watershed Watch. "After the training, you'll never look

at a creek the same way again. In fact, you'll start seeing creeks and streams you never noticed before even though you pass them every day." SRWW volunteers sample streams across the Salt River Basin three times a year. Each time volunteers measure pH, dissolved oxygen, temperature and conductivity and record information about recent rainfall and stream flow. Once a year the volunteers assess biological diversity and habitat quality and record information about the physical condition of the stream.

- **Tradewater / Lower Green Watershed Watch** – kywater.org

  The Tradewater/Lower Green Watershed Watch has been sampling waterways in Breckinridge, Butler, Caldwell, Christian, Crittenden, Daviess, Grayson, Hancock, Hardin, Henderson, Hopkins, Livingston, Logan, McLean, Muhlenberg, Ohio, Todd, Union and Webster counties since 2000. There are over 90,000 miles of waterways in Kentucky and DOW is looking for citizens who are interested in sampling for water quality. The training is free and the equipment is loaned to you for as long as you are in the program. You will be trained on how to take a grab sample and perform basic field chemistry for dissolved oxygen, pH, temperature and conductivity. You will also be trained on how to perform habitat, physical and biological stream assessments. If you are interested in becoming a Watershed Watch volunteer, you may register online or by calling 1-800-928-0045.

- **Upper Cumberland River Watershed Watch (UCWW)** - www.uppercumberlandriver.org

  The Upper Cumberland Water Watch is a 501(c)(3) organization whose mission is to raise awareness of water quality issues in the drainage basin. UCWW was formed in 1999 as an entirely volunteer organization that performs lab tests on streams in the Upper Cumberland watershed. Its members are people who live in or near the watershed and are concerned about the quality of water. It is said that if you want to measure the health of the land, judge the health of the streams. As streams pass over the landscape, it takes on the characteristics of its environment. By testing the water, we can monitor the health of the surrounding land. If you are interested in becoming a Watershed Watch volunteer, you may register online or by calling 1-800-928-0045.

- **Upper Green River Watershed Watch (UGRWW)** – kywater.org

  The Upper Green River Watershed Watch Project is a cooperative nonprofit umbrella organization covering volunteer samplers from the project area of 18 counties. The mission of the project, which began in 2001, is to recruit and train volunteers to monitor water quality in the community. Many of the volunteers are associated with local, state and national nonprofit and civic organizations as well as state and local government agencies and scientific institutions.

15.2.7 Funding

The only funding currently available through the Division of Water for NPS education and outreach is in the form of 319(h) grant awards. However, other sources of funding are available. Often mini-grants are awarded through local governments and municipalities as well as local and regional nonprofits. Additionally, the following websites offer grant opportunities.

Grant Databases

- **US EPA NPS Related Funding Opportunities** - water.epa.gov/polwaste/nps/funding.cfm

  US EPA hosts a funding database for governments, nonprofits and other watershed organizations. They also offer training on finance management and sustainable finance tools. For more information, please visit the US EPA Nonpoint Source Related Funding Opportunities website.

- **Fundsnet Services** - www.fundsnetservices.com

  The Fundsnet Services Fundraising & Grants Directory is provided at no cost to website visitors. Since 1996 Fundsnet Services has provided resources information about grants, fundraising, philanthropy, foundations and 501(c)(3) nonprofit organizations to those in need of funding and research for their philanthropic efforts and missions.

Specific Grant Opportunities

- **319(h) NPS Grants** - https://eec.ky.gov/Environmental-Protection/Water/Protection/Pages/Section-319(h)-Grant-Program-Funding.aspx

  319(h) is the section of the Clean Water Act dealing with nonpoint source pollution. Each year DOW applies to US EPA to receive 319(h) funding. DOW distributes a majority of the monies received through a competitive grant award process to communities, citizen groups, and organizations throughout Kentucky. A requirement for all award recipients is an education and outreach component. It is widely understood that making improvements in a watershed will have no lasting effect unless area governments, residents and businesses understand and support the on-the-ground solutions. Additionally, the highest ranked applicants build partnerships in their watershed, comprised of stakeholders from all areas, to achieve citizen and government support and maintain sustainable results during watershed plan implementation. To find out more about the 319(h) grant process, please visit the DOW website or see Appendix A.

- **American Water** - https://amwater.com/corp/customers-and-communities/environmental-grant-program

  American Water state subsidiaries accept applications for their Environmental Grant Program. Established in 2005, the Environmental Grant Program offers funds for innovative, community-based environmental projects that improve, restore or protect the watersheds, surface water and/or groundwater supplies in our local communities. American Water is pleased to offer this modest assistance to their community partners, while leveraging local resources and capabilities to make a positive impact on the environment. Participating states will award grants of up to $10,000.

- **Coca-Cola Company** - https://www.coca-colacompany.com/our-company/community-requests-guidelines-application

  The Coca-Cola Company recognizes that they cannot have a healthy and growing business unless the communities they serve are healthy and sustainable. As a global beverage company, they have committed themselves to improving the quality of life in the communities where they do business. Their community investment priorities reflect

the global and local nature of their business and focuses on those global pillars where the Coca-Cola Company can make a unique and sustainable difference: water stewardship, active healthy living, community recycling, and education. All requests for community support in the form of grants or sponsorships for consideration by the Coca-Cola Company, the Coca-Cola Foundation or any of its affiliated regional foundations must be submitted through their online application system.

- **Eastern Kentucky PRIDE** - kypride.org/programs/education-grant

  Goals of the PRIDE grant program include: 1) Developing education partnerships, 2) Fostering environmental involvement by young people, 3) Providing resources to support environmental education, 4) Enhancing environmental literacy through the design, implementation and support of environmental projects, and 5) Encouraging through educational activities the understanding of actions beneficial to the environment. Grant amounts vary annually, based on available funds. There is no minimum grant request. The grant period is approximately one year.

- **Lexington-Fayette Urban County Government (LFUCG) Incentive Grant Program** - www.lexingtonky.gov/index.aspx?page=2119

  The Stormwater Quality Projects Incentive Grant Program provides financial assistance for projects in the community that improve water quality, address stormwater runoff and educate the public about these issues. Because neighborhoods and institutions have different needs, there are two types of grants available. Class A grants are for neighborhoods and community groups. Class B grants focus on education and infrastructure. Please refer to the Application Packets and the information on the website to determine a project's eligibility.

- **Louisville Gas & Electric (LG&E) and Kentucky Utilities (KU) Foundation** - www.lge-ku.com/foundation/grant_info.asp

  Since its inception in 1994, the LG&E and KU Foundation have represented LG&E and KU Energy LLC and its subsidiaries as the philanthropic arm for charitable giving. Subsidiaries include: LG&E, KU and Old Dominion Power (ODP). The foundation's mission is to contribute to the communities in which they do business by supporting education, diversity, environmental, and health and human services initiatives. The foundation believes supporting environmental excellence is inherent and vital for the protection of the communities in which people live and play, and helps promote economic growth.

- **Louisville Metropolitan Sewer District's Green Infrastructure Financial Incentives Program** - www.msdlouky.org/pdfs/Green_Infrastructure_Incentives_Savings_Weba.pdf and www.msdlouky.org/pdfs/MSDDrainageServiceCharges2011.pdf

  The Green Infrastructure Financial Incentive Program includes components for residential and non-residential properties. The financial incentive for residential properties is being applied to a targeted area where residents who remove direct downspout connections to the combined sewer systems may receive $150 per

downspout removed. The short-term financial incentive for non-residential properties includes a construction cost offset stipend intended to incentivize property owners throughout MSD's service area to install green infrastructure in excess of the minimum requirements. The long-term financial for non-residential properties includes a discount of up to 50% off the monthly stormwater drainage service fee through 10 year renewal agreements for installations, inspection and maintenance of green infrastructure beyond the minimum requirements. Other financial incentives are available for green infrastructure education and outreach programs.

- **The Steele-Reese Foundation** - www.steele-reese.org

  The Steele-Reese Foundation, a trust for charitable purposes, was created by Eleanor Steele Reese in 1955. The foundation makes grants to charitable organizations operating in the western states of Idaho and Montana, and in the southern Appalachian mountain region of eastern Kentucky. Please verify that your county falls within their grant award area by visiting their website. The Steele-Reese Foundation supports projects in education, health, human/social services, arts/humanities, and conservation/preservation. Grants generally vary in size from $5,000 to (rarely) over $150,000. Larger grants are typically paid in installments over a three, four, or five year period. In many cases, grants are payable only after the grantee has raised either a matching amount or the entire remaining balance for the proposed project. No grants are made to individuals or to organizations that have not been recognized as exempt by the Internal Revenue Service.

- **Toyota USA. Foundation** - https://www.toyota.com/usa/community#!/grant-guidelines-and-applications

  The Toyota USA. Foundation supports K-12 education programs with a focus on math, science and environmental science. The foundation partners with leading organizations and institutes serving diverse populations across all 50 states. Grants are provided to support the development and implementation of programs ranging from $50,000 - $500,000. The Foundation will only fund a program one time; however, a grant recipient may present a new program for consideration after three years. The Toyota USA Foundation reviews applications continually and does not have deadlines. The review process can take up to six months.

15.3 Objectives and Action Items

The Kentucky Division of Water endeavors to reduce nonpoint source pollution across the Commonwealth. To achieve the stated goal of restoring nonpoint source impaired waters in Kentucky, DOW has developed an objective and four actions to remain a leader in environmental education and continue providing quality educational services to citizens.

Long Term Goal 1: Restore Nonpoint Source Impaired Waters.

Objective 13: Support education and outreach.

Action 1: Support education and outreach efforts across Kentucky.

Action 2: **Update nonpoint source webpages and continue social media campaign.**

Action 3: **Develop and maintain NPS pollution educational materials.**

Action 4: **Support the Watershed Watch program in Kentucky and training of volunteer water quality monitors.**

Action 5: **Provide financial and technical support for Project WET implementation in Kentucky.**

See Appendix B for a complete list of Kentucky's NPS Pollution Program goals, objectives, activities and tracking measures with anticipated completion time frames.

References

401 Kentucky Administrative Regulations (KAR) 4:220 (2016).

401 KAR 5:037 (2017).

401 KAR 10:026 (2016).

401 KAR 10:031 (2016).

902 KAR 10:085 (2017).

Ernst, C., Gullick, R., & Nixon, K. (2004, May). *Protecting the Source: Conserving Forests to Protect Water.* Opflow, Volume 30, No. 5. Retrieved from http://www.ci.slc.ut.us/Utilities/NewsEvents/pdf/Op0504_1.pdf

Jelks, H.L., S.J. Walsh, N.M., Burkhead, S. Contreras-Balderas, E. Diaz-Pardo, D.A. Hendrickson, J. Lyons, N.E. Mandrak, F. McCormick, J.S. Nelson, S.P. Platania, B.A. Porter, C.B. Renaud, J.J. Schmitter-Soto, E.B. Taylor, and M.L. Warren, Jr. (2008). *Conservation Status of Imperiled North American Freshwater and Diadromous Fishes*. Fisheries, Volume 33 (8): pp. 372-407. Retrieved from http://www.srs.fs.usda.gov/pubs/ja/ja_jelks001.pdf

Kentucky Department of Agriculture. (2017). *Quick Facts.* Retrieved from https://www.kyfoodandfarm.com/ky-ag-facts

Kentucky Department of Travel. (2012). *Kentucky Outdoor Adventure*. Retrieved from www.kentuckytourism.com/outdoor_adventure/great_outdoors.aspx

Kentucky Division of Forestry. (2010). *Kentucky Statewide Assessment of Forest Resources and Strategy: Part 1: Issue 2: Water Quality and Quantity*. Kentucky Division of Forestry. Retrieved from http://forestry.ky.gov/LandownerServices/Documents/Issue%202%20-%20Water%20Quality%20and%20Quantity.pdf

Kentucky Division of Water (KDOW). (2010a, September). *Groundwater Awareness*. Fact Sheet. Retrieved from http://water.ky.gov/Fact%20Sheets/Groundwater%20awareness.pdf

KDOW. (2016). *Integrated Report to Congress*. Retrieved from https://eec.ky.gov/Environmental-Protection/Water/Monitor/Integrated%20Report%20Docs/2016%20Integrated%20Report.pdf

KDOW. (1997). *Kentucky Watershed Management Framework*. Kentucky Department for Environmental Protection, Frankfort, Kentucky. 125 p.

KDOW. (1999). *Kentucky Watershed Priority Formula: Application Guidelines and Data Requirements*. Kentucky Department for Environmental Protection, Frankfort, Kentucky. 43 p.

KDOW. (2010b). *Watershed Planning Guidebook for Kentucky Communities* (1st ed.). Kentucky Division of Water. Retrieved from http://water.ky.gov/watershed/Pages/WatershedPlanningGuidebook.aspx.

Kentucky Forest Conservation Act, Kentucky Revised Statutes (KRS) 149.330-149.355 (1998).

Kentucky Geological Survey (KGS). (2008, September 14). *Coal Production Highlights*. University of Kentucky. Retrieved from http://www.uky.edu/KGS/coal/production/coalprodhighlights.htm

KRS 150.255 (2000).

KRS 151.250 (1982).

KRS 151.625 (1998).

KRS 224.71 (2017).

Kentucky State Parks. (2010). *Financial and Operations Strategic Plan*. Kentucky State Parks. Retrieved from http://parks.ky.gov/!userfiles/parks-media/KYSPSummaryReport60410.pdf

Lynch, Mike. (2018). *Oil and Natural Gas in Kentucky*. KGS. Retrieved from http://www.uky.edu/KGS/GeoEducation/factsheet/oilgas.pdf

National Park Service. (2017). *Statistical Abstract 2017 Natural Resource Data Series NPS/NRSS/EQD/NRDS*. US Department of the Interior. Retrieved from https://irma.nps.gov/DataStore/DownloadFile/600257

Outdoor Industry Association. (2018). *Outdoor Participation Report, 2018*. Retrieved from https://outdoorindustry.org/resource/2018-outdoor-participation-report/

Safe Drinking Water Act of 1986 § 42 U.S.C. § 300f (1986).

Surface Mining Control and Reclamation Act of 1977 § 102, 30 U.S.C. § 1234–1328 (1977).

Third Rock and Kentucky Division of Forestry. (2010, June). *Kentucky Statewide Assessment of Forest Resources: A comprehensive Analysis and Plan for Action*. Frankfort, Kentucky.

US Census Bureau. (n.d.). 1990 US Census. Retrieved from http://www.census.gov/main/www/cen1990.html

US Census Bureau. (n.d.). 2010 US Census. Retrieved from http://2010.census.gov/2010census/data/

US Environmental Protection Agency (US EPA). (2012a, Mar). *America's Wetlands*. Retrieved from http://water.epa.gov/type/wetlands/wetlands.cfm

US EPA. (2018). *Basic Information About Nonpoint Source (NPS) Pollution.* Retrieved from https://www.epa.gov/nps/basic-information-about-nonpoint-source-nps-pollution

US EPA. (2009, July). *EPA's Healthy Watersheds Initiative,* EPA 841F09001. Retrieved from http://water.epa.gov/polwaste/nps/watershed/upload/2009_08_05_NPS_healthywatersheds_highquality_hwi.pdf

US EPA. (2011). *Healthy Watersheds: Outreach Tools*. Retrieved from http://water.epa.gov/polwaste/nps/watershed/outreach_tools.cfm.

US EPA. (2010, September 24). *Kentucky Water Resources Research Institute designated as Center of Excellence for Watershed Management*. Retrieved from http://yosemite.epa.gov/opa/admpress.nsf/3881d73f4d4aaa0b85257359003f5348/d2203d2e309ebd5c852577a800668833!OpenDocument

Appendix A: 319(h) Grant Application Guidance

Nonpoint source pollution is controlled primarily through the adoption of practical and cost-effective land management practices known as best management practices (BMPs). Use of BMPs allow for everyday activities while reducing or preventing nonpoint source pollution. BMPs installations protect water quality while maintaining the economic value of Kentucky's land resources.

Kentucky's approach to controlling NPS pollution includes both focused watershed projects and statewide initiatives. Watershed projects are important for reducing NPS pollution; they are designed to improve or maintain water quality conditions in watersheds through aggressive BMP implementation. Watershed projects address diverse NPS concerns, utilize a variety of funding sources for BMP implementation and include water quality monitoring as a measure of success. Statewide programs are an integral part of Kentucky's strategy to reduce NPS pollution. Statewide programs help to raise public awareness about runoff pollution, provide technical information on BMPs and develop and implement regulatory programs. Kentucky's NPS Pollution Control Program uses both regulatory and non-regulatory mechanisms to achieve BMP implementation in watershed projects and statewide initiatives.

Like many states, Kentucky does not have sufficient resources to implement BMPs for all existing or potential NPS pollution problems. In order to maximize NPS pollution control efforts, technical and financial assistance from other federal, state and local sources are cooperatively targeted to NPS priority watersheds. Grant funds authorized by Section 319(h) of the Clean Water Act assist states with implementing nonpoint source pollution control projects.

Funding through Section 319(h) of the Clean Water Act is provided to the Kentucky Nonpoint Source (NPS) Pollution Control Program from the US Environmental Protection Agency (US EPA). Funds can be used to pay for 60% of the total cost for each project; a 40% nonfederal match is required.

The Kentucky NPS Pollution Control Program seeks projects to compete for funding. Grants are available for watershed-based plan development and implementation, protection of Special Use Waters with identified threats, as well as other nonpoint source pollution control projects to help mitigate or prevent runoff pollution. Priority consideration will be given to applications for watershed-based plan development and implementation in 303(d) listed streams and protection of threatened Special Use Waters.

Project proposal forms may be submitted at any time; however, deadlines apply to specific federal funding cycles. To be considered for annual funding, project proposal forms are generally due by a set date in February.

Grant Application and Funding Process

The most successful applicants to the 319(h) grant program are those that completely read and thoroughly follow all instructions. The general application process includes the following steps:

1. Read the Grant Guidance Document and Application instructions.
2. Contact an NPS staff member to discuss your potential project.
3. Submit Project Proposal Form no later than the date designated by NPS staff in February of the grant award year.
4. An NPS staff member will contact you to discuss your proposal.
5. During the month of February, after the deadline for submission, proposals are reviewed and selected based on an internal ranking process.
6. If your project proposal receives a qualifying score, you will be invited to develop an application.
7. Submit application. Application must be postmarked by midnight of the deadline set by NPS staff. If delivered by hand, application must be received by 4:30 p.m. EST on the deadline date.
8. Over the next two months, projects are reviewed and ranked based on the in-depth descriptions provided in the application. Applications that score high enough in the ranking process for funding are notified of forth coming award.
9. Oct. 1 is the expected receipt of federal grant monies from US EPA.
10. Contracts are written and executed in the last months of the grant award year.
11. Projects begin in January following the year of application.

For current year grant guidance and application instructions, please visit https://eec.ky.gov/Environmental-Protection/Water/Protection/Pages/Section-319(h)-Grant-Program-Funding.aspx. If you have any questions, e-mail Nonpoint Source Grants at dale.booth@ky.gov or contact a Nonpoint Source staff member at 502-564-3410.

Appendix B: NPS Management Goals, Objectives and Actions

NPS Management Plan Goals, Objectives, and Actions								
Long Term Goal 1: Restore Nonpoint Source Impaired Waters				Targeted Completion				
Objective 1:	Prioritize watersheds for restoration potential.			2019	2020	2021	2022	2023
	Action 1:	Utilize EPA Recovery Potential Screening Tool to select watersheds for implementation, within existing watershed planning areas.						
		Tracking measure:	Number and list of watersheds identified as recoverable within areas of watershed plans.			X	X	X
		Tracking measure:	Number and list of recoverable watersheds receiving targeted implementation.					X
	Action 2:	Utilize EPA Recovery Potential Screening Tool to identify 303(d) listed impaired watersheds that have a high potential of showing measureable water quality improvement after targeted implementation.						
		Tracking measure:	Number of watersheds identified as recoverable for pathogens.		X	X	X	X
		Tracking measure:	Number of recoverable watersheds receiving targeted implementation.					X
Objective 2:	Monitor and assess Kentucky's waters			2019	2020	2021	2022	2023
	Action 1:	Conduct monitoring and perform assessments of Kentucky's waters in conjunction with the watershed framework.						
		Tracking measure:	Number of stream miles assessed.	X	X	X	X	X

		Tracking measure:	Number of stream miles impaired by NPS pollution.	X	X	X	X	X
		Tracking measure:	Number of pollutant/waterbody combinations impaired by NPS pollution.	X	X	X	X	X
	Action 2:	Conduct monitoring and perform assessments of targeted watersheds for the development of new watershed plans or to revise existing plans.						
		Tracking measure:	Number of stream miles with assessments completed in preparation for watershed plan development or improvement.	X	X	X	X	X
		Tracking measure:	Number of streams with monitoring being conducted in preparation for watershed plan development or improvement.	X	X	X	X	X
	Action 3:	Conduct monitoring and perform assessments of watersheds targeted through the Division of Water's Success Monitoring Program.						
		Tracking measure:	Number and list of streams prioritized through the Division's Success Monitoring program with completed assessments.	X	X	X	X	X
		Tracking measure:	Number and list of streams that have a documented change in use support awaiting EPA approval.	X	X	X	X	X
		Tracking measure:	Number and list of streams that have a documented change in use support approved by EPA.	X	X	X	X	X
	Action 4:	Continue to implement a Division level watershed Success Monitoring Program.						
		Tracking measure:	Maintain and continue to update GIS layers for BMP implementation tracking tool.	X	X	X	X	X
		Tracking measure:	Number of watersheds identified as needing success monitoring.	X	X	X	X	X

		Tracking measure:	Conduct annual meeting to coordinate locations appropriate for success monitoring within the watershed framework.	X	X	X	X	X
	Action 5:	Conduct post-BMP implementation Water Quality Monitoring for National Water Quality Initiative (NWQI) watersheds.						
		Tracking measure:	Evaluate NWQI watersheds annually to determine needs, and design success monitoring plan as appropriate.	X	X	X	X	X
		Tracking measure:	Implement NWQI success monitoring as needed.	X	X	X	X	X
		Tracking measure:	Compile water quality data for trend analysis in NWQI watersheds as needed.	X	X	X	X	X
		Tracking measure:	Number of NWQI BMPs per selected HUC 12.	X	X	X	X	X
Objective 3:	Implement the Nonpoint Source component of Approved TMDLs of restoration strategies in prioritized impaired watersheds.			2019	2020	2021	2022	2023
	Action 1:	Coordinate with the Division's TMDL Program to implement the nonpoint source pollution component of approved TMDLs in areas with approved watershed plans.						
		Tracking measure:	Coordinate with the Division's TMDL Program to implement the nonpoint source pollution component of approved TMDLs in areas with approved watershed plans.	X	X	X	X	X
		Tracking measure:	Number of sub-grantee projects implementing BMPs in watersheds with approved TMDLs.	X	X	X	X	X
	Action 2:	Coordinate with the Division's TMDL program to prioritize, develop, and/or implement TMDL Alternative Plans.						
		Tracking measure:	Number and list of watersheds prioritized for TMDL Alternative Plan development.	X	X	X	X	X

		Tracking measure:	Number and list of watersheds with approved TMDL Alternative Plans.	X	X	X	X	X
Objective 4:	Implement restoration strategies for prioritized impaired watersheds that will result in measurable water quality improvements.			2019	2020	2021	2022	2023
	Action 1:	Continue development and implementation of accepted watershed plans.						
		Tracking measure:	Number and list of watershed plans currently under development.	X	X	X	X	X
		Tracking measure:	Number and list of watershed plans approved by EPA Region 4 for implementation.	X	X	X	X	X
		Tracking measure:	Number and list of watershed plans approved by EPA Region 4 for implementation actively being implemented.	X	X	X	X	X
	Action 2:	Work to develop local capacity and implement actions necessary to address the pollution in prioritized watersheds.						
		Tracking measure:	Number of active watershed groups.	X	X	X	X	X
		Tracking measure:	Number of partner and/or stakeholder meetings attended.	X	X	X	X	X
Objective 5:	Decrease input of pollutants from agricultural sources.			2019	2020	2021	2022	2023
	Action 1:	Support projects that educate the agricultural community.						
		Tracking measure:	Number of sub-grantee projects with an agricultural BMP demonstration event or educational component.	X	X	X	X	X
		Tracking measure:	Provide financial and technical support to educate producers about the Agriculture Water Quality Act and nutrient management strategies.	X	X	X	X	X

	Action 2:	Provide financial and/or technical support for the implementation of BMPs that reduce nonpoint source pollution from agricultural sources.						
		Tracking measure:	Number of sub-grantee projects implementing BMPs to address agricultural sources of nonpoint source pollution.	X	X	X	X	X
	Action 3:	Coordinate with NRCS and KY Division of Conservation to implement BMPs.						
		Tracking measure:	Coordinate with KY DOC to fund BMPs in priority watersheds.	X	X	X	X	X
		Tracking measure:	Coordinate with NRCS to fund BMPs in priority watersheds.	X	X	X	X	X
	Action 4:	Coordinate with NRCS to identify and prioritize NWQI watersheds.						
		Tracking measure:	Number of NWQI watersheds identified.	X	X	X	X	X
	Action 5:	Participate in state wide meetings and conferences that have a focus on Agriculture and Water Quality.						
		Tracking measure:	Attend two (2) USDA NRCS State Technical meetings per year. Track number attended.	X	X	X	X	X
		Tracking measure:	Participate in the four (4) quarterly Kentucky Agriculture Water Quality Authority Meetings per year.	X	X	X	X	X
		Tracking measure:	Participate in the Kentucky Agriculture Science and Monitoring Committee meetings.	X	X	X	X	X
		Tracking measure:	Number of staff attending agriculture related technical training.	X	X	X	X	X

		Tracking measure:	Present information or a booth at one agriculture related event each year.	X	X	X	X	X
Objective 6:	Decrease input of pollutants from developed lands.			2019	2020	2021	2022	2023
	Action 1:	Provide financial and technical support for the implementation of green infrastructure (GI), low-impact-development (LID), and stormwater management BMPs.						
		Tracking measure:	Number of sub-grantee projects implement GI, LID, and/or stormwater management BMPs.	X	X	X	X	X
		Tracking measure:	Attend a minimum of one (1) stormwater management training event per year.	X	X	X	X	X
	Action 2:	Coordinate with Kentucky Emergency Management to incorporate GI, LID, and/or stormwater management BMPs that address nonpoint source pollution into the State Hazard Mitigation Plan.						
		Tracking measure:	Participate in “Incorporating Green Infrastructure and Low Impact Development into State Hazard Mitigation Plan” grant project	X	X			
		Tracking measure:	Number of NPS BMPs included in the State Hazard Mitigation Plan.					X
		Tracking measure:	Provide updated GIS resources to KAMM program annually.	X	X	X	X	X
	Action 3:	Support Kentucky's MS4 program.						
		Tracking measure:	Number of Kentucky Stormwater Association meetings attended.	X	X	X	X	X
		Tracking measure:	Provide technical and/or educational support to MS4 communities.	X	X	X	X	X
		Tracking measure:	Provide technical and/or educational support for the DOW MS4 program.	X	X	X	X	X
		Tracking measure:	Provide updated GIS resources to MS4 program annually.	X	X	X	X	X

Objective 7:	Preserve the critical ecosystem functions which forestlands provide and reduce NPS pollution resulting from forestry related activities.			2019	2020	2021	2022	2023
	Action 1:	Support watershed projects that focus on sustainable forestry management with water quality being the primary concern.						
		Tracking measure:	Number of sub-grantee projects that incorporate forest management BMPs to protect water quality.	X	X	X	X	X
	Action 2:	Work with partners to protect and enhance forestlands for the purposes of protecting or restoring water quality, water supply, and aquatic habitat.						
		Tracking measure:	Attend at least one (1) Forest Conservation Act BMP Board meeting per year.	X	X	X	X	X
		Tracking measure:	Provide technical and/or educational support for Forest Conservation Act BMP implementation.	X	X	X	X	X
		Tracking measure:	Number of active partnerships working on forestry related projects to reduce NPS pollution in Kentucky.	X	X	X	X	X
Objective 8:	Protect and monitor Kentucky's groundwater.			2019	2020	2021	2022	2023
	Action 1:	Provide technical and/or financial support for the assessment of groundwater impacts from nonpoint source pollution.						
		Tracking measure:	Number of springs sampled.	X	X	X	X	X
		Tracking measure:	Number of groundwater samples collected for E. coli.	X	X	X	X	X
		Tracking measure:	Number of groundwater samples collected for pesticides.	X	X	X	X	X

	Action 2:	Provide technical and/or financial support for groundwater protection plans (GPP).						
		Tracking measure:	Number of GPP field reviews conducted.	X	X	X	X	X
		Tracking measure:	Number of GPPs approved.	X	X	X	X	X
Objective 9:	Decrease nonpoint source pollution from onsite wastewater sources in Kentucky's water bodies.			2019	2020	2021	2022	2023
	Action 1:	Provide financial, technical, and/or educational support to projects that decrease the negative impacts on water quality from sewage.						
		Tracking measure:	Number of sub-grantee projects that implement the onsite wastewater components of an accepted watershed plan.	X	X	X	X	X
			Number of sub-grantee projects with an educational component for onsite wastewater treatment.	X	X	X	X	X
	Action 2:	Coordinate with partners to decrease impacts from onsite wastewater.						
		Tracking measure:	Number of partner meetings attended.	X	X	X	X	X
Objective 10:	Protect and restore waters at risk from recreational impacts.			2019	2020	2021	2022	2023
	Action 1:	Provide technical and/or financial support for Kentucky's Volunteer Lakes Monitoring Program (for the identification of harmful algal blooms (HABs)).						
		Tracking measure:	Number of active volunteers.	X	X	X	X	X
		Tracking measure:	Number of volunteers receiving trainings.	X	X	X	X	X
		Tracking measure:	Number of sites sampled.	X	X	X	X	X

	Action 2:	Provide technical and/or financial support for projects that implement BMPs in watersheds with recreation use impairments.						
		Tracking measure:	Number of sub-grantee projects implementing BMPs in watersheds with recreation use impairments.	X	X	X	X	X
	Action 3:	Provide technical and/or educational support for Harmful Algal Bloom issues.						
		Tracking measure:	Number of meetings and/or technical support provided.	X	X	X	X	X
Objective 11:	Decrease nonpoint source pollution from resource extraction.			2019	2020	2021	2022	2023
	Action 1:	Provide technical and/or financial support for reducing nonpoint source pollution due to resource extraction activities.						
		Tracking measure:	Coordinate with the KY Division of Abandoned Mine Lands to prioritize restoration of acid mine drainage sites on a statewide basis and within watershed planning areas.	X	X	X	X	X
		Tracking measure:	Number of sub-grantee projects implementing BMPs in areas with resource extraction activities.	X	X	X	X	X
Objective 12:	Decrease the negative impacts of excessive sedimentation in Kentucky's Streams.			2019	2020	2021	2022	2023
	Action 1:	Provide financial, technical, and/or educational support for projects that implement sediment control BMPs.						
		Tracking measure:	Develop and/or distribute guidance and/or educational materials for stream and riparian buffer maintenance.	X	X	X	X	X
		Tracking measure:	Number of sub-grantee projects implementing riparian buffer BMPs or tree plantings.	X	X	X	X	X

		Tracking measure:	Number of projects monitoring for sediment impairments.	X	X	X	X	X
	Action 3:	Target additional sources of funding for stream restoration projects that will positively address sediment impaired streams.						
		Tracking measure:	Coordinate efforts with the USDA Natural Resources Conservation Service to help target conservation program funding toward priority watersheds and the implementation of accepted Watershed Plans.	X	X	X	X	X
		Tracking measure:	Coordinate stream restoration efforts with the KY Department of Fish and Wildlife Resources and Northern KY University to help target Fees in Lieu of Mitigation (FILO) funding toward priority watersheds and the implementation of accepted Watershed Plans.	X	X	X	X	X
Objective 13:	Support education and outreach.			2019	2020	2021	2022	2023
	Action 1:	Support education and outreach efforts across Kentucky.						
		Tracking measure:	Number of student and/or stakeholder contacts per year.	X	X	X	X	X
		Tracking measure:	Number of educational events participated in.	X	X	X	X	X
	Action 2:	Update nonpoint source website pages, and continue social media presence.						
		Tracking measure:	Number of followers for the I Love KY Water Facebook page.	X	X	X	X	X
		Tracking measure:	Annually update information on DOW NPS website.	X	X	X	X	X
	Action 3:	Develop and maintain nonpoint source pollution educational materials.						

		Tracking measure:	Number of educational materials developed or updated.	X	X	X	X	X
	Action 4:	Support the Watershed Watch program in Kentucky.						
		Tracking measure:	Number of active volunteers.	X	X	X	X	X
		Tracking measure:	Number of volunteers receiving trainings	X	X	X	X	X
		Tracking measure:	Number of sites sampled	X	X	X	X	X
	Action 5:	Provide financial and technical support for Project WET implementation in Kentucky.						
		Tracking measure:	Number of Project WET educator/facilitator trainings.	X	X	X	X	X
		Tracking measure:	Number of teachers trained.	X	X	X	X	X

Long Term Goal 2: Protect waters currently meeting designated uses				Targeted Completion				
Objective 1:	Promote the identification and protection of healthy watersheds throughout Kentucky.			2019	2020	2021	2022	2023
	Action 1:	Provide technical and/or financial support for land conservation programs.						
		Tracking measure:	Coordinate annually between NPS and Wild Rivers program to prioritize land for conservation.	X	X	X	X	X
		Tracking measure:	Coordinate annually between NPS and Heritage Land Conservation program to prioritize land for conservation.	X	X	X	X	X
	Action 2:	Provide technical and/or financial support for sub-grantee projects that implement the protection components of an approved watershed plan.						
		Tracking measure:	Number of sub-grantee projects implementing the protection component of an approved watershed plan.	X	X	X	X	X

		Tracking measure:	Number of watershed planning areas with Special Use Waters.	X	X	X	X	X
	Action 3:	Develop and implement a NPS Program strategy for better coordination with the Healthy Watersheds program.						
		Tracking measure:	Number and list of current priority Healthy Watersheds.			X	X	X
		Tracking measure:	Number and list of new priority Healthy Watersheds.			X	X	X
Objective 2:	Prioritize Source Water and Wellhead Protection areas for protection from nonpoint sources of pollution.			2019	2020	2021	2022	2023
	Action 1:	Coordinate with the Division's Source Water Protection Program to identify and reduce nonpoint source pollution in source water protection areas.						
		Tracking measure:	Number and list of Source Water Protection Areas with an approved watershed plan.	X	X	X	X	X
		Tracking measure:	Number and list of Source Water Protection Areas with an approved watershed plan that is being actively implemented.	X	X	X	X	X
		Tracking measure:	Number of Source Water Protection Plans developed and/or updated.	X	X	X	X	X
	Action 2:	Provide technical assistance for projects protecting source water and promoting groundwater recharge						
		Tracking measure:	Staff attend at least one technical event per year on protection of drinking water sources.	X	X	X	X	X
	Action 3:	Coordinate with the Division's Wellhead Protection Program to identify and reduce nonpoint source pollution in wellhead protection areas.						
		Tracking measure:	Number and list of Wellhead Protection Areas with an approved watershed plan.	X	X	X	X	X
		Tracking measure:	Number and list of Wellhead Protection Areas with an approved watershed plan that is being actively implemented.	X	X	X	X	X
		Tracking measure:	Number of Wellhead Protection Plans developed and/or updated.	X	X	X	X	X

Long Term Goal 3: Efficient and effective implementation of Kentucky's Nonpoint Source Program				Targeted Completion				
Objective 1:	Develop NPS program components to increase program effectiveness and maintain current program staff.			2019	2020	2021	2022	2023
	Action 1:	Develop tools for increased efficiency.						
		Tracking measure:	Complete development of a tracking spreadsheet for Watershed Based Plans.	X				
		Tracking measure:	Transfer electronic project management and storage for 319(h) projects to the Department's new ARM database.	X	X	X		
	Action 2:	Maintain a minimum two (2) technical advisors in the section for effective NPS program coordination and on the ground implementation						
		Tracking measure:	Number of DOW NPS technical staff.	X	X	X	X	X
	Action 3:	Maintain a minimum of six (6) Basin Coordinators in the section for effective NPS program coordination and on the ground implementation						
		Tracking measure:	Number of Basin Coordinators.	X	X	X	X	X
	Action 4:	Maintain local watershed coordinators in watershed planning areas for effective NPS program coordination and on the ground implementation						
		Tracking measure:	Number of Watershed Coordinators implementing watershed plans.	X	X	X	X	X
	Action 5:	Provide professional development for watershed management to increase program effectiveness.						
		Tracking measure:	Number of training events hosted and/or attended.	X	X	X	X	X
Objective 2:	Meet federal and state requirements.			2019	2020	2021	2022	2023
	Action 1:	Track KY's NPS Program Un-liquidated Funding Obligation and maintain a level less than 20% level throughout the Federal Fiscal Year.						
		Tracking measure:	Drawdown percentage in comparison to ULO goal of 20%.	X	X	X	X	X

		Tracking measure:	Continue to manage KY's NPS sub-grantee projects with the goal of completing work in a 2.0 to 3.0 year contract timeframe.	X	X	X	X	X
	Action 2:	Complete EPA required Grants Reporting and Tracking (GRTS) information updates.						
		Tracking measure:	Enter new projects into GRTS within ninety (90) days after grant award.	X	X	X	X	X
		Tracking measure:	Complete bi-annual project status updates in March 30 and September 30 of each year.	X	X	X	X	X
		Tracking measure:	Conduct bi-annual maintenance on EPA Mandated Elements.	X	X	X	X	X
		Tracking measure:	Enter calculated project load reductions by February 28th of each year.	X	X	X	X	X
	Action 3:	Submit Kentucky's Nonpoint Source Annual Report to EPA Region 4 by December 31st of each year.						
		Tracking measure:	Submission of Annual Report.	X	X	X	X	X
	Action 4:	Submit at least one (1) Nonpoint Source Success Story to fulfill the requirements of WQ-10 by August 1st of each year.						
		Tracking measure:	Number of watersheds delisted and possible for WQ-10 development.	X	X	X	X	X
		Tracking measure:	Number of success stories submitted to EPA Region 4 this year.	X	X	X	X	X
		Tracking measure:	Number of Kentucky Success stories on EPA webpage.	X	X	X	X	X
	Action 5:	Review and approve all Nonpoint Source Sub-grantee Quality Assurance Project Plans (QAPP) prior to monitoring activities.						
		Tracking measure:	Number of approved sub-grantee QAPPs.	X	X	X	X	X
		Tracking measure:	Number of data packages reviewed.	X	X	X	X	X

Objective 3:	Provide technical assistance and support to the division regarding watershed impacts and the watershed perspective.			2019	2020	2021	2022	2023
	Action 1:	Participate in DOW projects requiring technical experience from NPS staff.						
		Tracking measure:	Assist with finalizing and/or implementing the Kentucky Nutrient Reduction Strategy.	X	X	X	X	X
		Tracking measure:	Provide water quality monitoring data for inclusion in the Integrated Report.	X	X	X	X	X
	Action 2:	Update the Watershed Framework						
		Tracking measure:	Number of Basin Status Updates and/or Report Cards issued.	X	X	X	X	X
		Tracking measure:	Annually update the Kentucky Water Health Portal.	X	X	X	X	X
		Tracking measure:	Update priority watersheds as determined by the River Basin Coordinators and Basin Team members.	X	X	X	X	X

Appendix C: Watershed Management Framework

Mission: *The Kentucky Watershed Framework serves as a means for coordinating and integrating the programs, tools and resources of multiple stakeholder groups to better protect, maintain and restore the ecological structure and function of watersheds and support the sustainable uses of watersheds*.

What is the Kentucky Watershed Management Framework?

The Kentucky Watershed Management Framework is a dynamic, flexible structure for coordinating watershed management across the Commonwealth of Kentucky.

The interagency Watershed Framework Workgroup has designed and implemented the framework to facilitate the transition from a program-centered to a resource-based approach. The framework design reflects the following watershed resource management goals:

Goal 1: Conserve and enhance public health.

Goal 2: Conserve and enhance watershed ecosystems.

Goal 3: Support watershed resource use to achieve water quality standards and conservation goals.

Goal 4: Conserve and improve ambient conditions.

Goal 5: Reduce or prevent pollutant loadings and other stressors.

Furthermore, to attain these goals, the framework has been designed to accomplish the following operational objectives:

1. Increase communication and consensus among state programs and other stakeholder groups to improve understanding of watershed ecosystems, strengthen information and data exchange, share expertise and tools, and develop and implement integrated solutions.

2. Identify indicators of watershed integrity to support sound, scientific assessments of watershed resources and establish watershed management priorities to guide integrated efforts.

3. Implement integrated solutions by coordinating regulatory (standards, permitting, monitoring, enforcement and federal reporting) and non-regulatory (planning, technical assistance and outreach) activities on targeted watersheds or problem areas within watersheds.

4. Provide a forum for program networking to manage changes in program funding, leverage and share common resources, and help obtain increased support.

5. Develop stronger partnerships with regional, county and local governments to better incorporate best management practices and address multiple resource management objectives within watersheds.

6. Coordinate public communication and education forums, coordinate existing means and develop new avenues for individual and group participation in watershed management, and promote stronger resource conservation ethics.

Major Elements:

- **Stakeholder involvement**. A stakeholder might be any agency, organization or individual that has an interest in watershed management. This might include other state agencies (e.g., Division of Waste Management or Division for Air Quality, Department for Fish and Wildlife Resources, Kentucky Geological Survey), federal (e.g., US Geological Survey, Natural Resources Conservation Service), local (e.g., city or county governments), or non-governmental organizations (e.g., local Chamber of Commerce, Sierra Club, Kentucky Waterways Alliance). Avenues for public participation include public forums, monitoring, plan development and review and implementation.
- **Basin-wide management units**. These units are large-scale basins (e.g., Kentucky River, Green River) that serve as resource units toward which monitoring and management strategies will be focused. The general idea is to focus resources and attention on a concentrated area in a more coordinated fashion with the various stakeholders so that better utilization of resources (i.e., tax dollars, time, and information) can be achieved.
- **Statewide basin management cycle**. A five-year cycle has been established wherein management activities phase from one basin unit to the next. Activities within a basin unit include:
    - Scoping and information gathering (monitoring) - Includes communication of current status of a basin to the public and collecting additional information on the condition of the basin as a basis for the watershed priority formula.
    - Basin assessment - Data analysis and summary.
    - Prioritization and targeting of resources - This formula is an interagency tool for prioritizing watersheds within a basin for further action, based upon a rating system that considers both human health and ecological health for both restoration and protection goals. It provides a basis for decision making and targeting of program resources.

- Development of TMDL document - A TMDL document may be developed following monitoring activities to summarize information on a subwatershed scale and to document allowable loads and reductions required to address pollutants in a subwatershed.
- Development of management strategies and plans - A basin management plan serves as the document for summarizing information on the basin, documenting proposed strategies for addressing problems and communicating to the public the status of watersheds.
- Implementation - A "tool box" of implementation activities serves as a resource for addressing various environmental problems.

One or more of the above activities occur in all of the basins simultaneously once the basin approach is fully implemented. However, activities are staggered so that personnel in various fields of expertise will not be spread too thin, but can rather focus their efforts on the basin at hand.

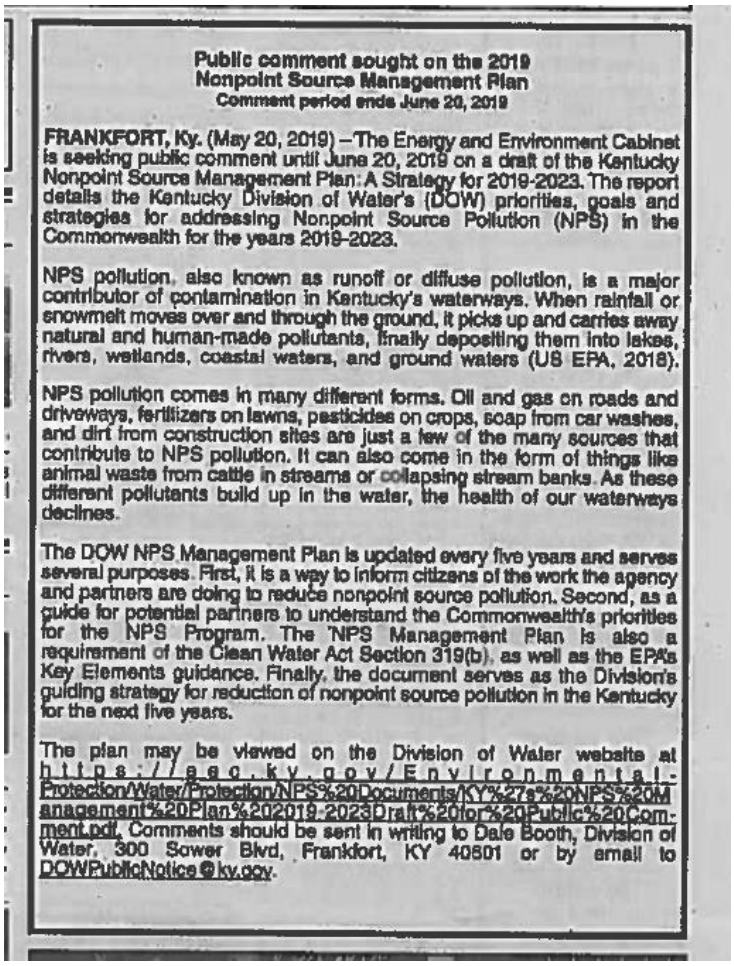
Benefits:

- **More direct focus on the resource to be protected**, tailored to the region- and basin-specific problems and conditions that may be present.
- **Coordination among programs and agencies** that perform similar duties, thus stretching tax dollars and manpower.
- **Improved capabilities** to address complex environmental issues that cross agencies' jurisdictions.
- **Improved basis for management decisions** as better coordination of monitoring is established and more information is gathered on a specific basin.
- **Consistency and continuity** is encouraged as an initial framework is prepared and applied evenly to all basins in a systematic and sequential fashion.
- **Opportunities for data sharing** enhanced as agencies and organization improve communication and coordination.
- **Enhanced public involvement** as agency solicits stakeholder input and participation.
- **Encouragement of innovative solutions** with input from the various stakeholders, especially at the local level.

Appendix D: Public Comments on NPS Management Plan

The Energy and Environment Cabinet placed the 2019 Nonpoint Source Management Plan on public notice via press release, online and in cabinet publications. The 30-day public comment period occurred May 20 – June 20, 2019. The plan was posted in draft form on the Division of Water website. Notification of the comment period was given via the EEC NPS Announcement LISTSERV, the EEC Blog (*Naturally Connected*; https://kydep.wordpress.com/2019/05/20/public-comment-sought-on-the-2019-nonpoint-source-management-plan/) and through a press release that was posted in 8 major newspapers, statewide. The comment summary and resulting actions appear in the table below.

Comment Summary	Source	Resulting Action
General Comment- Suggests that the publication of the NPS Management Plan does not go far enough, and should include regulatory and enforcement recommendations and actions, especially as it relates to Agriculture.	Public	No action taken. The NPS Management Plan is not intended as a regulatory document and the recommended actions do not fall under our authority.



Public comment sought on the 2019 Nonpoint Source Management Plan
Comment period ends June 20, 2019

FRANKFORT, Ky. (May 20, 2019) – The Energy and Environment Cabinet is seeking public comment until June 20, 2019 on a draft of the Kentucky Nonpoint Source Management Plan: A Strategy for 2019-2023. The report details the Kentucky Division of Water's (DOW) priorities, goals and strategies for addressing Nonpoint Source Pollution (NPS) in the Commonwealth for the years 2019-2023.

NPS pollution, also known as runoff or diffuse pollution, is a major contributor of contamination in Kentucky's waterways. When rainfall or snowmelt moves over and through the ground, it picks up and carries away natural and human-made pollutants, finally depositing them into lakes, rivers, wetlands, coastal waters, and ground waters (US EPA, 2018).

NPS pollution comes in many different forms. Oil and gas on roads and driveways, fertilizers on lawns, pesticides on crops, soap from car washes, and dirt from construction sites are just a few of the many sources that contribute to NPS pollution. It can also come in the form of things like animal waste from cattle in streams or collapsing stream banks. As these different pollutants build up in the water, the health of our waterways declines.

The DOW NPS Management Plan is updated every five years and serves several purposes. First, it is a way to inform citizens of the work the agency and partners are doing to reduce nonpoint source pollution. Second, as a guide for potential partners to understand the Commonwealth's priorities for the NPS Program. The NPS Management Plan is also a requirement of the Clean Water Act Section 319(b), as well as the EPA's Key Elements guidance. Finally, the document serves as the Division's guiding strategy for reduction of nonpoint source pollution in the Kentucky for the next five years.

The plan may be viewed on the Division of Water website at https://eec.ky.gov/Environmental-Protection/Water/Protection/NPS%20Documents/KY%27s%20NPS%20Management%20Plan%202019-2023Draft%20for%20Public%20Comment.pdf. Comments should be sent in writing to Dale Booth, Division of Water, 300 Sower Blvd, Frankfort, KY 40601 or by email to DOWPublicNotice@ky.gov.

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Figure D-1. Examples of call for public comment on the 2019 NPS Management Plan.