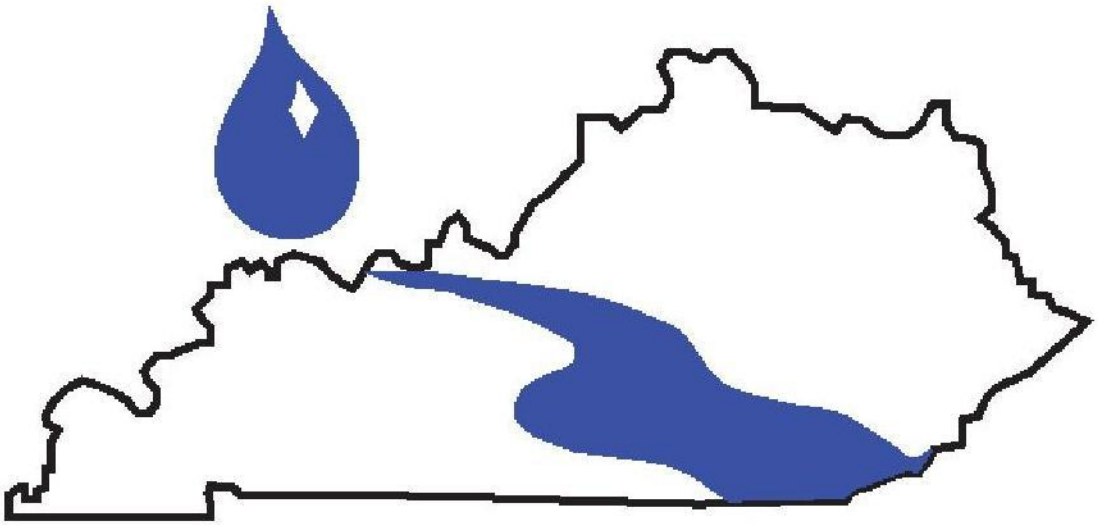
2012
Nonpoint Source Management Plan



Kentucky
Division of Water
200 Fair Oaks Lane, Fourth Floor
Frankfort, Kentucky 40601
water.ky.gov

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1. Introduction

Nonpoint source (NPS) pollution, also known as runoff or diffuse pollution, is a major contributor of pollutants in Kentucky's waterways. Unlike point source pollution, NPS pollution comes from many different sources over distributed areas. Point source pollution occurs when pollutants are discharged from distinct, confined conveyances, such as a pipe, well or even a boat. Point sources are permitted and monitored by the government. 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. Even though NPS pollution is hard to regulate, it is one of the largest threats to water quality. The Kentucky Division of Water (KDOW) is tasked with reducing nonpoint source pollution in the Commonwealth. This plan outlines the ways in which KDOW works to lessen NPS pollution and improve the health of our waterways.

NPS pollution comes in many different forms. When rainfall or snowmelt touches surfaces on earth, the water picks up and carries whatever is on those surfaces. Oil and gas on roads and driveways, fertilizers on lawns, pesticides on food crops, soap from car washes, and dirt from construction sites are just a few of the many sources that contribute to NPS pollution. These pollutants are carried by the moving water over the ground, and then deposited into lakes, rivers, wetlands, coastal waters and even in underground aquifers. NPS pollutants can also come in the form of things in the water, like cattle in streams or collapsing stream banks. As these different pollutants build up in the water, our water quality declines. A decline in water quality is bad not only for the plants and animals that live in the water, but also for our drinking water.

According to the 2010 Integrated Report (see Section 3.1), the top three NPS pollutants affecting water quality for aquatic life in the Commonwealth's streams are sedimentation (dirt), nutrients (i.e., nitrogen and phosphorus), and total dissolved solids (KDOW, 2010b). Human or animal waste contamination is another major contaminant that affects aquatic life as well as human health and the recreational use of our waters. The Nonpoint Source Management Plan is a summary of the ways that Kentuckians can work together to address these impacts.

The Kentucky Nonpoint Source Program is authorized under Section 319 of the Clean Water Act (CWA) amendments of 1987. While some people are familiar with Section 319(h), the grant program, fewer people are aware that Section 319(b) is the requirement for the development of a management program for controlling NPS pollution. This plan is called the Nonpoint Source Management Plan. Although the CWA only required the initial plan development, the United States Environmental Protection Agency (US EPA) has since issued guidance for management of the plan. This guidance is called the Nine Key Elements (see Section 1.3). These elements

require that the Nonpoint Source Management Plan be updated at least every five years. While US EPA requires that states have a plan, each state is given flexibility in developing strategies and management options to address the specific state problems.

KDOW has designed the Kentucky Nonpoint Source (NPS) Management Plan to be used for several purposes. First, this plan was designed as a way to inform citizens of the work the agency is doing to reduce nonpoint source pollution. Understanding what causes NPS pollution and the steps to decrease its effects in our state are necessary for lasting improvements to our water quality. Second, anyone applying for a Section 319(h) grant should draw on this document as a way of understanding the Commonwealth's priorities for the NPS Program. Understanding the Commonwealth's goals for the program will enable grant applicants to better select target areas for improvements in their communities. Finally, this document was intended to meet the CWA Section 319(b) requirements and US EPA's Nine Key Elements guidance.

The NPS Management Plan was crafted in a modular format so that certain sections could stand alone as pieces for targeted audiences. Sections 5 through 15 of the Nonpoint Source Management Plan address a subject or "functional area" that might be of concern to a particular citizen, community group or business; these sections can be read individually to learn more about KDOW's objectives and strategies for reducing NPS pollution within that functional area. Each modular section considers one of the functional areas, detailing summary information, KDOW's strategy, educational resources, and opportunities for funding.

KDOW hopes you find the NPS Management Plan an informative and helpful resource. The division welcomes comments and concerns about nonpoint source pollution in the Commonwealth. If you have questions or would like to provide feedback to KDOW, please contact the Watershed Management Branch, Nonpoint Source and Basin Team Section at 200 Fair Oaks Lane, Fourth Floor, Frankfort, KY 40601 or by phone at 502-564-3410.

1.1. Vision

The vision of the Kentucky Nonpoint Source Pollution Control 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.

1.2. Kentucky Nonpoint Source Management Plan

The Nonpoint Source Management Plan is an element required by Section 319(b) of the Clean Water Act (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. CWA Section 319(b) also contains a list of specific content that must be included.

The *Kentucky Nonpoint Source Management Plan 2.0* identified Kentucky's NPS pollution control goals and strategies for federal fiscal years 2000 - 2005. It described how Kentucky anticipated assessing NPS pollution impacts and threats, identifying priority watersheds and projects, coordinating technical and financial assistance for Best Management Practices (BMP) implementation, implementing statewide education and technology transfer programs, and implementing regulatory and enforcement mechanisms. The *Kentucky Nonpoint Source Management Plan 3.0* builds upon the lessons learned in the past 10 years and develops a plan that can be used by a broad audience to decrease NPS pollution in the state. For public comments received on the 2012 *Plan 3.0*, please refer to Appendix D.

1.3. US EPA Key Element Requirements

The US EPA has identified Nine Key Elements as necessary components for the upgraded Nonpoint Source Management Plan. These revised elements are based on the original Nine Key Elements and must all be included for the plan to be approved by US EPA. These elements emphasize a well-rounded program with developed partnership and targeting of funds to a watershed scale. The Nine Key Elements are listed below.

Key Element 1: The State program contains explicit short- and long-term goals, objectives and strategies to protect surface and ground water.

Key Element 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 Element 3: The state uses a balanced approach that emphasizes both statewide nonpoint source programs and on-the-ground management of individual watersheds where waters are impaired or threatened.

Key Element 4: The state program (a) abates known water quality impairments from nonpoint source pollution and (b) prevents significant threats to water quality from present and future nonpoint source activities.

Key Element 5: The state program identifies waters and watersheds impaired by nonpoint source pollution and identifies important unimpaired waters threatened or at risk. Further, the state establishes a process to progressively address these identified waters by conducting more

detailed watershed assessments and developing watershed implementation plans, and then by implementing the plans.

Key Element 6: The state reviews, upgrades, and implements all program components required by Section 319(b) of the Clean Water Act, and establishes flexible, targeted, and iterative approaches to achieve and maintain beneficial uses of water as expeditiously as practicable.

Key Element 7: The state identifies federal lands which are not managed consistently with state nonpoint source program objectives. Where appropriate, the state seeks US EPA assistance to help resolve issues.

Key Element 8: The state manages and implements its nonpoint source program efficiently and effectively, including financial management.

Key Element 9: The state periodically reviews and evaluates its nonpoint source management program using environmental and functional measures of success, and revises its nonpoint source assessment and management program at least every five years.

1.4. 319(h) Nonpoint Source Grants

Section 319(h) of the Clean Water Act deals with nonpoint source pollution. Each year KDOW applies to US EPA to receive 319(h) funding. After receiving the federal award, KDOW 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 KDOW 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. KDOW 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 KDOW 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 and maintain sustainable results. KDOW 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.

1.5. Project list

Since the *Nonpoint Source Management Plan 2.0* was completed in August 2000, KDOW has been awarded over 40 million dollars in federal money to support Section 319 of the Clean Water Act. With changing US EPA guidance through the years, the scope and focus of these projects has also changed. In the past twelve years, the majority of the funding has been spent on projects that implement NPS pollution controls and Watershed Based Plans (WBPs) (see Figure 1.1).

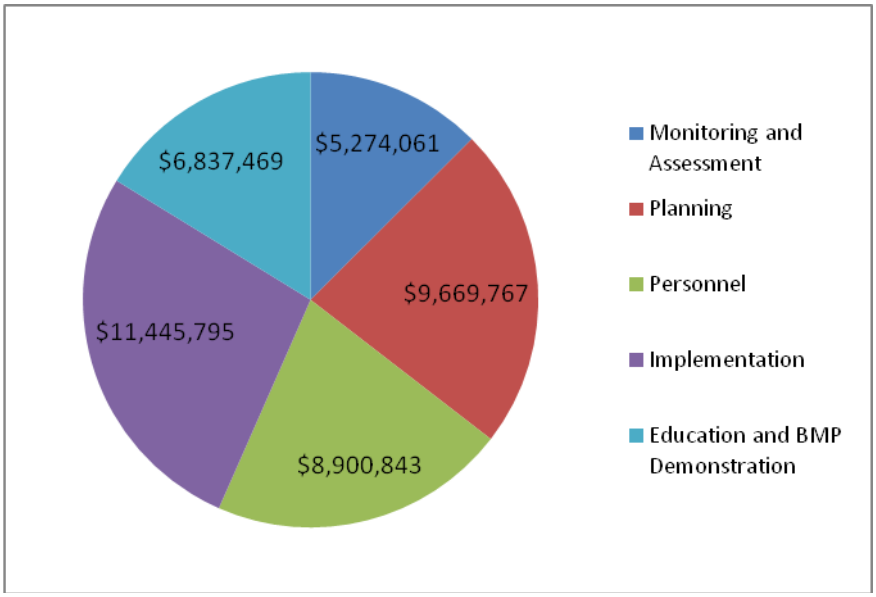

Figure 1.1: Estimated expenditures by category for 2000-2011.

The number of projects funded in each year has varied with changes in the economy and changes in priorities. While twenty-five projects were funded in 2000, the years since 2005 have had no more than fifteen projects each year. Over the twelve year time period from 2000-2011, a total of 172 projects have been funded (see Table 1.1).

Table 1.1: Estimated expenditure by project for 2000-2011

Fiscal Year	Project Name	319(h) funds
2011	Nonpoint Source Program Staff Support – Watershed Management Branch Personnel	$50,000

	Division of Conservation Nonpoint Source Support Staff	$112,600
	Watershed Watch in Kentucky: Volunteer Training Upgrades and Support	$264,174
	Franklin County Judicial Green Streets Demonstration Project	$228,900
	Chautauqua Park's Green Solution to Pollution	$93,358
	Lost River Cave Wetland and Valley	$31,391
	Kentucky Stream Restoration Manual	$372,408
	Best Management Practices Implementation on Timber Harvests in Kentucky	$79,330
	Hinkston Creek Watershed-Based Plan Implementation Project	$452,042
	Agricultural BMPs in the Hanging Fork and Clarks Run Watershed	$194,400
	Sinking Creek Water Quality Sediment and Habitat Investigation	$499,516
	Coarse sediment assessment and stream restoration design alternatives for upper Kinniconick Creek	$342,881
	Little Laurel River Watershed – Watershed Plan Implementation	$150,000
	Total 2011 Funds Awarded for NPS Projects	**$2,871,000**
2010	Nonpoint Source Program Staff Support – Watershed Management Branch Personnel	$399,504
	Nonpoint Source Administrative Support for the Division of Water	$258,093
	Division of Conservation Nonpoint Source Support Staff	$112,600
	Groundwater Monitoring in Kentucky	$157,006
	Nonpoint Source Program Monitoring – Division of Water	$176,880
	Habitat for Humanity Green Infrastructure Demonstration	$391,205
	Four Rivers Basin Coordinator	$173,596
	Kentucky Forest Landowner's Handbook - Reprint	$10,800
	Livestock Stewardship BMP Training and Demo	$188,814

	Capacity Building in the Little River Watershed	$42,900
	Dix River Watershed Implementation Project – Phase I	$200,460
	Woolper Creek Watershed Based Plan	$449,870
	Bacon Creek Watershed Plan Implementation	$255,953
	Brushy Creek Sediment and Water Quality Investigation	$487,919
	Total 2010 Funds Awarded for NPS Projects	**$3,305,600**
2009	Nonpoint Source Program Support - Watershed Management Branch Personnel	$426,504
	Nonpoint Source Administrative Support for the Division of Water	$258,093
	Division of Conservation Nonpoint Source Support Staff	$105,701
	Groundwater Monitoring in Kentucky	$151,906
	Nonpoint Source Program Monitoring - Division of Water, Water Quality Branch	$176,880
	Agriculture Water Quality Act Compliance	$303,900
	Eagle Creek Straightpipe Abatement and Education Project	$107,469
	Stockton Creek Watershed Based Plan Implementation Project	$299,700
	Red River Gorge Restoration and Watershed Based Plan	$780,000
	Gunpowder Creek Watershed Initiative	$501,056
	Wolf Run Creek Watershed Based Plan	$174,125
	Total 2009 Funds Awarded for NPS Projects	**$3,285,334**
2008	Nonpoint Source Program Staff Support - Division of Water Watershed Management Branch	$572,347
	Nonpoint Source Administrative Support for the Division of Water	$258,093
	Division of Conservation Nonpoint Source Support Staff	$93,228
	An Assessment of Pathogens in Groundwater in Kentucky	$73,800

	Geomorphic Assessment of Fine-Grained Sediment Loads in the Bluegrass Physiographic Region	$362,579
	Kentucky Watershed Leadership Academy Program Development and Implementation	$200,000
	Triplett Creek Watershed Based Plan	$658,617
	Cane Run and Royal Spring Watershed Based Plan Implementation Project	$454,343
	Hinkston Creek Watershed Planning and BMP Implementation Project	$484,404
	TMDLs for Critical Watersheds	$148,189
	Total 2008 Funds Awarded for NPS Projects	**$3,305,600**
2007	Nonpoint Source Program Staff Support – Division of Water	$619,831
	Nonpoint Source Administrative Support for the Division of Water	$349,784
	Division of Conservation Nonpoint Source Support Staff	$75,540
	Groundwater Impacts to Surface Water Quality in Portions of Basin Management Units 3 and 4, Kentucky	$92,400
	Estimation of Flow-Duration Curves for Streams in Kentucky	$141,000
	Assessment and Restoration Design for Sediment Impaired Watersheds	$297,907
	Banklick Creek Watershed Based Planning, Implementation and Results	$600,000
	Clarks River WBP - BMP Implementation	$436,970
	Water Quality Improvement Projects for the Corbin City Reservoir Watershed	$312,568
	Elkhorn Creek Watershed Plan Project	$161,166
	Hancock Creek: Watershed Improvement Initiative	$208,534
	Total 2007 Funds Awarded for NPS Projects	**$3,295,700**
2006	Nonpoint Source Program Staff Support-Division of Water-Watershed Management Branch	$507,741
	Nonpoint Source Administrative Support for the Division of Water	$248,193

	Division of Conservation Nonpoint Source Support Staff	$103,146
	Groundwater Assessment for Mining and Other Impacts in BMU 5 Kentucky	$100,658
	Curry's Fork Comprehensive Watershed Based Plan-Development and Implementation	$970,500
	Watershed Based Planning in three impacted sub-watersheds of Big South Fork-Source Water for McCreary County Water District	$280,978
	Cane Run and Royal Spring Watershed Based Plan	$666,564
	Lower Rock Creek Watershed Stream Restoration Project Phase III	$505,320
	Total 2006 Funds Awarded for NPS Projects	**$3,383,100**
2005	Nonpoint Source Program Staff Support for the Division of Water	$486,428
	Division of Conservation Nonpoint Source Support Staff	$110,488
	Integrated Ground and Surface Water Quality Assessment in Large Karst Springs in BMU 4, Kentucky	$84,000
	Water-Quality Characteristics and Trend Analysis for Selected Sites within the Kentucky Watershed Framework and Statewide Monitoring Network	$3,868
	Cromer Ridge Watershed Restoration	$582,000
	North Elkhorn Urban Water Quality BMP Education and Demonstration Project	$271,500
	Buck Creek Watershed Riparian Restoration	$330,094
	Geomorphic Assessment and Watershed Implementation Plan For a Sediment Impaired Watershed	$342,704
	Watershed Based Plan Development and Initial Implementation for Bacon Creek, Hart Co., KY	$86,946
	Sinkhole Education and Restoration For the Reduction of Nonpoint Source Pollution in the Pleasant Grove Creek Subwatershed	$125,000
	Eagle Creek Straightpipe Abatement and Education Project	$159,000
	Pleasant Run Acid Mine Drainage Abatement Project	$720,400

	Obion Creek Restoration Re-obligation	$131,172
	Total 2005 Funds Awarded for NPS Projects	**$3,433,600**
2004	Nonpoint Source Staff Support for the Division of Water	$436,629
	Division of Conservation Support Staff	$219,313
	Stream Geomorphic Bankfull Regional Curves 2004	$84,609
	Groundwater Quality Monitoring for Nonpoint Source Chemicals in the Jackson Purchase Region of Kentucky	$85,000
	Nonpoint Source Water Quality Monitoring and Assessment for Kentucky TMDL Program.	$108,122
	Precision Agriculture BMP Technology Transfer	$200,250
	Dry Run Watershed Land Use BMP Education Project	$158,500
	Mud, Horses, and Clean Water - A BMP Demonstration Project for Suburban Horse Owners	$185,600
	Interactive GIS Tool to Estimate Basin Characteristics	$228,000
	Land Use Practices And Their Impact on Water-Quality in Upper Sinking Creek Watershed-A Priority Targeted Watershed	$321,000
	Basin Coordination for Kentucky Watershed Management Framework	$202,777
	Developing Watershed Implementation Plans; Creating a formula for success in the Salt and Licking River Basins	$354,338
	Corbin City Reservoir/Laurel River Watershed Implementation Plan	$108,989
	Strodes Creek Conservancy: Watershed Improvement Initiative	$680,034
	Fleming Creek Clean Water Action Plan	$570,639
	Total 2004 Funds Awarded for NPS Projects	**$3,943,800**
2003	Nonpoint Source Staff Support for the Division of Water	$116,399
	Nonpoint Source Water Quality Monitoring Assessment	$135,210
	Groundwater Assessment and Spring Basin Delineation within the Salt and Licking River Basins	$83,047
	Nonpoint Source Water Quality Monitoring and Assessment in	$40,069

	Kentucky's TMDL Program	
	Stream Geomorphic Bankful Regional Curves	$112,410
	Gainesway Retention Basin Retofit for Water Quality and Educational Programming	$373,560
	McConnell Springs Stormwater Quality Wetland Pond	$314,114
	Silvicultural BMP Implementation Monitoring Study	$85,000
	Kentucky Nonpoint Source Education (KNSE) for Landuse Development	$117,592
	Development of Interpretive Materials for Nonpoint Source Pollution Displays	$42,000
	Groundwater Education, Training, and Technology Transfer	$450,000
	Continuation of Nonpoint Source Staff Support for the Division of Water	$16,500
	Reduction of NPS Urban Runoff in the Floyds Fork Watershed through a Stormwater Management Plan	$244,000
	Townsend Creek Watershed	$900,000
	Olympia Watershed Improvement Project	$570,000
	Floyds Fork Comprehensive Watershed-Based Plan	$304,400
	Four Rivers Basin Coordinator	$79,699
	Total 2003 Funds Awarded for NPS Projects	**$3,984,000**
2002	Nonpoint Source Staff Support for the Division of Water	$422,262
	Division of Conservation Nonpoint Source Support Staff	$192,639
	Nonpoint Source Water Quality Monitoring and Assessment in the Kentucky River BMU	$135,750
	Assessment of Groundwater Quality in the Kentucky River Basin	$87,600
	Stream Geomorphic Bankfull Regional Curves 2002	$113,076
	Green River Watershed Demonstration Project-Subproject 3	$206,583
	The Comprehensive Commonwealth Water Education Project	$743,842

	Pesticide/Nutrient BMP Buffer: From the Classrom to the Field	$81,961
	Nonpoint Source Staff Support for the Division of Water-Incremental Grant	$274,240
	Nonpoint Source TMDL Development-Incremental Grant	$171,400
	Dix River Herrington/Reservoir Watershed Implementation Plan Development	$536,452
	Upper North Fork of the Kentucky River-Clean Water Action Plan Project	$203,326
	Continuation Support for Controlling Erosion and Sediment at Construction Sites in Kentucky	$53,383
	Watershed Based Planning in Cane Creek Watershed	$59,868
	Watershed Based Planning for the Upper East Fork of Clarks River	$108,300
	Peyton Creek Watershed - Phase III	$243,192
	Lean Management for the 319(h) Grant Process	$108,540
	Kentucky Watershed Leadership Academy: Program Development	$30,000
	Stormwater Master Plan for Kenton County Schools	$195,086
	Total 2002 Funds Awarded for NPS Projects	**$3,967,500**
2001	Nonpoint Source Section Staff Support	$377,316
	University of Kentucky Cooperative Extension Service Liaison	$41,638
	Section 319(h) Administrative Assistant-Nonpoint Source Personnel	$35,103
	Water Quality Monitoring and Assessment	$87,000
	Expanded Groundwater Monitoring for Nonpoint Source Pollution Assessment of Water	$75,000
	Development of TMDLs for Four Streams in the Kentucky River Basin	$62,000
	Stream Geomorphic Bankfull Regional Curves 2001	$124,946
	Statewide Training Program for Controlling Sediment and Erosion at Construction Sites	$204,491

	Kentucky Wastewater Education Project	$315,827
	Roundstone Renewal BMP Demonstration Project	$282,892
	Stream Restoration Assessment and Natural Channel Design Training Module	$466,648
	The River Institute	$180,639
	Kentucky Division of Water Nonpoint Source Program Staff Support FFY01 Incremental Workplan	$199,614
	Peyton Creek Watershed	$450,000
	Assessment of pesticides, nutrients, and suspended sediment of the Little River Basin, Kentucky	$308,100
	Division of Abandoned Mine Lands Homestead Refuse Reclamation: Pleasant Run Watershed Clean Water Action Plan	$756,286
	Total 2001 Funds Awarded for NPS Projects	**$3,967,500**
2000	Nonpoint Source Section Staff Support	$374,966
	Section 319(h) Administrative Assistant Interagency Personnel Position	$26,000
	UK Cooperative Extension Service Liaison with the Kentucky Nonpoint Source Pollution Program in Agriculture and Silviculture Areas	$46,180
	Livestock Waste Resources Utilization Specialist-Nonpoint Source State Level Interagency Personnel Position	$46,420
	Water Quality Monitoring and Assessment	$71,524
	Bacteriological and Biological Assessments of the Green River and Tradewater River Watersheds	$50,000
	Biological Monitoring Program Expansion: Green River Basin	$50,000
	Expanded Groundwater Monitoring for Nonpoint Source Pollution Assessment for the Tradewater and Green River Basins	$50,000
	Stream Geomorphic Bankfull Regional Curves	$84,460
	Development of pH (H+ Ion Mass) TMDL's for two 303(d) Listed Streams in Western Kentucky: Cypress Creek in Muhlenberg County, Kentucky and Drakes Creek in Hopkins County Kentucky	$31,298
	Pirates Cove Cluster System Sewage Disposal Demonstration	$132,300

	Channel Restoration and Riparian Reforestation Along Wilson Creek	$336,305
	Addressing Agricultural Nonpoint Source Pollution and Water Quality in Franklin County	$28,200
	Evaluation of Existing Groundwater Quality Data in the Kentucky, Salt, Licking, Tygarts, Big Sandy, and Little Sandy River Basins	$68,576
	The American Cave and Karst Center Educational Program	$25,600
	Nonpoint Source Program Staff Support	$336,428
	Biological Baseline Conditions in the Little River Watershed (Murray State University)	$72,000
	Fleming Creek Watershed Clean Water Action Plan - Watershed Restoration Plan	$500,000
	Rock Creek Clean Water Action Plan Project Phase II	$460,930
	Surface Water and Water Quality Monitoring at Selected Sites in Kentucky	$154,242
	Nonpoint Source TMDL Development	$169,000
	Training Program for Controlling Erosion and Sediment at Construction Sites in Kentucky	$31,400
	Technical Transfer and Training for NPS Pollution Control	$23,087
	Meeting the Demand for NPS Education	$111,415
	Commonwealth Mass Media Campaign to Reduce NPS Pollution	$104,869
	Total 2000 Funds Awarded for NPS Projects	**$3,385,200**

1.6. Goals

The first of US EPA's Nine Key Elements of a nonpoint source management plan is that the plan should have short- and long-term goals, objectives and strategies. To meet this requirement, KDOW has developed two broad goals for the NPS Program in the next five years.

The first of these goals is to **manage nonpoint source pollution in Kentucky**. This goal involves fostering and further developing KDOW's many partnerships across the Commonwealth. It also involves working efficiently and effectively to ensure implementation of NPS solutions. This goal additionally encourages development and demonstration of new and innovative technologies,

and guidance for their use. Objectives and strategies for this goal can be found in the specific functional groups discussed in Sections 5 through 15.

The second broad goal is to **continue development of the Kentucky Nonpoint Source Program**. The specific objectives in this portion of the management plan pertain more directly to the everyday oversight of the program. While they do not directly affect the causes and sources of NPS pollution, they allow for efficient use of federal funds. Objectives and strategies for this goal can be found in Section 2.7.

A complete list of goals, objectives and strategies can be found in Appendix B.

2. 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, Kentucky; 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 gis.gapsky.org/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 KDOW determined that managing water where it falls and flows is a smarter approach than managing water by artificial political lines. Supervising water based on watershed boundaries means more control in all areas of management.

KDOW manages the waters of the Commonwealth by using the watershed management approach, grouping water bodies into basins. A basin is a large scale watershed. Kentucky has twelve major river basins, grouped into five large-scale basin management areas (see Figure 2.1). Each of these basins serves as a resource unit in which monitoring and management strategies are focused. This approach engages stakeholders including local citizens, government and nongovernmental agencies, helping them realize positive, sustainable differences in their local watershed.

Figure 2.1: Basin Management Units.

2.1. Framework

The Kentucky Watershed Management Framework is a flexible structure for coordinating watershed management across the Commonwealth of Kentucky. The Watershed Management Framework is not a new program, but rather 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 (KDOW, 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 KDOW 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 2.1);

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.

2.2. 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* (KDOW, 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. Figure 2.2 is a map of those priority watersheds, and Table 2.1 (next page) provides a key to the map.

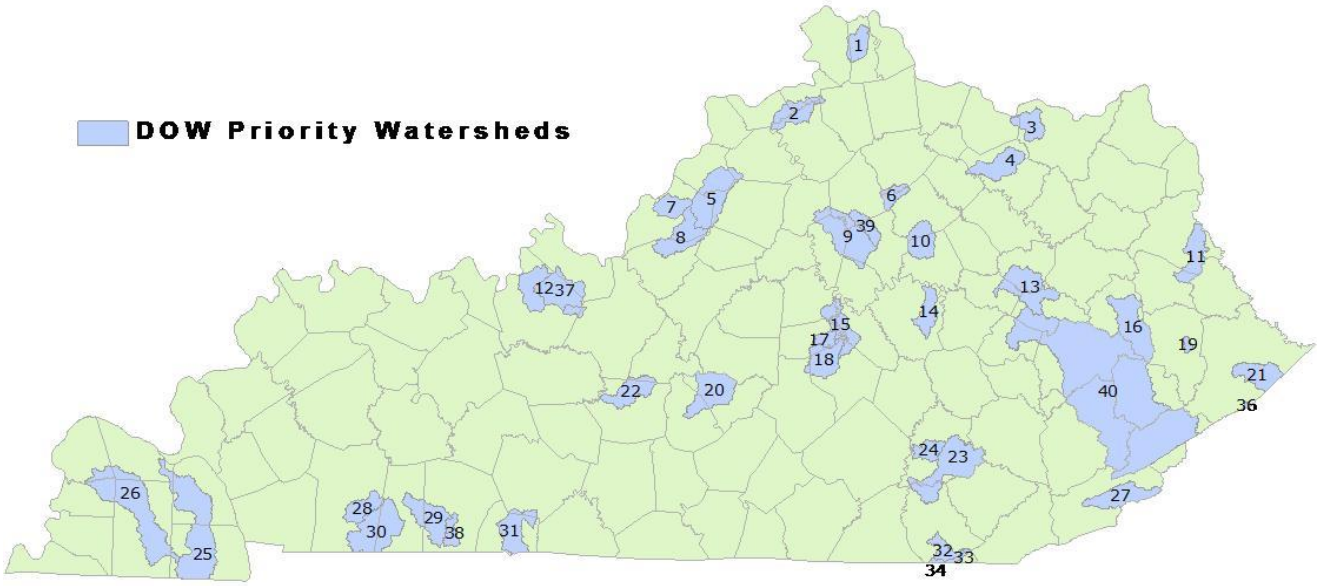

Figure 2.2: DOW Priority Watersheds.

Table 2.1: KDOW Priority Watersheds, Key to Figure 2.2.

#	Watershed	#	Watershed	#	Watershed	#	Watershed
1	Banklick Creek	11	Levisa Fork, near Louisa	21	Jonican Branch, near Fish Trap Lake	31	West Fork Drakes Creek
2	Eagle Creek mouth	12	Sinking Creek, at Hardinsburg	22	Bacon Creek	32	Clear Fork, Cumberland River
3	Cabin Creek	13	Red River Gorge	23	Laurel River	33	Mud Creek
4	Fleming Creek	14	Muddy Creek	24	Sinking Creek, of Rockcastle River	34	Elk Fork Creek
5	Floyds Fork	15	Dix River, Herrington Lake	25	Clarks River	35	Clear Fork, Cumberland River
6	Townsend Creek	16	Licking River, headwaters	26	Mayfield Creek	36	Elkhorn Creek, near Pine Mountain
7	Beargrass Creek, St. Matthews	17	Clarks Run	27	Clover Fork, Cumberland River	37	Boiling Springs
8	Floyds Fork	18	Hanging Fork Creek	28	South Fork Little River	38	Pleasant Grove Creek
9	South Elkhorn Creek	19	Prater Creek, near Banner	29	Whippoorwill Creek	39	Cane Run
10	Strodes Creek	20	Big Pitman Creek	30	West Fork Red River	40	North Fork Kentucky River

2.3. Federal Lands

Just over 1.5 million acres, or about six percent, of Kentucky is owned by the federal government. The largest land manager is the US Forest Service, with approximately 707,000 acres in the Daniel Boone National Forest (see Table 2.2, next page). Many of these publicly owned areas have a significant economic impact from tourism. The US Forest Service lands in the state attract more than seven million visitors annually; the National Park lands attract almost three million visitors annually; the US Army Corps of Engineers owned lakes attract more than 22 million and contribute more than 432 million dollars each year to the local economy. Kentucky is also home to five federal prisons, which represent a smaller proportion of federally owned land; however, the largest of these facilities, the Federal Medical Center in Lexington, uses a portion of its land as a working horse farm for rehabilitation of prisoners.

While KDOW has worked with these federal partners in many programs across the state, a review of their management plans for these federal lands has not been performed. During the

term of this NPS Management Plan for Kentucky, a review all of the existing plans will be completed and KDOW will work with our federal partners to ensure that the plans are consistent with the state plan. Where appropriate, the Commonwealth will seek assistance from US EPA to resolve any issues with coordination of these plans.

Table 2.2: Federal Lands in Kentucky.

	Acres
US Forest Service	
Daniel Boone National Forest	604,632.98
Land Between The Lakes	106,667.75
Jefferson National Forest	961.00
Beaver Creek Wilderness Area	4,854.71
Beaver Creek Wildlife Management Area	17,753.00
Cane Creek Wildlife Management Area	6,691.00
Clifty Wilderness Area	12,509.02
Natural Arch Scenic Area	1,064.93
Mill Creek Wildlife Management Area	13,009.00
Pioneer Weapons Wildlife Management Area	7,731.00
Redbird Wildlife Management Area	24,014.00
Red River Gorge Geological Area	24,336.15
Tight Hollow Research Natural Area	308.69
Rock Creek Research Natural Area	86.29
Subtotal	824,619.51
US Department of Defense, includes Army Corps of Engineers Lakes	
Fort Campbell	36,117.00
Fort Knox	109,684.00
Lexington Bluegrass Army Depot	13,814.00
Lake Cumberland	65,530.00
Laurel River Lake	6,060.00
Barren River Lake	10,100.00
Nolin River Lake and WMA	6,371.00
Martins Fork Lake	829.00
Buckhorn Lake and WMA	3,571.00
Fishtrap Lake and WMA	13,134.00
Dewey Lake	9,242.00
Paintsville Lake and WMA	11,186.00
Cave Run Lake	8,270.00
Grayson Lake and WMA	17,085.00
Rough River Lake	6,742.00

Taylorsville Lake and WMA	9,418.00
Carr Creek Lake and WMA	2,880.00
Lake Barkley	69,627.00
Green River Lake and WMA	21,037.00
Boatwright WMA	59.00
Dale Hollow Lake WMA	6,745.63
Yatesville Lake WMA	13,139.00
Sloughs WMA	3,462.00
Ohio River Islands WMA	400.00
Boatwright WMA	2,005.00
Subtotal	446,507.63
US Department of the Interior, National Park Service	
Mammoth Cave - National Park	5,283.00
Abraham Lincoln Birthplace - National Historical Park	146.00
Big South Fork - National River and Recreation Area	125,000.00
Cumberland Gap - National Historical Park	24,000.00
Subtotal	154,429.00
Tennessee Valley Authority	
Kentucky Lake WMA	4,044.00
West Kentucky WMA	315.00
West Kentucky WMA	1,167.00
Kentucky Lake	57,101.32
Subtotal	62,627.32
US Fish and Wildlife Service	
Ohio River National Wildlife Refuge	601.09
Reelfoot Lake National Wildlife Refuge	2,079.56
Clarks River National Wildlife Refuge	16,172.31
Subtotal	18,852.96
US Department of Energy	
West Kentucky WMA	1,890.00
Paducah Gaseous Diffusion Plant	3,425.00
Subtotal	5,315.00
US Department of Justice	
Federal Correctional Complex - Ashland, KY	105.00
Federal Correctional Complex - Manchester, KY	20.00
Federal Medical Center Lexington, KY	1,050.00
US Penitentiary Big Sandy - Inez, KY	800.00
US Penitentiary McCreary - McCreary Co, KY	450.00
Subtotal	2,425.00
Total	1,514,776.42

2.4. Planning Guidebook and the Kentucky Watershed Leadership Academy

Through a 319(h) grant with Kentucky Waterways Alliance, Kentucky Division of Water developed the *Watershed Planning Guidebook for Kentucky Communities* (KDOW, 2010) available online at water.ky.gov/watershed/Pages/WatershedPlanningGuidebook.aspx . 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 Leadership Academy (KWLA) was formed and will provide a foundation in areas necessary for watershed planning.

2.5. Center of Excellence

US 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 center will provide hands-on, practical products and services for communities to identify watershed problems and solve them. The US EPA designated center actively seeks 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 (US EPA, 2010). KDOW and US EPA Region 4 signed a Memorandum of Understanding with Kentucky Water Resources Research Institute (KWRRI) to develop the Kentucky Center of Excellence for Watershed Management in September 2010.

2.6. Citizen Reporting

Citizens may contact the KDOW 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. 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 KDOW 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 KDOW's regional offices. Regional office contact information and county coverage areas can be found online at water.ky.gov/Pages/CTAB.aspx 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.

2.7. Objectives and Strategies

The Kentucky Division of Water endeavors to reduce nonpoint source pollution across the Commonwealth. Although most of the ways KDOW addresses NPS impacts relate specifically to the source of pollution, maintaining a strong NPS program allows KDOW to efficiently address these impacts across the state. KDOW seeks to meet all requirements established by US EPA as grant conditions and to strengthen the NPS program in the state. To achieve the stated goal of **continuing development of the Kentucky Nonpoint Source Program**, KDOW developed several objectives and strategies related to protecting the Commonwealth from NPS pollution.

Objective 1: Meet federal requirements.

- Strategy 1: Increase federal drawdown and reach 20% goal.
- Strategy 2: Update GRTS at least twice a year.
- Strategy 3: Submit NPS Annual Report.
- Strategy 4: Submit NPS Success Story.
- Strategy 5: Continue review of QAPPs for all NPS funded monitoring.

Objective 2: Enhance programmatic capacity.

- Strategy 1: Update the NPS Management Plan.
- Strategy 2: Develop electronic filing system for NPS documents.
- Strategy 3: Develop Memorandums of Understanding with additional state or federal partners.

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

- Strategy 1: Participate in the development of the Kentucky Nutrient Reduction Strategy.
- Strategy 2: Provide information for Integrated Report and TMDL implementation narratives.

Objective 4: Develop and promote the Watershed perspective.

- Strategy 1: Update the Watershed Framework.
- Strategy 2: Pilot the Kentucky Watershed Leadership Academy.
- Strategy 3: Develop the Center of Excellence for Watershed Management.
- Strategy 4: Participate in the update of the Elements of a State Monitoring and Assessment Program document.

Objectives and strategies associated with the first goal can be found under each managed functional area, as discussed in Sections 5 through 15. For a complete list of Goals, Objectives and Strategies, see Appendix B.

3. Monitoring Summary

In the Commonwealth, there are approximately 92,000 miles of streams. About 11% of these waters have been assessed for support of their designated use, with nearly 52% fully supporting uses (KDOW, 2010). KDOW monitors streams throughout Kentucky according to the rotation outlined in the Watershed Framework (KDOW, 1997). A portion of annual 319(h) money is spent on monitoring for NPS pollution impairments, success monitoring and monitoring of Wild Rivers.

A designated use refers to specific use categories for a given water body. In Kentucky, as outlined in 401 KAR 10:026, designated uses are one of the following:

- Warm water aquatic habitat (WAH);
- Cold water aquatic habitat (CAH);
- Primary contact recreation (PCR);
- Secondary contact recreation (SCR);
- Domestic water supply (DWS); and
- Outstanding state resource water (OSRW).

KDOW takes into consideration the use and the value of the water body when making a determination on a water body's use. Water quality standards and criteria are set to ensure the designated uses are maintained and protected.

In addition, water bodies can also be designated as Exceptional Waters. This designation refers to certain water bodies whose quality exceeds that necessary to support the reproduction of fish, shellfish and wildlife, and recreation in and on the water. Waters placed in this category are Reference Reach waters, Kentucky Wild Rivers, some OSRWs and waters with "excellent" fish or macroinvertebrate communities. For more information on these designations, see 401 KAR 10:030, Section 1 or visit the Special Use Waters pages online at water.ky.gov/waterquality/Pages/SpecialUseWaters.aspx.

Streams are assessed by a variety of different programs. KDOW uses a targeted watershed approach for reference reaches and large rivers, and has a statistical program that assesses randomly selected streams each year. Streams are assessed using a minimum of one biological group, but may be assessed with a three-grouped approach, including macroinvertebrates, fish and diatoms. Methods for stream assessments can be found at water.ky.gov/Pages/SurfaceWaterSOP. The Water Quality Branch plans to update the Elements of a State Water Quality Monitoring and Assessment Program document for Kentucky in 2012.

3.1. Integrated Report

The Integrated Report (IR) documents the condition of water resources in Kentucky and is submitted to the US EPA to fulfill requirements of Sections 303(d), 305(b) and 314 of the Clean Water Act. Section 305(b) of the CWA requires states to assess and report water quality conditions to US EPA every two years. The KDOW has submitted the biennial report in the IR format since 2006. This reporting format provides categories to report assessment results per designated use of assessed water bodies, thus providing a convenient method to track water bodies and segments by designated use and assessment results. Table 3.1 shows the assessment categories assigned to water bodies in the Integrated Report.

Table 3.1: Reporting categories assigned to surface waters during the assessment process.

Category	Definition
1	All designated uses for water body fully supporting.
2	Assessed designated use(s) is/are fully supporting, but not all designated uses assessed.
2B	Segment currently supporting use(s), but 303(d) listed and proposed to US EPA for delisting.
3	Designated use(s) has/have not been assessed (insufficient or no data available).
4A	Segment with an US EPA approved or established TMDL for all listed uses not attaining full support.
4B	Nonsupport segment with an approved alternative pollution control plan (e.g., BMP) stringent enough to meet full support level of all uses within a specified time.
4C	Segment is not meeting full support of assessed use(s), but this is not attributable to a pollutant or combination of pollutants.
5	TMDL is required.
5B	Segment does not support designated uses based on evaluated data, but, based on Kentucky listing methodology, insufficient data are available to make a listing determination. No TMDL needed.

KDOW has executed a five year rotating Basin Management Unit monitoring strategy since 1998. This strategy has many advantages for the state to monitor and manage water resources; namely, it focuses available resources to a particular BMU once every five years, providing an in-depth assessment of water quality and issues specific to regional water resources. There are five BMUs in the state:

1) Kentucky River,
2) Salt-Licking Rivers,
3) Upper Cumberland and Four Rivers,

4) Green-Tradewater, and
5) Big Sandy-Little Sandy-Tygarts.

The assessment results use three classifications to denote relative level of designated use support: fully supporting (good to excellent water quality); partially supporting (fair water quality, does not fully meet designated use); and nonsupporting (poor water quality).

The KDOW monitors streams and lakes or reservoirs. In the ambient water quality network, all stations are monitored for a suite of conventional and toxic pollutants on a monthly or bimonthly frequency. Below, Table 3.2 outlines variable groups of parameters that water samples may be tested for.

Table 3.2: Variable group parameters

Variable Group	Parameters
Bulk	BOD, Bromide, Chloride, Color, Conductivity, Fluoride, Nitrite, pH, Sulfate, Total Dissolved Solids, Total Suspended Solids, Turbidity
Nutrients	Ammonia, Nitrate-Nitrite, Total Kjeldahl Nitrogen, Total Organic Carbon, Total Phosphorus
Metals	Hardness, Calcium, Iron, Magnesium, Potassium, Sodium, Aluminum, Arsenic, Barium, Cadmium, Chromium, Copper, Lead, Manganese, Nickel, Selenium, Silver and Zinc
Alkalinity/Acidity	Alkalinity as CaCO3, Bicarbonate as CaCO3, Carbonate as $CaCO_3$, Acidity
Nitrogen-Phosphorus Pesticides Method	Atrazine, Metribuzin, Simazin
Pesticides Method EPA508	Chlorpyrifos, Endosulfan, Propachlor
Herbicides EPA 555	Chlorophenoxy
Carbamates EPA 531.1	N-methylcarbamates, N-methylcarbamoylximes
Low-level Mercury	Mercury
Bacteria	*Escherichia coli,* Total Coliforms

Water quality stations in a given BMU are monitored once monthly every fifth year and are monitored bimonthly the other four years. When the rotating BMU monitoring strategy was adopted, the KDOW expanded the primary (permanent, regular monitored stations) water quality stations to 70 and added approximately 20 additional watershed water quality stations

per BMU. This has provided greater coverage of water quality stations and the flexibility to add watershed stations for monitoring watersheds for particular reasons (e.g., landuse considerations, TMDL development, intra-basin issues) for each BMU. Some of the primary water quality stations are monitored for biological community health once every five years. KDOW develops biological monitoring plans for streams including a reference network for development and refinement of biological metrics and targeted monitoring to address needs and fill gaps in each BMU.

Probability-based monitoring design of wadeable streams (stream order 1 – 5) is employed in each BMU to provide a nonbiased assessment of water quality, laying the foundation for trends across the state. This random approach provides water quality data that is nonbiased and can be applied to many issues and water quality needs for KDOW. Additionally, the KDOW TMDL Section monitors water bodies and associated watersheds to scope the extent and verify sources of each pollutant affecting a 303(d) listed water body as part of TMDL development.

3.1.1. Warmwater and Coldwater Aquatic Habitat Use Support

Kentucky has almost 92,000 miles of streams. To date, there are 9,967 miles, or about 11%, assessed for coldwater and warmwater aquatic habitat designated uses (collectively often referred to as Aquatic Life use). Of assessed miles, 5,167 or nearly 52%, fully support this designated use. The number of assessed miles not supporting Aquatic Life use is about 4,800 miles, or 48%. The three leading causes (pollutants) of impaired water quality for this designated use are sedimentation/siltation, nutrient/eutrophication and total dissolved solids (KDOW, 2010).

3.1.2. Contact Recreation Use Support

Primary Contact Recreation criteria are in place to protect people recreating in a way that likely will result in full body immersion, such as swimming. Both bacteria and pH criteria apply to this designated use. Currently in the Commonwealth, 4,762 miles have been assessed statewide for PCR. A total of 1,494 miles or 31% fully support and 3,268 miles or 69% do not support the use. Secondary Contact Recreation designated use criteria are in place to protect those recreational activities that are likely to result in incidental contact with water, such as boating, fishing and wading. There have been 1,951 miles assessed for this use in the Commonwealth and 1,330 miles or 68% fully support; a total of 621 miles or 32% do not fully support this use (KDOW, 2010).

3.2. Groundwater Monitoring

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

Currently active sites provide data on granular aquifers, alluvial aquifers, karst terrains and fracture-flow dominated aquifers. One-time ambient groundwater samples are often collected as part of ongoing citizen complaint investigations to assist private citizens with care and maintenance of water wells and springs. Analyses from these one-time sites are added to the program's database, thus broadening the information base on ambient groundwater in Kentucky. Many of the wells and springs sampled in emergency response situations represent ambient groundwater conditions and are also added to the network database.

Additional wells and springs are sampled as a part of the Kentucky Nonpoint Source Pollution Control Program investigations. The groundwater studies occurring as part of these investigations, funded by Clean Water Act Section 319 grants, are carried out for surface and subsurface water on a yearly rotating basis in each of five major BMUs that correspond to major river watersheds in the state. Typical nonpoint sources of groundwater pollution include pesticides and nutrients from row crop production, hydrocarbons and chlorides from oil and gas exploration and production, and pollutants associated with urban runoff, such as salting of roadways and the application of lawn chemicals. All nonpoint source groundwater sites are sampled on a varying schedule with the same protocol and parameters as the Ambient Groundwater Monitoring Program, and this data is added to the database to further enhance groundwater information in Kentucky. Information from the Ambient Groundwater Monitoring Program is providing the geochemical data necessary to help characterize, protect and manage this important resource.

Data collected from all of the above are available from the Kentucky Groundwater Data Repository www.uky.edu/KGS/water/research/gwreposit.htm at the Kentucky Geological Survey.

3.3. Quality Assurance (QA)

As required by 48 CFR 46, 40 CFR 31, and 40 CFR 35, the Kentucky Department for Environmental Protection (KDEP) and Division of Water are required to have a quality assurance program for the data management and proscribed procedures within the organization. Agencies are required to complete Quality Management Plans (QMPs) and Quality Assurance Project Plans (QAPPs) to show how data can meet program goals and objectives. QAPPs are

required for all projects funded by 319(h) grants that involve water quality monitoring or modeling.

3.3.1. Quality Management Plan (QMP)

The QMP for the KDEP is an overarching document that encompasses the QA program for all divisions in the Department for Environmental Protection. It was last updated in 2010 and is available at water.ky.gov/Documents/QA/DEPQMPedited.pdf. Information on the QA program for the Division of Water can be found at water.ky.gov/Pages/QualityAssurance.aspx. Additionally, the Standard Operating Procedures (SOPs) for numerous water quality sampling methods for KDOW can be found at water.ky.gov/Pages/SurfaceWaterSOP.aspx.

3.3.2. Quality Assurance Project Plans (QAPPs)

US EPA requires that all environmental data used in decision making be supported by an approved Quality Assurance Project Plan. This requirement is defined in US EPA Order 5360.1 A2 (US EPA, 2000), Policy and Program Requirements for the Mandatory Agency-wide Quality System, for US EPA organizations. Non-US EPA organizations funded by US EPA are required to develop a QAPP through:

- 48 CFR 46, for contractors;
- 40 CFR 30, 31, and 35 for assistance agreement recipients; and other mechanisms, such as consent agreements in enforcement actions.

The QAPP integrates 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.

4. Nonpoint Source Functional Areas

The approach in the *Kentucky Nonpoint Source Management Plan 2.0*, was to address pollutant impacts in the state as either regulatory or non-regulatory. Recently, KDOW has begun to look at impacts holistically with a watershed perspective. This version of the 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
- Section 10: Protection
- Section 11: Recreation
- Section 12: Resource Extraction
- Section 13: Riparian Areas and Stream Restoration
- Section 14: Water Quantity
- 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

Kentucky has approximately 85,700 farms, with the average farm size of 163 acres (US Department of Agriculture, 2011). The KDOW has found that agriculture is the leading source of impairments resulting in streams not supporting their designated uses in Kentucky. Agriculture is associated with 55% of non-supporting streams in Kentucky (KDOW, 2010).

Figure 5.1: Cows in a Kentucky creek. Allowing cattle in the creek is bad for water quality and for livestock health.

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. Agricultural Water Quality Plans can be developed online at warehouse.ca.uky.edu/AWQP2000/index.html. To access the full AWQA, see KRS 224.71-100 through 224.71-140.

5.2. KDOW Strategy

The KDOW's non-regulatory approach to reducing nonpoint source pollution from agricultural operations is much more 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 there is a substantial amount of pesticides and other farm chemicals as well as petroleum products and septic systems entering streams from farming operations.

Stormwater runoff from animal feeding operations can be a source of nonpoint source pollution. If excessive amounts of manure and wastewater are land applied, or if the land application is conducted under the wrong conditions, the waste can leave the application area and cause contamination of streams. Contamination can also be caused by runoff from animal holding areas as well as by runoff from manure storage areas such as litter piles or uncovered manure stack pads.

Under Kentucky regulations, any Animal Feeding Operation (AFO) that has a liquid manure handling system must have a permit in order to legally operate. In accordance with Kentucky Administrative Regulations 401 KAR 5:005, Section 1(3), these operations are required to have a Kentucky No Discharge Operational Permit (KNDOP). To apply for a KNDOP, a Short Form B should be submitted to KDOW. The form (Form DEP 7033-B-ND) is available at: water.ky.gov/permitting/Pages/WastewaterDischarge.aspx

5.3. Partner Strategy

The Kentucky Division of Water 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 KDOW 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 provides a direct link between the Governor of Kentucky and one of the Commonwealth's most important industries. The office administers the Governor's Commission on Family Farms, the Kentucky Agricultural Resource Development Authority (KARDA), the Kentucky Agricultural Development Board (Phase I), the Kentucky Tobacco Settlement Trust Corporation (Phase II), and the Kentucky Aquaculture Infrastructure Development Fund. Additionally, this office

represents Kentucky's interests as national agricultural policy is developed. The Governor's Office of Agricultural Policy is dedicated to doing all it can to develop and implement agricultural development policies that result in a brighter future for our Commonwealth.

- **Kentucky Agriculture Science and Monitoring Committee (KASMC)** - ky.water.usgs.gov/projects/ky_ag_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. KASMC meetings are generally held quarterly at locations across the Commonwealth. 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)** - conservation.ky.gov/Pages/AgricultureWaterQuality

  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.

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

  The Kentucky 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.

- **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 landusers 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.

- **The Nature Conservancy (TNC)** - www.nature.org/ourinitiatives/regions/northamerica/unitedstates/kentucky

  The Nature Conservancy helped launch the Conservation Reserve Enhancement Program (CREP) along the Green River in 2001, focused primarily on working with willing landowners who receive federal and state financial incentives for reforesting cleared lands to improve wildlife habitat. In 2008, TNC helped reach the program cap for the Green River of 100,000 acres. TNC secured permanent conservation easements on 73 of these tracts, which can be used as matching money for the CREP.

  More recently, TNC has partnered with NRCS to help fund the Wetlands Reserve Enhancement Program (WREP) as part of the Mississippi River Basin Healthy Watersheds Initiative (MRBI). The MRBI-WREP area is located in the Bayou du Chien/Mayfield focus watershed. The objective of the MRBI-WREP is to reduce sediment and nutrients and improve the quality of water entering the Mississippi River, and improve wildlife habitat by restoring the extent and function of forested wetland systems in the Bayou du Chien/Mayfield watershed in Western Kentucky. WREP is a part of the Wetlands Reserve Program and is a voluntary program offering landowners the opportunity to protect, restore and enhance wetlands on their property. The USDA NRCS provides technical and financial assistance to help landowners with their wetland restoration efforts. Landowners who choose to participate in WREP may sell a conservation easement or enter into a cost-share restoration agreement with USDA to restore and protect wetlands. The landowner voluntarily limits future use of the land, yet retains private ownership. Additional information can be found at www.ky.nrcs.usda.gov/programs/2011WREP/index.html.

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

  The Agricultural Research Service 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 Animal Waste Management Research Unit is located in Bowling Green, KY.

5.3.1. 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.

- **Kentucky State University (KSU)**- www.kysu.edu/landGrant

  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. Its three distinct areas are the Community Research Service (CRS), the Cooperative Extension Program (CEP), and Aquaculture Research Center (ARC).

5.4. Education and Outreach

Although the AWQA was passed over fifteen years ago, 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.** - www.kyagr.com/marketing/ageducation/KAEC.htm

  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** - www.kyagr.com/pr/agstats

  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 -** www.ca.uky.edu/enri/kawqa_information.php

  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 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** - www.epa.gov/agriculture/ag101

  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** - ces.ca.uky.edu/ces

  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 Task Force** - 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 Task Force 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.

5.5. 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** - water.ky.gov/Funding/Pages/NonpointSource.aspx

  319(h) is the section of the Clean Water Act dealing with nonpoint source pollution. Each year KDOW applies to US EPA to receive 319(h) funding. KDOW 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 KDOW 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 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).

- **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 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.

5.6. Objective and Strategies

The Kentucky Division of Water endeavors to reduce nonpoint source pollution across the Commonwealth. Agriculture is one of the biggest contributors to NPS pollution in our state, and therefore a primary target for achieving pollution reductions. To achieve the stated goal of **managing nonpoint source pollution in Kentucky**, KDOW has developed an objective and three strategies related to agricultural NPS.

Objective 1: Decrease input of pollutants from agricultural sources.

Strategy 1: Support projects that educate the agricultural community and install best management practices for agricultural impacts.

Strategy 2: Work with DOC on nonpoint source agricultural issues and support staff as outlined in the Memorandum of Understanding.

Strategy 3: Continue participation in the State Technical Committee, Agricultural Water Quality Authority and Kentucky Agriculture Science Monitoring Committee.

Objectives and strategies associated with the second NPS Program goal can be found in Section 2.7 of the full NPS Management Plan. For a complete list of NPS pollution goals, objectives and strategies, see Appendix B of the full plan.

6. Developed Lands

6.1. Summary

Developed land such as cities, neighborhoods and commercial areas creates nonpoint source pollution in many of Kentucky's streams. Of the stream miles assessed for the 2010 Integrated Report for Kentucky, "Urban Runoff" or "Municipal" are the suspected sources of impairment for 2,059.29 stream miles while "Residential Related" is the source of impairment for 1,398.18 stream miles (KDOW, 2010b). Events contributing NPS in developed areas include increased runoff from impervious surfaces, nutrients and pesticides from lawn application, bacteria from pets and onsite systems, as well as sediment and metals from land disturbance, construction and industrial impacts. Though developed lands face many hurdles in reducing NPS pollution, new technologies and best management practices are being implemented in communities across the Commonwealth to reduce NPS pollution.

Large communities often have failing gray infrastructure that leads to water and sewer leaks. 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. Some communities have begun implementation of green infrastructure on a localized scale to lessen these impacts on water quality (see Figure 6.1). Flooding is another issue in these developed areas due to stream channelization, habitat modification, and increased impervious surfaces.

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

Some developed areas can also have other programs related to stormwater including Combined Sewer Overflow (CSO) and Sanitary Sewer Overflow (SSO). There are no CSO or SSO regulations in Kentucky's Administration Regulations. CSOs are permitted outfalls within the sewer utility's KPDES coverage while SSOs are considered illegal, as they are unpermitted discharges. In addition to these programs, any construction site of an acre or more is required to obtain a

permit (40 CFR 122.26). These sites must prevent erosion and control sediment generated by the construction activities.

6.2. KDOW Strategy

KDOW addresses impacts from developed lands through both regulatory and nonregulatory approaches. KDOW provides 319(h) funding and technical assistance for communities throughout the Commonwealth dealing with nonpoint source pollution from developed areas. The programs for MS4s, CSOs, SSOs, brownfields and construction sites provide assistance for the regulatory aspects. These programs are discussed in more detail in the following sections. Communities impacted by wet weather regulations are highlighted in the map below (see Figure 6.2).

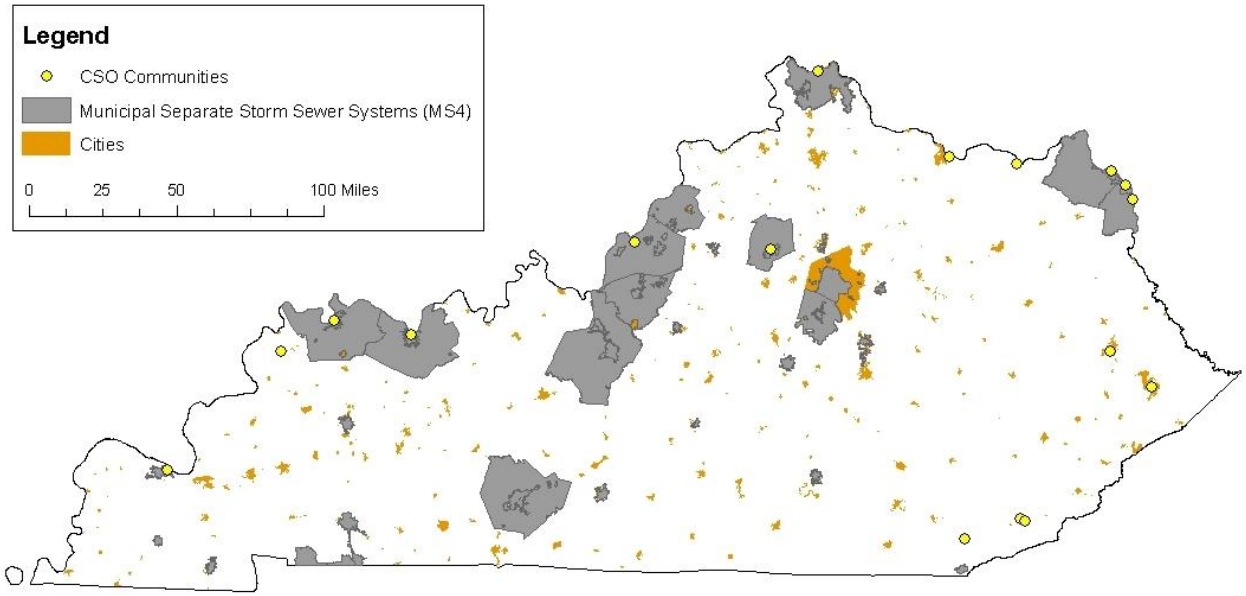

Figure 6.2: Wet weather regulated communities in Kentucky.

6.2.1. Municipal Separate Storm Sewer Systems (MS4s)

Stormwater runoff is generated when precipitation from rain and snowmelt events flows over land or impervious surfaces and does not 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. The primary method to control stormwater discharges is the use of best management practices (BMPs). In addition, 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, contain not only stormwater but also untreated human and industrial waste, toxic materials, and debris. According to US EPA, approximately 772 cities in the US have CSO systems. Kentucky has 17 areas with combined sewer systems with a total of 297 CSO outfalls. All of these communities and sewer utilities are under consent agreements with Kentucky, with several of those being joint Consent Decrees with the United States and Kentucky. All the consent agreements are calculated to bring these communities into compliance with the Clean Water Act, the 1994 CSO Control Policy, and state regulations within the next ten to fifteen years. Additional information about CSOs is included in Section 6.4.4.

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

The Wet Weather Section of the Surface Water Permits Branch of KDOW 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 Wet Weather 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 dozen 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.

6.3. Partner Strategy

The impacts from developed lands are vast and KDOW 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. Below is a list of some of the organizations assisting with these efforts and the work they are performing throughout the Commonwealth.

- **Bluegrass PRIDE** - www.bgpride.org

  Bluegrass PRIDE is a 501(c)(3) organization dedicated to providing environmental resources and information to schools, community groups, local governments and citizens in Central Kentucky. PRIDE stands for Personal Responsibility In a Desirable Environment. 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, Powell, Scott and Woodford. Bluegrass PRIDE partnered with KDOW to develop the Gray 2 Green Kentucky Handbook to assist local leaders in their understanding and acceptance of green infrastructure practices.

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

  The Division of Compliance Assistance 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 KDOW 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 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.

- **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 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 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 KDOW regarding current and pending

regulations and is working with KDOW to secure funding to support its education and outreach mission. The KSA annually hosts three regional training meetings and statewide training conferences.

6.4. 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 6.3: Rain garden installation at Turkeyfoot Middle School in Kenton County, Kentucky.

6.4.1. 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** - louisville.edu/landuse/healthy-watersheds-land-use-initiative.html

  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/owow_keep/NPS/urban.html

  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.

6.4.2. 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 for Dummies** - www.dlt.com/library/whitepaper/ms4-for-dummies-ebook-download

  Author Steve Kaelble writes about Municipal Separate Storm Sewer Systems and the government agencies that oversee them. The book is about the problem of pollution, and the remedies and regulations that are designed to fight that pollution; it's about running an MS4 that's in compliance. The book is available download for free at the website listed above.

- **MS4 Program** - cfpub.epa.gov/npdes/stormwater/munic.cfm

  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** - cfpub1.epa.gov/npdes/stormwater/menuofbmps/index.cfm

  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.

6.4.3. 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.kyt2.com/assets/files/uploads/09fieldguide_final.pdf

  This helpful field guide provides instruction on how to properly install and maintain BMPs on a construction site. Hardcopies of the most current version of the field guide are available upon request from the Kentucky Division of Water.

- **Kentucky Erosion Prevention and Sediment Control Technical Manual** - www.kyt2.com/assets/files/uploads/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** - cfpub.epa.gov/npdes/stormwater/const.cfm

  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.

6.4.4. 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** - cfpub.epa.gov/npdes/pubs.cfm?program_id=5

  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** - cfpub.epa.gov/npdes/pubs.cfm?program_id=4

  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** - cfpub.epa.gov/npdes/sso/toolbox.cfm?program_id=4

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

6.4.5. Green Infrastructure

Green infrastructure is an approach to stormwater management that utilizes nature's capacity to reduce stormwater runoff and improve water quality. The two 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.

- **Gray 2 Green Kentucky handbook** - www.gray2greenky.com

  To meet the demands of aging infrastructure and increased water quality regulations, municipalities are learning to implement more sustainable stormwater management techniques that utilize nature's capacity to reduce runoff and improve water quality. This innovative approach to stormwater management is commonly referred to as green infrastructure. This website was developed by Bluegrass PRIDE in partnership with KDOW as a tool to help municipal decision-makers choose the most effective way to implement green infrastructure and promote education about stormwater issues.

- **Green Infrastructure** - cfpub2.epa.gov/npdes/home.cfm?program_id=298

  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.

6.5. 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** - water.ky.gov/Funding/Pages/NonpointSource.aspx

  319(h) is the section of the Clean Water Act dealing with nonpoint source pollution. Each year KDOW applies to US EPA to receive 319(h) funding. KDOW 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 KDOW website or see Appendix A.

- **Clean Water State Revolving Fund (SRF)** - water.ky.gov/Funding/Pages/CleanWaterStateRevolvingFund.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.

- **KDOW Funding Information** - water.ky.gov/Funding

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

- **US EPA Green Infrastructure** - cfpub.epa.gov/npdes/greeninfrastructure/fundingopportunities.cfm

  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.

6.6. Objective and Strategies

The Kentucky Division of Water endeavors to reduce nonpoint source pollution across the Commonwealth. 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. To achieve the stated goal of **managing nonpoint source pollution in Kentucky**, KDOW has developed an objective and three strategies related to NPS from developed lands.

Objective 2: Decrease input of pollutants from developed lands.

Strategy 1: Support projects that demonstrate green infrastructure/low impact development (LID) and good stormwater management. Provide technical assistance for Urban/LID/Stormwater/Smart Growth efforts throughout the Commonwealth.

Strategy 2: Continue partnerships with Stormwater/Developed area groups locally, regionally and statewide.

Strategy 3: Participate in KDOW development of revised Construction General and MS4 permits.

Objectives and strategies associated with the second NPS Program goal can be found in Section 2.7 of the full NPS Management Plan. For a complete list of NPS pollution goals, objectives and strategies, see Appendix B of the full plan.

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 US 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 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. KDOW Strategy

KDOW's NPS Management 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 which forests provide and to reduce the nonpoint source 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.

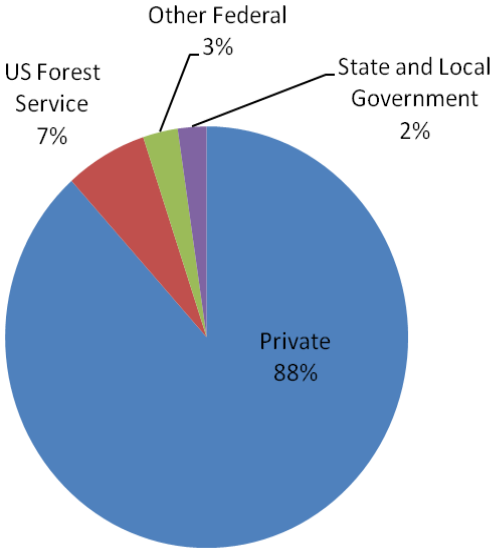

Figure 7.1: Ownership of Kentucky Forests.

The Kentucky Statewide Assessment of Forest Resources and Strategy, 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 62% of the Commonwealth's streams and rivers that have been assessed were found to be impaired (KDOW, 2010b). One of the primary causes of impairment was found to be 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).

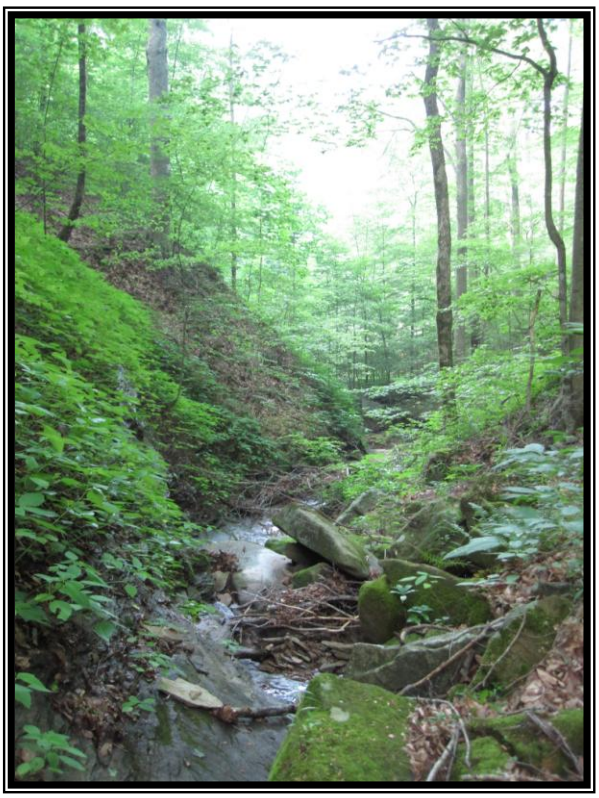

Figure 7.2: Forest covered mountain stream at Buckhorn State Resort Park. Photo © Michelle Shane, 2011.

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

7.3. Partner Strategy

Partnerships are crucial to KDOW's forestry management and protection strategy. The following is a brief description of the primary partners working with KDOW. 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. 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. The following are a list of some of the specific water and watershed management activities the USFS conducts:

  - Stream Inventory System: Fish habitat, fish population, macroinvertebrates, channel stability, valley segment types, and riparian vegetation are measured and evaluated in several reference streams.
  - Watershed Improvement: Watersheds that are determined to be in need of rehabilitation are the target of restoration efforts. The USFS monitors water quality at 40 locations in 10 to 15 different watersheds.
  - Water Quality Analysis: The USFS works to ensure that activities within the forest do not degrade water quality.
  - Artificial Wetlands: In order to minimize the potential impacts from historical mining operations and to remediate issues related to acid mine drainage, the USFS has constructed several artificial wetlands.
  - Horse Lick: As part of a watershed restoration project, the USFS and The Nature Conservancy worked to protect and restore the Horse Lick watershed. The area is now designated as a Nature Conservancy Bioreserve.
  - Cromer Ridge: The USFS received a 319(h) grant to restore an area heavily impacted by the use of all-terrain vehicles. The restoration efforts focused on reducing sediment erosion from the area.
  - The USFS also provides valuable information on the status and condition of watersheds within the forests. The agency serves as advisors to other state and federal organizations and groups, such as the Natural Channel Design Working Group. Additionally, the USFS provides several different education and outreach opportunities.

- **Forest Conservation Act BMP Review 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 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 KFCA. 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.

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

  The KDF is responsible for enforcing compliance with the Forest Conservation Act. As part of the agency's overall mission, KDF also works to conserve, protect and enhance the forests of the Commonwealth. 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. KDF conducts studies and monitoring programs to better assess the health and status of forests. When appropriate, KDF seeks input and technical guidance from KDOW on changing developments within the forest industry. KDF has also applied for and received several 319 (h) grants.

  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. KDF works with a landowner to determine priority land uses such as watershed improvement. Depending on the landowner's goals for the property, KDF will create a management plan or arrange for a wildlife biologist and other natural resources professionals to provide assistance. More specifically, the KDF Stewardship Program is proactively involved with mitigating water quality concerns by providing technical assistance for riparian buffer development within the auspices of Natural Resources Conservation Service's Conservation Reserve Program (CRP). KDF has been a key player in the Conservation Reserve Enhancement Program (CREP) and currently maintains a role in the Mississippi River Basin Initiative.

  KDF is a member of the KDOW Watershed Steering Committee and is also a participant in the Kentucky Interagency Groundwater Monitoring Network.

  KDF identified several partnering opportunities with KDOW in the 2010 Kentucky Statewide Assessment of Forest Resources Strategy. The following are goals and objectives intended to address water quality and quantity, forest fragmentation, and loss:

- Ensure timber harvest operations employ measures to maximize water quality protection specifically by developing and conducting a monitoring plan for BMP implementation. Also, increase emphasis on BMP implementation in continuing education programs. Funding from a 319 (h) grant was used to conduct a study of BMP implementation rates within the Commonwealth. Based on the results, BMP implementation rates have increased over time. Results from the study were used to improve and revise BMP educational material. Similar studies are planned for the future.
- Improve Kentucky water quality through protection, enhancement and restoration of forested riparian areas. KDF leverages funds and resources from governmental and non-governmental organizations to increase and protect forested riparian areas. The agency is also expanding the use of conservation easement programs and encouraging the creation and improvement of forested riparian areas through cost-share programs. KDF also compares the actual amount of forested riparian area by watershed to the desired area based on stream use to provide a baseline to measure future changes and focus remediation.
- Reduce the rate of variation in stream flow and volume by encouraging reforestation.
- Improve Kentucky water quality through protection, enhancement and creation of forested wetlands by expanding the use of conservation easement programs and Forest Legacy acquisitions in target areas.
- Increase public awareness of the relationship between forestland use and water quality and quantity. KDF works to inform landowners, loggers and the general public of the need for and benefits of BMP implementation and on the benefits of forested riparian. The agency also works with local watershed groups to educate community planners, zoning boards, public officials and developers about the benefits and necessity of forested riparian areas and the detrimental effects of excessive stormwater runoff. KDF provides technical assistance to communities to conduct tree inventory and tree canopy mapping projects using the USFS iTree software suite.
- Work with the Agricultural Water Quality Authority to promote or enhance BMP regulations that results in a change of farming practices that protect or restore forest areas. Through cost share programs, KDF works to increase fencing and/or tree planting in riparian areas. The agency is also working to develop incentives to maintain forested buffers.

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

  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:

  - Pine Mountain Wildlife Corridor Project is a 120 mile long forested corridor that connects existing protected areas to maintain a migratory passageway for plants and animals.
  - 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.
  - 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.

- **Land Between the Lakes (LBL) National Recreation Area, US Forest Service** - www.lbl.org/LRMGate.html

  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.

  An additional program is the Wildlife Habitat Incentive Program. The program aids landowners in restoring remnant prairies, planting native grasses/wildflowers, shrubs, and trees, implementing wildlife beneficial forest stand improvements, and creating shallow water areas. The CSP also works to exclude livestock from sensitive streams and woodlands. To be eligible, landowners must devote at least ten acres to the program.

- **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)** - www.nature.org/ourinitiatives/regions/northamerica/unitedstates/kentucky/

  TNC is a national nonprofit conservation organization with an active program within Kentucky. The organization has protected more than 45,000 acres in the Commonwealth and there are currently forty preserves owned and managed by TNC. The 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.

- **Wild Rivers Program** - water.ky.gov/waterquality/Pages/WildRivers.aspx

  In 1972, the Kentucky Wild Rivers Act established the Wild Rivers Program which is administered by KDOW. 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.

7.4. 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 forest land management which includes an emphasis on water quality issues related to timber harvesting. There are a number 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. The following is a list of current MACED forest projects:

  - **Appalachian Carbon Partnership** - www.appalachiancarbonpartnership.org

    The program provides financial incentives to landowners to enroll their forested land in a conservation program. Participating landowners must provide documentation that carbon offsets are occurring and have a certified sustainable management plan.
  - **Center for Forest and Wood Certification** - www.ca.uky.edu/forestryextension/cfwc/cfwcindex.html

    The center works to build capacity for forest certification within Kentucky and surrounding states. A primary goal is to make it easier for landowners and businesses to gain certification.
  - **Central Appalachian Forestry Alliance** - www.maced.org/foi/cafa.htm

    The alliance is made up of various organizations that seek to promote a stronger forest-based economy and healthier forests in the Appalachian region.
  - **The Kentucky Forest Landowner's Handbook** - www.maced.org/Forestry-handbook/index.html

    The handbook is a forest management guide for Kentucky landowners. The publication provides information on how to protect water resources and sustainably manage forested property. MACED received a 319 (h) grant to update and print the book in 2010.

- **Project Learning Tree (PLT)** - kaee.org/workshops/plt

  PLT 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. 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, 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 list of the education and outreach programs conducted by the UK Cooperative Extension program with assistance from the KDF.

  - **Kentucky Woodlands Magazine** - www.ca.uky.edu/kywoodlandsmagazine/about.php

    Published by the cooperative extension, the magazine is produced by the UK Department of Forestry and KDF. The magazine features articles and information on forestry related issues for private and public landowners and managers within the Commonwealth.
  - **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.
  - **Woodland Owners Short Course** - www.ca.uky.edu/forestryextension/WOSC.php

    The program provides short educational courses on forest management to private landowners. Topics that are generally covered include wildlife habitat, selling timber and protecting water quality.

7.5. 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** - water.ky.gov/Funding/Pages/NonpointSource.aspx

  319(h) is the section of the Clean Water Act dealing with nonpoint source pollution. Each year KDOW applies to US EPA to receive 319(h) funding. KDOW 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 KDOW website or see Appendix A.

- **Appalachian Carbon Partnership** - www.appalachiancarbonpartnership.org

  The program provides financial incentives to landowners to enroll their forested land in a conservation program. Participating landowners must provide documentation that carbon offsets are occurring and have a certified sustainable management plan.

- **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 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)** - heritageland.ky.gov/Pages/default.aspx

  The KHLCF provides funds to protect and preserve natural areas with unique value and qualities. KDOW 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 unmined 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 Kentucky State Nature Preserves Commission. 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), Conservation Innovation Grants (CIG), Wetlands Reserve Program (WRP), and the Wildlife Habitat Incentive Program (WHIP).

7.6. Objective and Strategies

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 KDOW is involved when water quality violations are observed. To achieve the stated goal of **managing nonpoint source pollution in Kentucky**, KDOW has developed an objective and three strategies related to NPS pollution from forestry activities.

Objective 3: Decrease NPS pollution impacts from forestry activities.

Strategy 1: Support statewide and regional projects that focus on scientific and sustainable forestry management with water quality being a primary concern.

Strategy 2: Participate in the Forest Conservation Act BMP board and continue partnerships with US Forest Service and KDF.

Strategy 3: Provide subgrantee funding to the KDF to regularly conduct an assessment of Forest Conservation Act BMP compliance.

Objectives and strategies associated with the second NPS Program goal can be found in Section 2.7 of the full NPS Management Plan. For a complete list of NPS pollution goals, objectives and strategies, see Appendix B of the full plan.

8. Groundwater

8.1. Summary

Groundwater is a vital resource for Kentucky. Groundwater 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 increase 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 (KDOW, 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, KDOW faces unique challenges in defining pollution sources and developing protective management

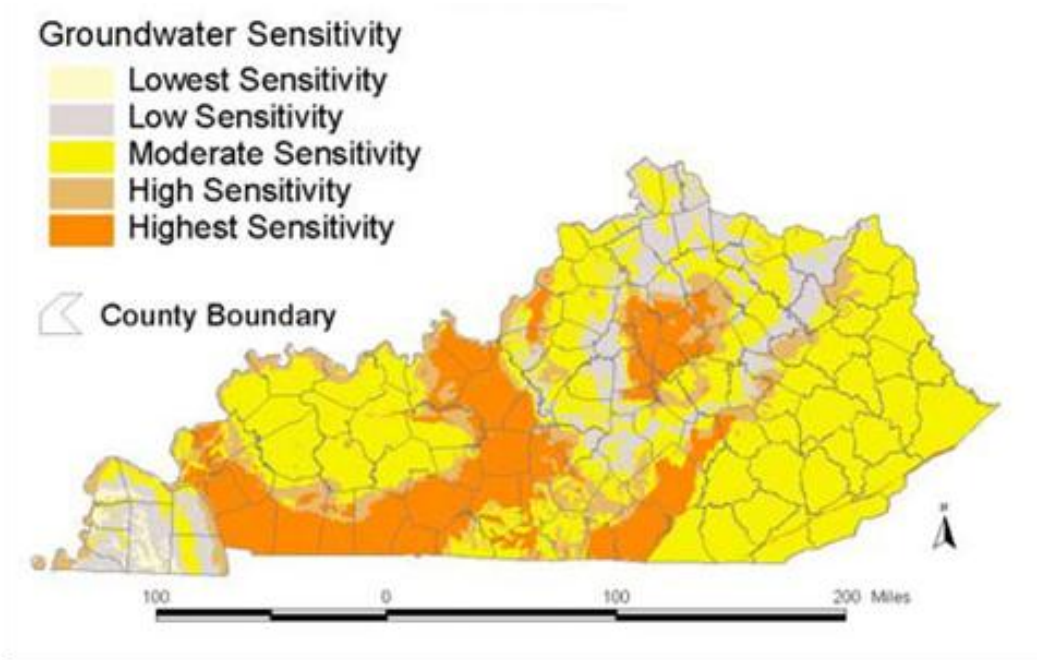

Figure 8.1: Groundwater sensitivity regions of Kentucky.

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 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 supplies.

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.

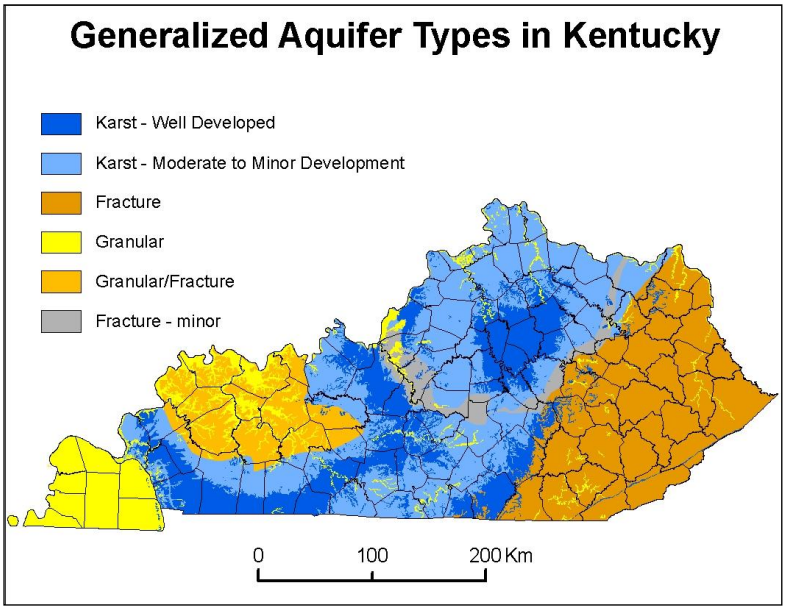

Figure 8.2: Generalized Aquifer Types in Kentucky.

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. As described below, the KDOW's Groundwater Section manages multiple programs to monitor and protect this valuable resource. The mission of KDOW's 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 BMPs, 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** - water.ky.gov/groundwater/Pages/AmbientGWMonProg.aspx

  The Groundwater Section coordinates groundwater quality monitoring and quantity assessment through various programs. KDOW 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 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** - water.ky.gov/groundwater

  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** - water.ky.gov/groundwater

  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)** - water.ky.gov/groundwater/Pages/GroundwaterProtectionPlans

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

- **Underground Injection Control (UIC)** - www.epa.gov/region4/water/uic/

  The Underground Injection Control program in Kentucky is administered by US EPA Region 4. Groundwater wells meeting this classification require a permit for operation through US EPA. The KDOW Groundwater Section actively partners with US EPA in developing permit conditions for operating UIC wells in Kentucky. The KDOW 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** - water.ky.gov/groundwater/Pages/WellDrillersProgram

  The Technical Services staff of the KDOW 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)** - water.ky.gov/groundwater/Pages/WellheadProtection

  Kentucky's Wellhead Protection Program was approved by US EPA in September 1993. Kentucky's WHPP is coordinated by KDOW 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. WHPP is designed to assist those communities relying on groundwater as their drinking water source to develop groundwater protection strategies. Currently, 250 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 KDOW also provides technical assistance to nontransient/noncommunity, semi-regular use, systems and smaller community PWSs upon request.

8.3. Partner Strategy

Groundwater impacts are diverse and numerous across Kentucky. The complexity of groundwater protection requires the focus and action of many groups and programs to be effective. KDOW is not able to address the impacts to groundwater from nonpoint source pollutants without the activities and policies of the following key partners.

- **County Health Departments** - chfs.ky.gov/dph/Local+Health+Department.htm

  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)** - www.kyagr.com/consumer/envsvs/technical

  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 KDOW.

- **Kentucky Division of Forestry (KDF)** - forestry.ky.gov/LandownerServices

  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)** - dmre.ky.gov

  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** - oilandgas.ky.gov

  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)** - waste.ky.gov
  - **Solid Waste Branch (SWB)** - waste.ky.gov/SWB

    The SWB 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 landfarming and composting facilities and registrations for permit-by-rule facilities.

- **Superfund Branch** - waste.ky.gov/SFB

  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** - waste.ky.gov/UST

  The UST 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.

- **KDOW Drinking Water Program** - water.ky.gov/DrinkingWater/

  KDOW 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. 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

  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. 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)** - www.uky.edu/WaterResources

  KWRRI coordinates ITAC 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

  USGS implements an extensive network of collaborative efforts to understand the nation's water resources. Through diverse programs, 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.

8.4. Education and Outreach

Many of the issues that lead to contamination of groundwater supplies are related to actions and processes that most people don't identify as harmful to groundwater. For this reason, it is an important part of Kentucky's protection and restoration strategy for groundwater to offer information and opportunities for learning, awareness and involvement. This is accomplished through the following materials and activities supported by KDOW 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)** - forestry.ky.gov/LandownerServices

  KDF supports a variety of programs that provide education and information regarding the protective relationship between forests and groundwater. Kentucky Woodlands Magazine is a joint effort with UK Forestry Extension.

- **KDOW Groundwater Awareness** - water.ky.gov/groundwater/Pages/GroundwaterAwareness

  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.

- **KDOW Groundwater Section** - water.ky.gov/groundwater/Pages/GroundwaterSection.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

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

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

  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, with assistance from KDF, implements and supports several programs that provide educational opportunities and information sharing related to forestry and water quality, including groundwater.

8.5. 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** - water.ky.gov/Funding/Pages/NonpointSource.aspx

  319(h) is the section of the Clean Water Act dealing with nonpoint source pollution. Each year KDOW applies to US EPA to receive 319(h) funding. KDOW 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 KDOW website or see Appendix B.

- **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.

  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. 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 Revolving Fund (SRF)** - **Clean Water State Revolving Fund (CWSRF)** - http://water.ky.gov/Funding/Pages/CleanWaterStateRevolvingFund.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 USGS Cooperative Water Program conducts studies in every state, protectorate and territory of the US through a workforce of about 1,800 people staffed within forty-eight Water Science Centers in partnership with nearly 1,600 local, state, and tribal agencies. Jointly funded programs (programs that may be matched by up to 50% USGS dollars) are considered when the study is mutually advantageous to the USGS and localities, states, and tribes. These cooperative programs are reviewed and renegotiated annually to ensure that they are responsive to the needs of those served and to the national priorities of the USGS.

8.6. Objective and Strategies

The Kentucky Division of Water endeavors to reduce nonpoint source pollution across the Commonwealth. 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. To achieve the stated goal of **managing nonpoint source pollution in Kentucky**, KDOW has developed an objective and three strategies related to NPS pollution in groundwater.

Objective 4: Protect and assess Kentucky's groundwater.

Strategy 1: Support the assessment of groundwater impacts from nonpoint source pollution in Kentucky.

Strategy 2: Provide technical assistance regarding groundwater protection and the development of groundwater and wellhead protection plans.

Strategy 3: Support the use of best management practices that protect and infiltrate groundwater.

Objectives and strategies associated with the second NPS Program goal can be found in Section 2.7 of the full NPS Management Plan. For a complete list of NPS pollution goals, objectives and strategies, see Appendix B of the full plan.

9. Onsite Wastewater Treatment

9.1. Summary

One impact of nonpoint source pollution on Kentucky's waterways is through wastewater that is not properly treated onsite. This is typically seen with failing septic systems or the use of straight pipes. 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.

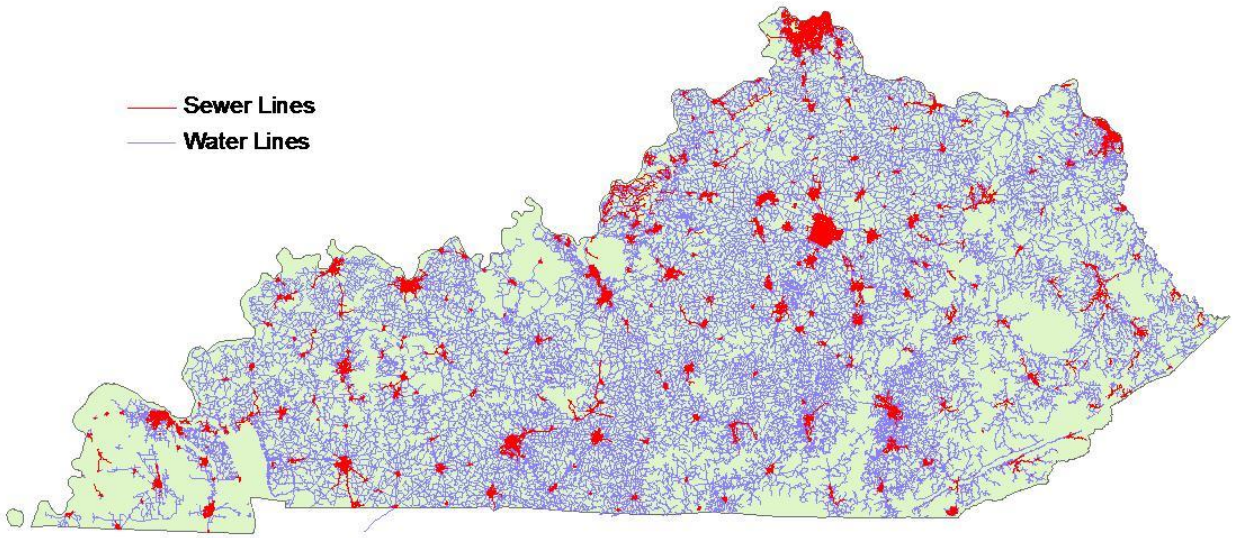

Figure 9.1: Sewer and water infrastructure in Kentucky.

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. In 2011,

CHFS had a staff of six working in the Onsite Sewage Disposal Systems program. The program is funded through a $30 permit fee. Due to the economic recession, the number of onsite sewage permits issued for the fiscal year 2009 to 2010 was only 8,578, a decrease of more than 50% from the 22,031 permits issued in 1998 to 1999.

9.2. DOW Strategy

KDOW'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.

KDOW's Watershed Management Branch strategy for onsite waste 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. KDOW 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.

9.3. Partner Strategy

Working with partners allows KDOW to begin to meet the vast needs for adequate onsite wastewater treatment across the Commonwealth. Regional and state agencies and organizations are critical partners in providing oversight and assistance for onsite systems.

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

  Community Action Kentucky 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/dph/Local+Health+Department.htm

  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.

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

  The Rural Community Assistance Program 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 complains 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.

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

  The Kentucky Onsite Wastewater Association, Inc. 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.

9.4. 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.

- **A Kentucky Homeowner's Guide to Septic Systems** - www.kentuckyonsite.org/documents/1%20KentuckyHomeownerGuide7-06.pdf

  This publication provides a short, easy to read document on the care of septic systems.

- **National Environmental Health Association (NEHA) Online Wastewater Treatment Systems (OWTS) Programs** - www.neha.org/research/onsite_wastewater.htm

  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 US 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.

- **Septic Tank Maintenance and Care** - www.fcs.uga.edu/pubs/current/C819-3.html

  This information provided by University of Georgia is more technical, but addresses many of the common causes of system failure.

- **UK Cooperative Extension publication "The Dos and Don'ts of Taking Care of Your Septic System"** - www.ca.uky.edu/enri/PUBS/enri401revised.pdf

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

- **US EPA Septic System Guides and Checklists** - cfpub.epa.gov/npdes/wastewatermonth.cfm

  US EPA has several informational brochures and a checklist 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.

9.5. Funding

Funding available for onsite wastewater management through KDOW 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** - water.ky.gov/Funding/Pages/NonpointSource.aspx

  319(h) is the section of the Clean Water Act dealing with nonpoint source pollution. Each year KDOW applies to US EPA to receive 319(h) funding. KDOW 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 KDOW website or see Appendix A.

- **Clean Water State Revolving Fund (CWSRF)** - water.ky.gov/Funding/Pages/CleanWaterStateRevolvingFund.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/projects/current/section531

  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.

9.6. Objective and Strategies

The Kentucky Division of Water endeavors to reduce nonpoint source pollution 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. To achieve the stated goal of **managing nonpoint source pollution in Kentucky**, KDOW has developed an objective and three strategies related to NPS pollution from onsite wastewater.

Objective 5: Decrease human sewage in Kentucky's water bodies.

Strategy 1: Support projects that decrease sewage impacts to watersheds and provide technical assistance to the Division for BMPs for onsite sewage treatment.

Strategy 2: Develop partnerships with Department for Public Health and local health departments.

Strategy 3: Benchmark nonpoint source onsite wastewater programs to other states and investigate the implementation of an educational program.

Objectives and strategies associated with the second NPS Program goal can be found in Section 2.7 of the full NPS Management Plan. For a complete list of NPS pollution goals, objectives and strategies, see Appendix B of the full plan.

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 (US EPA, 2009). Traditionally, the chemical, biological and physical characteristics of a watershed were used to determine a water body's health. However, it is now understood that a more holistic approach is necessary to maintaining the integrity of healthy watershed systems. It is necessary to also understand the hydrology, geomorphology and natural disturbance patterns in the area (US EPA, 2009). Only with a complete understanding of all these factors can we begin to protect the remaining healthy waters in the Commonwealth.

10.1.1. Background

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. A map of these areas designated as Special Use Waters can be found in Figure 10.1, next page.

Today nearly 40% of fish in North American freshwater streams, rivers, and lakes are found to be 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). And while impairment is a problem with streams and rivers, loss is a problem associated with the Comonwealth's wetlands. From the 1780s to the 1980s it is estimated that the 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 KDOW.

Since 2010, KDOW has been working with US EPA to develop healthy watershed components within the NPS program. US 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" (US EPA, 2009). KDOW plans to continue efforts in protection strategies to avoid the inflated costs associated with restoration efforts of impaired water bodies.

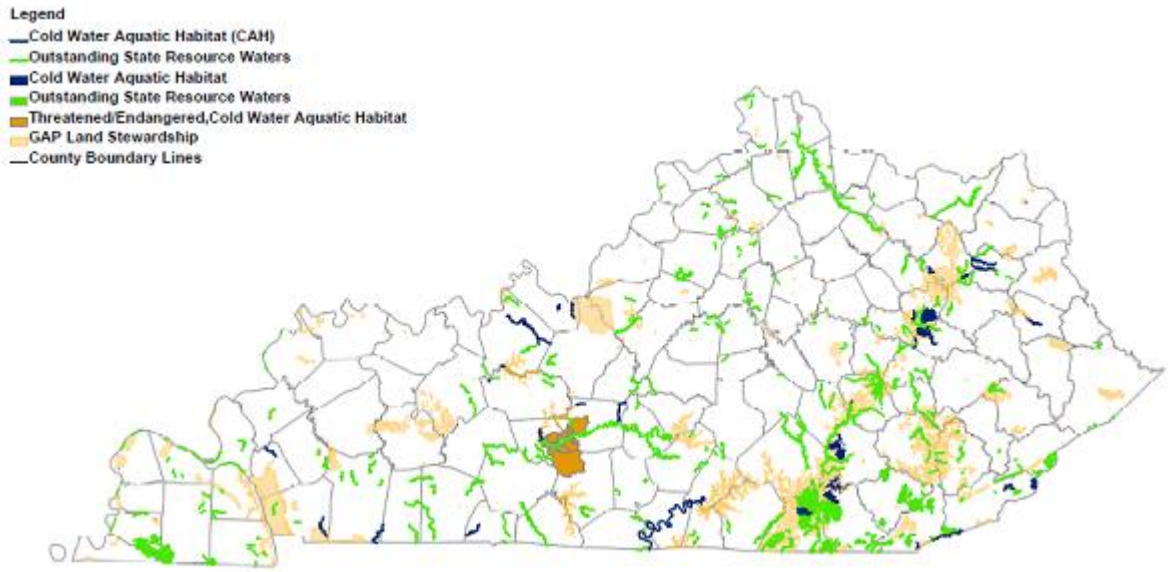

Figure 10.1: Kentucky Designated Use Waters.

10.2. KDOW 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. 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. Additionally, selection of protection areas in priority development is supported for Basin Teams. KDOW plans continued support of the Wild Rivers Program and will also continue to purchase land within Wild River corridor watersheds and work with the Heritage Land Conservation Fund Board.

10.2.1. 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. The program was established by the Kentucky Wild Rivers Act of 1972 and is administered by the Division of Water. Portions of nine rivers have been designated as Kentucky Wild Rivers and include a linear corridor encompassing all visible land on each side of the river up to a distance of 2,000 feet. Cumberland Falls (see Figure 10.2, next page) 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.

Figure 10.2: Cumberland Falls, a Wild River site.

With funding provided by the Kentucky Heritage Land Conservation Fund (KHLCF), the KDOW 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. To date, the program has purchased approximately 2600 acres in seven of nine Wild Rivers watersheds. Land acquisition projects representing an increase of about 70% in land holdings are scheduled for completion by 2012. More on the Wild Rivers Program can be found at water.ky.gov/waterquality/Pages/WildRivers.aspx.

10.3. Partner Strategy

Although partners have confines 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; Kentucky State Nature Preserves Commission 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. 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, 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)** - conservation.ky.gov

  The Division of Conservation 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 county in Kentucky is represented by a local conservation district, consisting of seven elected supervisors. 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)** - forestry.ky.gov/LandownerServices/Pages/ForestlandAssessment.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 *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. In Section 1, Issue 2, "Water Quality and Quantity" history and strategies are explored. The high quality waters of Kentucky consistently feature watersheds with large areas of forestland, as shown in Figure 10.3, next page.

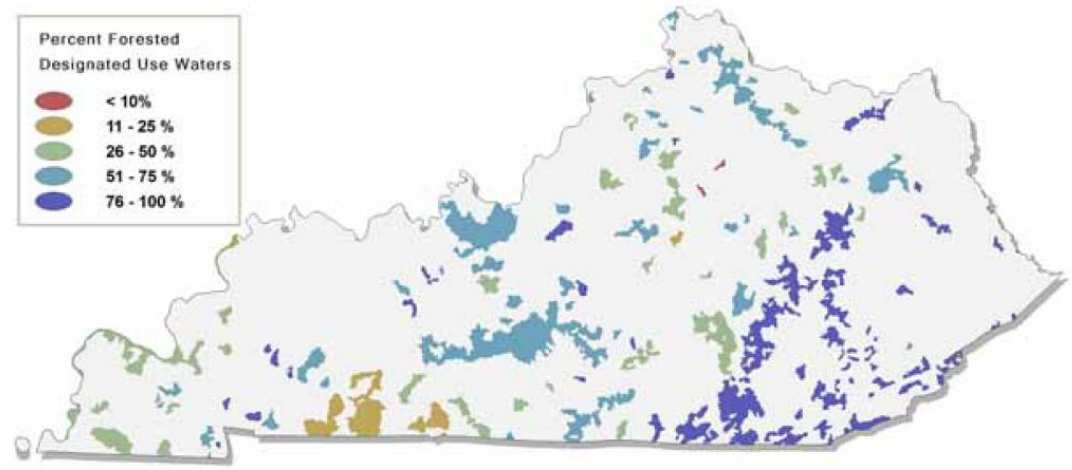

Figure 10.3: Percent forested Designated Use Waters. (Kentucky Division of Forestry, 2010)

- **Kentucky State Nature Preserves Commission (KSNPC)** - naturepreserves.ky.gov

  The Kentucky State Nature Preserves Commission participates in an international network of programs that monitor and protect biodiversity. The 1976 Kentucky legislature created the 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. The plant and animal life in Kentucky, from the bottomland swamps in the west to the rich Appalachian forests in the east, is extraordinary as well as beautiful. Glades, prairies, forests, wetlands, rivers and caves form a biologically diverse web of life that is unique to the Commonwealth. The state's ecosystems are teeming with a diversity of native species from black throated green warblers to lizard skin liverworts. Some of these species are found nowhere else in the world. The aquatic systems of the state are home to rainbow darters, ghost crayfish, salamander mussels and an impressive array of other species that constitute some of the greatest levels of freshwater diversity on the planet.

- **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, their work is making a difference in the quality of life for all Kentuckians one protected stream at a time. 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. 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.

- **Low Impact Development (LID)** – www.epa.gov/owow/NPS/lid

  Low Impact Development is an approach to land development (or re-development) that works with nature to manage stormwater as close to its source as possible. LID employs principles such as preserving and recreating natural landscape features, minimizing effective imperviousness to create functional and appealing site drainage that treat stormwater as a resource rather than a waste product. There are many practices that have been used to adhere to these principles such as bioretention facilities, rain gardens, vegetated rooftops, rain barrels, and permeable pavements. By implementing LID principles and practices, water can be managed in a way that reduces the impact of built areas and promotes the natural movement of water within an ecosystem or watershed. Applied on a broad scale, LID can maintain or restore a watershed's hydrologic and ecological functions. LID has been characterized as a sustainable stormwater practice by the Water Environment Research Foundation and others.

- **Natural Resources Conservation Service (NRCS)** - www.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 plan and animal biodiversity and enhance carbon sequestration. The program works by enrolling voluntary landowners in to 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. An additional program is the Wildlife Habitat Incentive Program. The program aids landowners in restoring remnant prairies, planting native grasses/wildflowers, shrubs, and trees, implementing wildlife beneficial forest stand improvements, and creating shallow water areas. The program also works to exclude livestock from sensitive streams and woodlands. To be eligible, landowners must devote at least ten acres to the program.

- **Southern Aquatics Resource Partnership (SARP)** - www.sarpaquatic.org

  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.

- **The Nature Conservancy (TNC)** - www.nature.org/ourinitiatives/regions/northamerica/unitedstates/kentucky

  The Nature Conservancy is the 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, The Nature Conservancy 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, partnerships made possible by support of a loyal and dedicated membership.

- **US EPA Healthy Watershed Initiative** - 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 US EPA programs focus on restoring impaired waters, the Healthy Watersheds Initiative augments the watershed approach with proactive, holistic aquatic ecosystem conservation and protection. The Healthy Watersheds Initiative includes both assessment and management approaches that encourage states, local governments, watershed organizations, and others to take a strategic, systems approach to conserve healthy components of watersheds, and, therefore, avoid additional water quality impairments in the future.

- **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. Kentucky will utilize these maps to help determine the best candidate water bodies for protection.

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

  The US Fish and Wildlife Service is the premier government agency dedicated to the conservation, protection and enhancement of fish, wildlife and plants, and their habitats. It is the only agency in the federal government whose primary responsibility is management of these important natural resources for the American public. 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, Migratory Bird Treaty Act, and the Marine Mammal Protection Act. They also provide conservation educational materials for 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. This 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, instream flow and other disciplines. Fisheries and Habitat Conservation blends these capabilities to provide expert technical assistance to conservation partners.

10.4. Land Trusts

Land trusts, also called land conservancies, have been in existence since 1891. However, it is only in the last two decades that land trusts began to proliferate, and they now form one of the fastest growing and most successful conservation movements in American history. 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. However, in many cases, land trusts work to eventually open up the land in a limited way to the public for recreation in the form of hunting, hiking, fishing, camping, wildlife observation, water sports, or other responsible outdoor activities. This is often with the assistance of community groups or government programs. Some land is also used for sustainable agriculture or ranching, or even for sustainable logging. While important, these goals can be seen as secondary to protection of the land from development (Wikipedia, 2011).

There are several active land trust groups in Kentucky. In addition to many of the partners 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; planned for Eastern and Southern Louisville, it will be 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 Conservancy** - www.bluegrassconservancy.org

  Founded in 1995, Bluegrass Conservancy is a nonprofit land trust working to protect the Inner Bluegrass Region of Kentucky through land conservation for future generations. They encourage the preservation of these lands through the use of conservation easements for agricultural viability, natural habitat, rural heritage, and scenic open space. To date, 74 parcels encompassing approximately 11,279 acres have been conserved.

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

  Ducks Unlimited 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 has worked to conserve more than 8,800 acres of waterfowl habitat throughout Kentucky, including two recent habitat projects on Barren River Lake Wildlife Management Area and Duck Island on Lake Barkley. DU's goal is to perpetually secure habitat and the future of Kentucky as a key wintering area for migratory waterfowl in North America.

- **Fayette Alliance** - fayettealliance.com

  The Fayette Alliance is Lexington's only land use advocacy organization that regularly educates and lobbies local government for a sustainable Lexington that benefits all Kentuckians. 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 the county has over 12,000 acres of vacant and blighted land inside the city for potential re-development. There is no question that Lexington-Fayette County will continue to grow. An additional 60,000 people will be calling Lexington home by 2030. Therefore, the real question is not if it grows, but how the area grows; 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. Since their founding in 2006, the Alliance has attended all relevant Lexington-Fayette Urban County Government (LFUCG) meetings and made a real difference in Lexington-Fayette County— successfully weighing in on over 40 major land use issues.

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

  The mission of the Fort Thomas Forest Conservancy is to protect and conserve the natural areas that contribute to the vitality and unique character of Fort Thomas, Kentucky, 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.** - (502) 425-7917

  Future Fund, Inc., located in Louisville, Kentucky, was founded in 1993. The focus of Future Fund land trust is Floyds Fork Watershed and Southeast Jefferson County, Kentucky.

- **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 is a statewide land trust with a mission to protect, restore and connect Kentucky's remaining wildlands. KNLT does this through the direct purchase of land, purchase of conservation easements and by working with other conservation partners. KNLT was initially established to protect Blanton Forest on Pine Mountain, the largest old-growth forest remaining in the Commonwealth. Their tremendously successful campaign resulted in the purchase and establishment of the forest as a state nature preserve. KNLT has expanded efforts into a variety of conservation projects across Kentucky and currently include 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 KNLT has protected thousands of acres of wildlands.

  - The Blanton Forest campaign achieved the preservation of more than 3,000 acres of old growth forest and buffer lands.
  - KNLT has secured major acquisitions in Harlan County to the east and west of Blanton Forest, including the 741 acre Arrington Property and the 786 acre

Parsons Tract. The Parsons tract was resold to the Commonwealth of Kentucky for the Pine Mountain State Park and Nature Preserve.

- KNLT assisted the Commonwealth in purchasing the 1,027 acre Howard Property as an addition to the Pine Mountain Trail State Park.
- KNLT purchased 386 acres in Harlan County to connect two disjunct tracts within the Blanton Forest Nature Preserve Design.
- KNLT received its first donated conservation easement of the 83 acre Good Spring Farm in McCreary County, Kentucky.
- KNLT joined forces with Fort Knox and the Lincoln Trail ADD to purchase conservation easements in the forest corridor around Fort Knox.

- **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 we focus our combined efforts to increase the pace, quality and permanence of conservation, we 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** - www.louisvilleky.gov/PlanningDesign/Environmental+Trust

  The Louisville/Jefferson County Environmental Trust envisions a network of neighborhood parks, greenways, historic sites, and natural areas that create a community in harmony with its environment. The 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 representatives of government agencies responsible for public land. The staff of the Louisville/Jefferson County Environmental Trust is housed at Metro Planning and Design. In a unique cooperative arrangement, technical expertise and staff support are also provided by staff in Metro Parks, Facilities Management, the County Attorney's Office and MSD.

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

  The National Wild Turkey Federation 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, spending more than $372 million to conserve nearly 17 million acres of habitat. Wild turkeys and hundreds of other species of upland wildlife, including quail, deer, grouse, pheasant and songbirds, benefit from this improved habitat. Wild Turkey Country is the NWTF's habitat conservation program designed to help 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. Since 1992, the North American Land Trust has completed more than 312 projects protecting more than 59,000 acres.

- **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 50 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 34 properties, totaling more than 2,200 acres, most of which is preserved forever.

- **Rocky Mountain Elk Foundation** - 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. But 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. The foundation has protected more than 5.9 million acres across the 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. is a nonprofit 501(c)(3) corporation dedicated to cave acquisition, conservation and management. The SCCi currently owns or leases twenty-seven preserves containing 185 caves in six southeastern states. They own nineteen of these preserves, comprising 1,453 acres. SCCi is interested in caves anywhere in the Southeastern US that need protection or management for conservation or access reasons. The organization is particularly interested in caves that are threatened with closure or destruction or those which provide a habitat for endangered species such as the Gray Bat, Tennessee Cave Salamander, or Hart's Tongue Fern. Their mission is to preserve caves and cave environments and to manage them responsibly. In Kentucky, SCCi owns the Frenchman Knob Cave and leases the Logsdon Cave, both in Hart County.

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

  The Boone Conservancy, established in 1999, is a nonprofit organization dedicated to the creation of parks and protection of land with unique or significant recreational, natural, scenic historical and/or cultural value. 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. Of the 80 square miles that comprise the incorporated area of Cincinnati, 15 square miles, or 18%, represent hillsides. Of the 264,849 acres that comprise Hamilton County, within which Cincinnati is located, 60,043 acres, or 23%, consist of hillsides. This percentage of hillside acreage is similar in the three Northern Kentucky Counties of Campbell, Kenton and Boone. 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 is a national organization with more than 140,000 volunteers organized into about 400 chapters from Maine 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. TU's mission is to conserve, protect and restore North America's coldwater fisheries and their watersheds.

  The organization 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. 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.

  Trout Unlimited's Eastern Abandoned Mine Program is focused on the conservation, protection, and restoration of coldwater fisheries and their watersheds throughout the Appalachian region that have been impacted by historic coal mining. With more than 8,000 stream miles polluted from acid mine drainage (AMD) just between Pennsylvania and West Virginia alone, AMD is cited by the US EPA as the single largest threat to the Appalachian environment. Trout Unlimited is actively working to expand its AMD work into other areas across the Appalachian region where coldwater resources are impacted by AMD.

- **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.

10.5. 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 (US 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 preservation 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 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 175 million visitors and 12 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 Zoo 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 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, conservation education enables people to realize how natural resources and ecosystems affect each other and how resources can be used 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. CE 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 40 years old. Leave No Trace was formally conceived of 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. In just over a decade, 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 in the last decade 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 outdoor recreation through ethics education and stewardship. 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.

- **US EPA Healthy Watershed Outreach Tools** - water.epa.gov/polwaste/nps/watershed/outreach_tools.cfm

  In 2003, US EPA released *Getting in Step: A Guide for Conducting Watershed Outreach Campaigns*. 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.

  US 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.

10.6. Funding

Funding conservation of our existing healthy waterways is essential because protection costs far less than restoration. Protection also preserves vital ecosystem services. KDOW currently

funds protection opportunities through the Wild Rivers Program and through 319(h) grants. Other sources of funding appear below.

- **319(h) NPS Grants** - water.ky.gov/Funding/Pages/NonpointSource.aspx

  319(h) is the section of the Clean Water Act dealing with nonpoint source pollution. Each year KDOW applies to US EPA to receive 319(h) funding. KDOW 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 KDOW 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 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. CREP is an offshoot of the country's largest private lands environmental improvement program, the Conservation Reserve Program (CRP). Like CRP, 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 is a federal program that supports state efforts to protect environmentally sensitive forestlands through property acquisition or conservation easements. FLP allows for the purchase of forest land 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)** - www.kwalliance.org/kentucky-aquatic-resources-fund

  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. 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, KHLCF provides funding for preserving and conserving natural areas that possess unique features such as: 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 or dlg.ky.gov/grants/federal/lwcf.htm

  The National Park Service Land and Water Conservation Fund 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. For the LWCF grants program, over $3.6 billion have been appropriated to the 50 States, the District of Columbia, Puerto Rico, Guam, the Virgin Islands, American Samoa, and the Northern Marianas for planning, acquisition and development of outdoor recreation opportunities in the United States. Through FY 2006, over 40,000 projects have been approved to support acquisition of open space for park lands or the development of outdoor recreation facilities. They are in every geographic region of the US, in every county, and almost all localities.

- **North American Wetlands Conservation Fund** - www.fws.gov/birdhabitat/Grants/NAWCA/index.shtm

  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 $75,000, and funding priority is given to grantees or partners new to the NAWCA's grants program.

- **Purchase of Agricultural Conservation Easement (PACE) Corporation** - www.kyagr.com/marketing/farmland

  In 1994, the Kentucky General Assembly established the Purchase of Agricultural Conservation Easement 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 88 farms totaling 20,927 acres for $17,873,444. The easement costs have averaged $854 per acre. The farm size has averaged 238 acres. In addition, 34 easements on 4,638 acres have been donated to the program, bringing the total inventory to 122 farms containing 25,565 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. Applications are ranked on January 1st and July 1st of each year.

10.7. Objective and Strategies

The Kentucky Division of Water endeavors to prevent nonpoint source pollution across the Commonwealth. One of the ways to ensure waterways remain free from pollution is to protect healthy watersheds. The protection of these watersheds is a more efficient and cost effective approach than trying to restore them. To achieve the stated goal of **managing nonpoint source pollution in Kentucky**, KDOW has developed an objective and three strategies related to protecting lands from NPS pollution.

Objective 6: Promote identification and protection of healthy watersheds.

Strategy 1: Purchase lands in the Wild Rivers corridors and provide technical assistance regarding conservation easements.

Strategy 2: Support projects in Special Use Waters.

Strategy 3: Identify healthy watersheds and pilot a Healthy Watershed Program for Kentucky.

Objectives and strategies associated with the second NPS Program goal can be found in Section 2.7 of the full NPS Management Plan. For a complete list of NPS pollution goals, objectives and strategies, see Appendix B of the full plan.

11. Recreation

11.1. Summary

Nationally, approximately 50% of Americans participate in outdoor activities, increasing from 134.4 million American participants in 2006 to 138.4 million Americans in 2007 (Outdoor Foundation, 2008). 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/OHV riding, biking, boating, swimming, trail hiking, camping, horseback riding (see 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 that can have the greatest negative effects on the water quality of Kentucky's surface and groundwater resources include the use of off-highway vehicles (OHVs), horseback riding, hiking/trail use, and camping activities. In particular, 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, or nutrient enrichment. 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 and the contribution of NPS pollution.

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 forestry.ky.gov/Kentuckysstateforests/Pages/default.aspx.

State lands also afford many hunting opportunities, with more than 100 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/wmaguide.asp?lid=600&NavPath=C100C154.

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/OHV 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)** - lbl.org/index.html

  The Land Between the Lakes offers multiple uses and recreational resources, including camping, mountain biking, ATV/OHV 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 2010, 1.8 million recreation visits were made to these four parks. Abraham Lincoln Birthplace National Historic Park received 1,177,122 visitors; Big South Fork National Recreation Area received 269,113 visitors; Cumberland Gap National Historic Park received 854,434 visitors; and Mammoth Cave National Park received 497,225 visitors during this time frame (National Park Service, 2010).

- **US Army Corp of Engineers (USACE)** - corpslakes.usace.army.mil/visitors/states-print.cfm?state=KY&Activity=All

  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. KDOW Strategy

The Kentucky Division of Water works with local, state and national partners to provide information on water quality assessments, and technical assistance regarding recreational impacts. The division reviews and comments on legislation that has the potential to effect

water quality in the Commonwealth. KDOW 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.

11.3. 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. Our partners include some of 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/kfwis/wmaguide.asp

    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/pdf/2012fishingandboatingguide.pdf

    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)** - dlg.ky.gov/NR/rdonlyres/E68749F1-5E10-4518-B95A-9E3C5C60FEBE/0/SCORPFinal.pdf

  Division of Federal Grants with extensive input from other government agencies, state universities, and nonprofit organizations and the public participation created the 2008 Kentucky Statewide Comprehensive Outdoor Recreation Plan. The 2008 SCORP outlines strategies and recommendation for addressing may 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)** - corpslakes.usace.army.mil/visitors/pdfs/RecreationStrategicPlan.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.

11.4. Education and Outreach

Education and outreach is one of the most important tools KDOW 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** - acspgolf.audubooninternational.org

  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.fed.us/r8/boone/planning/project/nepa_project.shtml?project=30623

  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/CleanMarinas

  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.

- **Learning Landscapes** - www.blm.gov/wo/st/en/res/Education_in_BLM/Learning_Landscapes.html

  The overall goal of this project is to provide outdoor experiences for diverse youth on the public lands in order to teach them about the recreational and cultural values of the land and about the importance of pursuing an active, healthy lifestyle. In addition, this project benefits the youth by providing them with real-world examples of science concepts they are learning in school and mentoring them on the importance of higher education. These experiences also help to cultivate environmental stewardship in these future leaders, with benefits for their families, their communities, and the local environment.

- **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.fed.us/r8/boone/lac

  The DBNF conducted a public outreach program for the Red River Gorge called Limits of Acceptable Change. 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. The LAC process for the gorge was recently completed and is the framework for this Watershed Protection Plan.

- **National Management Measures to Control Nonpoint Source Pollution from Marinas and Recreational Boating** - www.epa.gov/owow/NPS/mmsp/index.html

  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 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.

11.5. Funding

Funding available for abatement of recreational impacts through KDOW 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** - water.ky.gov/Funding/Pages/NonpointSource.aspx

  319(h) is the section of the Clean Water Act dealing with nonpoint source pollution. Each year KDOW applies to US EPA to receive 319(h) funding. KDOW distributes a majority of the monies received through a competitive grant award process to communities, citizen groups, and organizations throughout Kentucky. KDOW 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 KDOW website or see Appendix A.

- **Clean Water State Revolving Fund (CWSRF)** - water.ky.gov/Funding/Pages/CleanWaterStateRevolvingFund.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). This includes all costs that address NPS pollution control needs associated with boating and marinas, such as boat maintenance activities, discharge of sewage from boats, and the physical alteration of shoreline, wetlands and aquatic habitat during the construction and operation of marinas. Some typical BMPs used to address needs at marinas are bulk heading, pump out systems, and oil containment booms.

- **Land and Water Conservation Fund (LWFC)** - www.nps.gov/ncrc/programs/lwcf/index.html

  The 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)** - dlg.ky.gov/grants/federal/rtp.htm
  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** - cfpub.epa.gov/fedfund
  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).

11.6. Objective and Strategies

The Kentucky Division of Water endeavors to reduce nonpoint source pollution across the Commonwealth. KDOW 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. To achieve the stated goal of **managing nonpoint source pollution in Kentucky**, KDOW has developed an objective and three strategies related to reducing NPS pollution resulting from recreation.

Objective 7: Protect and restore waters at risk from recreational impacts.

Strategy 1: Support projects that protect Outstanding State Resource Waters and other Special Use Waters with known recreational impacts.

Strategy 2: Promote green infrastructure with dual use as recreation areas.

Strategy 3: Provide technical assistance for CWSRF funded projects addressing NPS impacts from marinas.

Objectives and strategies associated with the second NPS Program goal can be found in Section 2.7 of the full NPS Management Plan. For a complete list of NPS pollution goals, objectives and strategies, see Appendix B of the full plan.

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. Background: 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 (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 they 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, below). In the early history of Kentucky, nearly all mining was by

Figure 12.1: Kentucky Coal Field Counties.

underground 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. Background: Oil and Gas Production

Oil and gas exploration began in 1818 in Kentucky in McCreary County. Through 2009 over 165,000 oil and gas wells had been drilled in Kentucky. 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. Although permitting began in 1960, it wasn’t until 1978 that groundwater protection regulations began for protection of freshwater in association with oil and gas drilling (Kentucky Division of Oil and Gas, 2011).

Kentucky's oil and gas industry began in the early 19th century with pioneers searching for salt brines for use in tanning, food preservation, and livestock agriculture. The first commercial gas wells in Kentucky were drilled between 1863 and 1865 in Meade County. Historical data indicates Kentucky's total oil and gas production exceeds 9.85 quadrillion Btu (765 million barrels of oil and 5.4 trillion cubic feet of natural gas). Through 2009, over 165,000 known wells had been drilled in Kentucky associated with oil and gas production (KGS, 2006).

All of Kentucky's counties have been tested to varying depths for oil and gas resources. The historic production of oil and gas in Kentucky (Figure 12.2, next page) has fluctuated since it began in the early 19th century, with the largest peaks occurring in the 1950s and 1960s. In 2004, production was reported from 65 counties. In general, oil production dominates in the Western coal field and South-central areas of Kentucky; the Eastern coal field produces mostly natural gas. Kentucky has an estimated 18,000 producing oil wells and 13,000 producing gas wells. The majority of those producing wells have daily production rates of 60 million Btu or less (10 barrels of oil or 60,000 cubic feet of gas). Annually, Kentucky produces about 12% of the oil and natural gas consumed in the state (KGS, 2006).

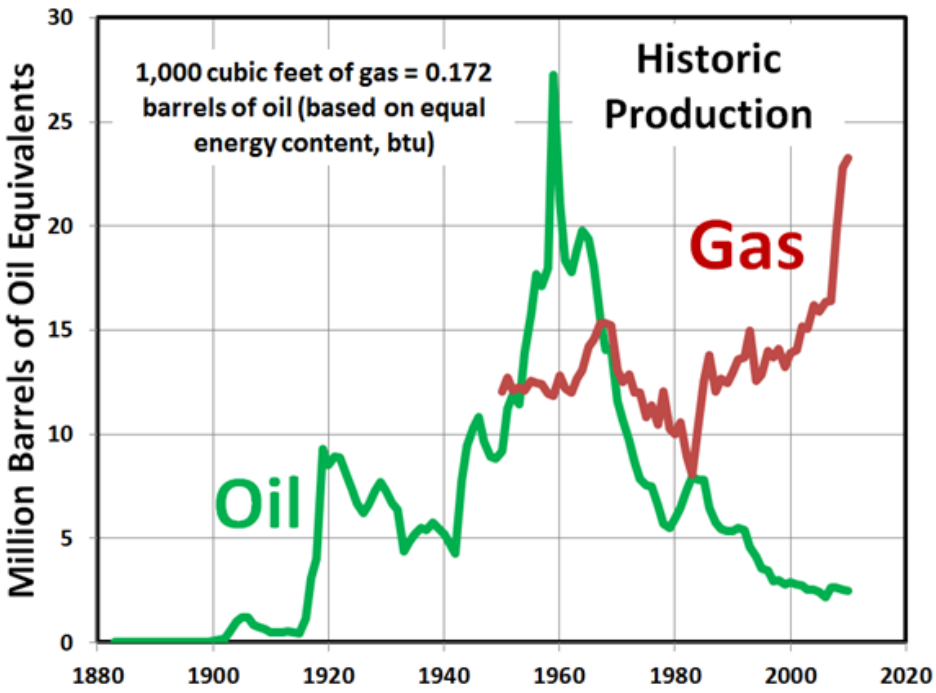

Figure 12.2: Kentucky's Historic Oil and Gas Production, from Kentucky Geological Survey.

12.1.3. Background: 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. KDOW Strategy

Much of the land use related to resource extraction requires a permit issued by 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.

12.3. Partner Strategy

Numerous partners across Kentucky help address nonpoint source pollution from resource extraction impacts. Working with partners provides KDOW with opportunities to collaborate on

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

- **Kentucky Brownfield Program** - dca.ky.gov/brownfields

  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)** - dnr.ky.gov

  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. 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)** - minepermits.ky.gov

  The Division of Mine Permits, along with the Division of Abandoned Mine Lands (AML) and the Division of Mine Reclamation and Enforcement (DMRE), administers 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. This information is available to the public at minepermits.ky.gov/Pages/HistoricalBackgroundWaterData.aspx.

- **Kentucky Division of Oil and Gas** - oilandgas.ky.gov

  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. Currently, there are 136,286 wells stored online. 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.

12.4. Education and Outreach

KDOW, 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.

- **American Coal Foundation (ACF)** - www.teachcoal.org

  The ACF was created in 1981 as a 501(c)(3) organization to develop, produce and disseminate coal related educational materials and programs designed for teachers and students. Materials include standards-based lesson plans, hands-on activities and downloadable booklets, including the *Power from Coal* activity book and teacher guide. Support for the ACF is provided by coal producers and manufacturers of mining equipment and supplies. In addition, electric utilities, railroads and organized labor have supported the work of the foundation over the years.

- ***Coal in Kentucky* Documentary** - www.coalinkentucky.com

  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** - www.maced.org/coal

  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 Environmental Quality Commission (EQC)** - eqc.ky.gov/Pages/extraction.aspx

  The Kentucky EQC is a seven member citizen advisory board that works to solve environmental problems in the state. The EQC was created under state law to facilitate public discussion and resolution of environmental issues and promote partnerships to protect the environment, including much related to resource extraction across the Comonwealth.

- **Kentucky Resources Council (KRC)** - www.kyrc.org

  The Kentucky Resources Council is Kentucky's only environmental advocacy organization offering legal and strategic assistance without charge to individuals, community groups and local governments statewide. 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.

12.5. Funding

Funding available through KDOW 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** - water.ky.gov/Funding/Pages/NonpointSource.aspx

  319(h) is the section of the Clean Water Act dealing with nonpoint source pollution. Each year KDOW applies to US EPA to receive 319(h) funding. KDOW 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 KDOW website or see Appendix A.

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

  US EPA's Brownfields Program provides direct funding for brownfields assessment, cleanup, revolving loans, and environmental job training. To facilitate the leveraging of public resources, US EPA's Brownfields Program collaborates with other US 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, US EPA also provides technical information on brownfields financing matters.

- **Abandoned Mine Lands Grants** - www.osm.gov/topic/grants/grants.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.

12.6. Objective and Strategies

The Kentucky Division of Water endeavors to reduce nonpoint source pollution across the Commonwealth. The political nature of resource extraction often makes it a challenging area to address. Additionally, the overlap with so many different regulatory programs can make it difficult to see who can address the pollution. To achieve the stated goal of **managing nonpoint source pollution in Kentucky**, KDOW has developed an objective and one strategy related to NPS pollution from resource extraction.

Objective 8: Decrease nonpoint source pollution from resource extraction.

Strategy 1: Support and provide technical assistance for projects in areas of Brownfields, acid mine drainage, abandoned mine lands and other resource extraction activities.

Objectives and strategies associated with the second NPS Program goal can be found in Section 2.7 of the full NPS Management Plan. For a complete list of NPS pollution goals, objectives and strategies, see Appendix B of the full plan.

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.

Urban expansion and rural development were responsible for 61% of the total net wetland loss from 1998 to 2004. Areas of the country where this was most prevalent included the Gulf–Atlantic coastal plain, the Great Lakes states and the Southeastern United States (Dahl, 2006).

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, 2012a).

According to the 2010 Integrated Report to Congress on the Condition of Water Resources in Kentucky, of the stream miles assessed (9,881 miles) in Kentucky, Sediment/Siltation is listed as the major cause of stream impairment (3,198 miles). The second leading probable source of impairment is listed as Habitat Related. These include loss of riparian habitat, channelization, streambank modifications, site clearance, and dredging (KDOW, 2010).

13.2. KDOW Strategy

The Kentucky NPS Section assembled a Natural Channel Design (NCD) Working Group in 1999 to improve the state of knowledge and practice of the individuals and agencies providing technical assistance for stream and streambank restoration projects in Kentucky. The NCD Working Group is composed of state employees, federal employees, and university personnel who are actively involved in stream restoration or are responsible for regulating the modification, relocation, or restoration of streams. These individuals include biologists, botanists, technologists, water resource engineers, forest hydrologists, highway engineers, and engineers with many years of experience working in Kentucky streams.

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 NPS Section contracted with the University of Louisville (U of L) to develop regional curves. The U of L Stream Institute conducted 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 at louisville.edu/speed/civil/si/projects.

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, KDOW 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 water.ky.gov/permitting/Pages/KYWaterQualityCertProg.aspx.

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 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 KDOW pursuant to KRS 151.250.

13.2.3. Kentucky Wetland Rapid Assessment Method (KY-WRAM)

The Kentucky Division of Water 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.

To find out more about rapid wetland assessment methods visit www.epa.gov/owow/wetlands/monitor/RapidMethodReview.pdf

13.3. Partner Strategy

The impacts from our lack of floodplains, intact riparian zones, wetlands and natural stream process capabilities are vast and KDOW 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. 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/navigation.aspx?cid=639

  The KDFWR runs an ambitious program to conserve and restore streams and wetlands in our home state. 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 and Wetland Restoration Program is committed to addressing the continued loss of these important resources.

  In July 2000, the Kentucky Legislature passed KRS 150.255 which established The Kentucky Wetland and Stream Mitigation Fund. The KDFWR Stream and Wetland Restoration 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 KDOW. Additionally, 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)** - appliedecology.nku.edu/projects/streamprogram/index.php

  The Northern Kentucky Stream & Wetland Restoration Program, 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 aquatic and wildlife habitat, water quality protection, floodwater and energy dissipation, and natural aesthetics.

- **U of L Stream Institute** - louisville.edu/speed/civil/si/home.html

  The U of L Stream Institute is an interdisciplinary applied research program that designs and restores stream and wetland ecosystems; studies how streams, wetlands, and watersheds and been affected by human activity; provides training to improve techniques used in restorations; and assists public agency personnel who work on restorations. Faculty and staff work collaboratively with local, state and federal agencies to ensure that project outputs and outcomes support US EPA's and Kentucky's programmatic needs.

  The work of the Stream Institute is concerned primarily with watershed assessment and stream restoration. Stream Institute watershed assessments identify and evaluate nonpoint sources of fine sediments and nutrients and recommend methods for reducing these pollutant loads. Stream Institute restorations not only improve the hydrologic function of the stream valley but also may improve the utility and condition of neighboring built environments. Impaired stream systems are enhanced, rehabilitated, and/or recreated so that they are physically and biologically sustainable. Nearby property may be regraded, landscaped or otherwise modified to reduce erosion and/or risk of flood damage. Thus the restoration projects benefit not only the stream ecosystems but also the stakeholders who use nearby land and infrastructure. Moreover, because the geology of Kentucky is highly varied, its characteristics may be found in many other states; therefore, the techniques developed by the institute for Kentucky streams will be applicable to many other streams across the Eastern and Midwestern United States.

13.4. 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.

- **Center for Wetlands and Stream Restoration** - www.wetlandsandstreamrestoration.org

  The Center for Wetlands 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 how they can bring back these ecosystems.

- **Draft Stream Relocation/Mitigation Guidelines Kentucky Division of Water** - water.ky.gov/permitting/Lists/Working%20in%20Streams%20and%20Wetlands/Attachments/5/DraftStreamMitigationGuidelines.pdf

  This 2007 draft document is intended to provide guidance to applicants for 401 Water Quality Certification with projects involving stream relocations or stream mitigation. This document is a draft and therefore subject to change. It is strongly recommended that you contact the KDOW 401 WQC Section prior to the submission of an application to confirm that you have the most current version of this document.

- **National Management Measures to Control Nonpoint Source Pollution from Hydromodification (July 2007)** - www.epa.gov/owow/NPS/hydromod/

  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.

- **Riparian Toolbox** - www.hydroqual.com/projects/riparian/education.htm

  The objective of this project is to assemble existing materials that will be of use to local officials in drafting and implementing regulations to protect riparian areas. This site allows users to view, read, copy or download documents, including public education brochures, model regulations, scientific articles regarding riparian buffers, a glossary of terms, GIS data, etc. The materials presented here contain results of the library and web-based research and compose the Riparian Toolbox.

- **US EPA Fact Sheets** - water.epa.gov/type/wetlands/outreach/facts_contents.cfm

  The US 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** - water.epa.gov/type/wetlands/outreach/education_index.cfm

  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 on-line 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.

- **Wilson Creek at Bernheim Arboretum and Research Forest** - www.bernheim.org/stream.html

  Wilson Creek flows through a valley in Bernheim, restored to natural contours thanks to the efforts of Bernheim, the University of Louisville and the University of Kentucky College of Agriculture. The work was funded by a 319(h) Grant and was overseen by KDOW. The Wilson Creek Restoration Site is actively used for educational programs and workshops on streams and stream restoration. The site is used to educate professional groups, college biology classes from across the state, as well as K-12 students who visit Bernheim. It is also used as a site for training sessions with agents for agriculture and natural resources. The site is an extremely important educational tool to help landowners understand what they can do to restore streams and improve water quality as well as wildlife habitat, and that there is state and federal cost share money available to help.

13.5. 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** - water.ky.gov/Funding/Pages/NonpointSource.aspx

  319(h) is the section of the Clean Water Act dealing with nonpoint source pollution. Each year KDOW applies to EPA to receive 319(h) funding. KDOW 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 KDOW website or see Appendix A.

- **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 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** - dlg.ky.gov/grants/federal/flood.htm

  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 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.

13.6. Objective and Strategies

The Kentucky Division of Water endeavors to reduce nonpoint source pollution across the Commonwealth. Intact riparian zones, floodplains and wetlands protect streams against numerous nonpoint source impacts including pollutants such as nutrients, pathogens, sediment and metals. Once damaged, the effort required to restore these areas to their natural state would take large amounts of time and money. To achieve the stated goal of **managing nonpoint source pollution in Kentucky**, KDOW has developed an objective and three strategies related to reducing NPS pollution from stream modifications.

Objective 9: Support projects developing natural stream process and wetland understanding.

Strategy 1: Support education for professionals in stream restoration techniques.

Strategy 2: Provide technical assistance regarding natural stream processes for watershed based plans.

Strategy 3: Support projects assessing and monitoring natural stream processes.

Objectives and strategies associated with the second NPS Program goal can be found in Section 2.7 of the full NPS Management Plan. For a complete list of NPS pollution goals, objectives and strategies, see Appendix B of the full plan.

14. Water Quantity

14.1. Summary

Kentucky is generally a water-rich state, and for many people water quantity 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 drinking water supply. Other pollutants can lead to health problems when they are found in water used for irrigation of crops for human consumption. The Kentucky Division of Water 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. KDOW Strategy

KDOW has several programs that address water quantity issues in the state, and these programs generally include water quality components. The Source Water Assessment and Protection (SWAP) and the Wellhead Protection programs are implemented through the division 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 (SWAP) Programs** - water.ky.gov/DrinkingWater/Pages/DWSrcAssessProt.aspx

  The Safe Drinking Water Act (SDWA) Amendments of 1996 required states to develop and implement SWAPs 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)** - water.ky.gov/groundwater/Pages/WellheadProtection.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.

14.3. Partner Strategy

Working with partners provides KDOW with opportunities to collaborate on priority water quantity issues across the Commonwealth. Regional agencies and state agencies and organizations are critical partners in providing developmental and technical assistance for water quantity issues.

- **Kentucky Infrastructure Authority (KIA)** - kia.ky.gov/wris/portal

  The KIA was created to provide 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 was established to provide training and technical assistance to improve regulatory compliance. 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.

14.4. Education and Outreach

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

- **Kentucky Rural Water Association (KRWA)** - www.krwa.org/assistance/source-water-protection

  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. KRWA also gives talks about wellhead and source water protection at their own trainings, public events, and meetings.

- **US EPA Drinking Water Academy** - water.epa.gov/learn/training/dwatraining/index.cfm

  The US EPA Drinking Water Academy is an online training resource for water professionals, public officials, and citizens to provide the necessary skills to protect drinking water. Training files include information on the National Drinking Water Rule, Public Water System Supervision Program, Public Water System Operation, Source Water Protection Program, and Underground Injection Control Program.

- **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 US EPA and non-US EPA publications and resources, state groundwater information, watershed based protection programs and other US 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.

14.5. Funding

Funding available for onsite wastewater management through KDOW 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** - water.ky.gov/Funding/Pages/NonpointSource.aspx

  319(h) is the section of the Clean Water Act dealing with nonpoint source pollution. Each year KDOW applies to US EPA to receive 319(h) funding. KDOW 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 KDOW website or see Appendix A.

- **Drinking Water State Revolving Fund** - water.ky.gov/Funding/Pages/DWSRFIntendedUsePlan.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.

- **KDOW Drinking Water Source Assessment and Protection** - water.ky.gov/DrinkingWater/Pages/ProgsResources.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, 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.

14.6. Objective and Strategies

The Kentucky Division of Water endeavors to reduce nonpoint source pollution across the Commonwealth. In an effort to achieve the stated goal of **managing nonpoint source pollution in Kentucky**, KDOW has developed an objective and two strategies related to the reduction of NPS pollution in our water supply.

Objective 10: Protect water supplies from nonpoint source impacts.

Strategy 1: Provide technical assistance for projects protecting source water and promoting groundwater recharge.

Strategy 2: Integrate a checkpoint for water quantity management in BMP implementation plan development.

Objectives and strategies associated with the second NPS Program goal can be found in Section 2.7 of the full NPS Management Plan. For a complete list of NPS pollution goals, objectives and strategies, see Appendix B of the full plan.

15. Education and Outreach

15.1. Summary

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, KDOW 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.

Figure 15.1: Streamside education workshop.

15.2. KDOW Strategy

KDOW 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.

Project WET and KDOW believe our future is tightly bound to water. Global water issues must be addressed through greater public involvement at all socioeconomic levels, among all water users and across all borders. People must be provided a deeper understanding of our complex environmental issues and the skills necessary to undertake the challenges of this century. Sustainable water management is crucial to secure social and economic stability, as well as a healthy environment, achievable only as a result of cooperation and a commitment to education.

Figure 15.2: Project WET logo.

Questions about Project WET in Kentucky should be directed to ProjectWET@ky.gov. Interested individuals may also visit water.ky.gov/ProjectWET for more information on the program in Kentucky and to find out about upcoming workshops.

15.2.2. 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.

- **Commonwealth Water Education Project (CWEP)** - www.inyourwater.org

  The mission of the Commonwealth Water Education Project is to improve the nonpoint source pollution knowledge base of all Kentuckians and to encourage them to take personal and collective action to improve the quality of Kentucky's streams and rivers. CWEP is a partnership of people in Kentucky, working together to help keep Kentucky's streams and rivers healthy for drinking, swimming, fishing and boating—for us and for

future generations. This project is trying to get the word out through educator professional development, training workshops, and a media campaign.

- **Council for Environmental Education (CEE)** - www.councilforee.org

  The Council for Environmental Education, a 501(c)(3) nonprofit organization, is a nationally recognized leader in environmental education. Founded in 1970, CEE programs are among the most long-lived and successful environmental education efforts in the nation. For more than 35 years, CEE has provided environmental education programs and services that promote stewardship of the environment and further the capacity of learners to make informed decisions. Each year CEE's benchmark programs provide materials and training for more than 50,000 educators, who reach millions of young people with essential information about conservation and the environment. Their renowned programs include Project WILD, Flying WILD, WET in the City, Team WET Schools, and Growing Up WILD.

- **Environmental Education Equipment** - water.ky.gov/ww/Pages/EnvironmentalEquipment.aspx

  The KDOW'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.

- **Environmental Education (EE) in Kentucky** - eeinkentucky.org

  EE in Kentucky is a one stop resource for Kentuckians who want a straightforward way to find environmental education opportunities in the state. This website allows users to locate organizations and events across the Commonwealth. EE in Kentucky also hosts educational opportunities, outreach materials, and a grants database. From acorns to zebra mussels, discovering the beauty and wonder of Kentucky's natural environment is only a click away.

- **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. "This website contains a wealth of information that can be a valuable tool to inform citizens of how state government is 'greening' and how Kentuckians can also take the lead in becoming more aware of how all of our choices at home and at work affect the environment," said Governor Steve Beshear.

- **Integrated Report to Congress on the Condition of Water Resources in Kentucky** - water.ky.gov/waterquality/Pages/IntegratedReport.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** - keec.ky.gov/publications/masterplan.htm

  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. An updated version titled *Land, Legacy, and Learning II* was completed in 2004. The newest version, *Land, Legacy, and Learning III,* was completed in 2009. 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** - cfpub.epa.gov/npdes/index.cfm

  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** - cfpub.epa.gov/npdes/outreach.cfm?program id=0&otype=1

  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)** - www.fema.gov/plan/prevent/fhm/rm_main.shtm

  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 KDOW 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** - water.ky.gov/waterquality/Pages/TMDLHealthReports.aspx

  KDOW'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** - water.ky.gov/watershed/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

KDOW 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 KDOW 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.

- **Eco Art Contest** - dca.ky.gov/LGGS/Pages/ecoart.aspx

  "The purpose of the contest was to encourage high school students to think about the environment and inspire them to include the environment in their artwork," said DEP Commissioner Bruce Scott, who presented the awards to students. Artwork from the contest winners will be displayed in the DEP Training Center in Frankfort, where it will be viewed by hundreds of visitors. "The impact of the winners' artwork can be far-reaching, creating a ripple effect that will educate multitudes who view it and create a new appreciation for preserving the beauty and resources of the Commonwealth," said First Lady Jane Beshear. "It is our hope that every eligible Kentucky high school junior and senior will submit artwork for this contest in future years."

- **Governor's Conference on the Environment** - eec.ky.gov/Pages/conference

  2011 was the 34th year for the Governor's Conference on 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.

- **Governor's Derby Celebration** - governor.ky.gov/derbycelebration

  Derby time in Kentucky is truly one of the most exciting, colorful, and special times of the year. Since 1936, there have been gatherings, both large and small, in the capital city to celebrate the Kentucky Derby. Each year vendors from across the state come out to share in the celebration and offer information to attending citizens. State agencies are given the opportunity to showcase their efforts to the public, and help raise awareness on departmental goals and efforts underway. The 2011 event marked the 75th anniversary of the Governor's Derby Celebration and was widely attended.

- **Jim Claypool Art and Conservation Contest** - conservation.ky.gov/Pages/ArtandWritingContest

  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 State Office Building Go Green Expo** - personnel.ky.gov/ggexpo.htm

  During this annual event, state employees are given the opportunity to visit with vendors and other state agencies to learn ways to save energy and help our environment. Various organizations are on hand to answer questions about reducing energy usage, ways to save money on utilities, composting, preventing nonpoint source pollution, installing rain barrels, reducing carbon footprints and much more.

- **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 2011 marks the 35th 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)** - www.unwater.org/worldwaterday

  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

KDOW 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.

- **Eastern Kentucky University** - www.eku.edu

  KDOW works with EKU on a bi-annual basis teaching the course “EMS 864S Teaching in the Outdoors”. Students in this class are graduate students and teachers completing professional development course work. Class participants learn about biological, chemical and habitat assessment techniques for streams in Kentucky. The protocols are consistent with those used in Watershed Watch trainings.

- **Union College** - www.unionky.edu

  KDOW works with Union College to teach a portion of their annual course “The School and Community Health Workshop”. The year 2011 marked the 47th consecutive year the workshop has been offered by the graduate program of Union College and the Department of Wellness, Human Performance and Recreation Management. Students in this class are graduate students and teachers completing continuing education course work. KDOW teaches class participants about natural and human water cycles, watersheds, water distribution, the global water and sanitation crisis, different types of pollution, and ways we can all help to improve water quality.

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, KDOW 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 Quantity – Section 14

15.3. Partner Strategy

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.

15.3.1. 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 Regional Water Program** - srwqis.tamu.edu

  States in the Southern region are facing major issues related to water quantity and conservation and water quality. Extension and research personnel with the Land Grant Universities in the Southern region are responding to these water quality and conservation issues with educational assistance, technology development and technology transfer programs. The Southern Region Water Quality Planning Committee (SRWQPC) was formed in 1988, and includes designated water quality coordinators from each of the 13 states: Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, New Mexico, North Carolina, Oklahoma, South Carolina, Tennessee, and Texas.

  As part of the regional project, the SRWQPC has developed the Southern Region Water Quality Information System, which is a regional water resources database. The site is designed to enhance access by federal and state agencies and organizations and the public to research, extension and education resources available through the Land Grant University System. Significant effort is directed toward enhancing coordination with other federal and state water resource management agencies such as the US EPA, USGS, and multiple USDA agencies – Agricultural Research Service (ARS), Farm Service Agency (FSA), Natural Resources Conservation Service (NRCS) and National Institute of Food and Agriculture (NIFA). Regular meetings are scheduled to enhance coordination and promote effective use of resources available through the Land Grant University System. In addition, multi-state training programs are developed and conducted, and/or co-sponsored by SRWQPC member states.

- **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.

15.3.2. State

- **10-10-10 Challenge** - dca.ky.gov/Pages/101010Challenge.aspx

  The Kentucky Department for Environmental Protection is challenging individuals and industries across the Commonwealth to reduce their waste and conserve water and energy, each by 10% over the next three years. That is only a little more than three percent each year. Taking the 10-10-10 Challenge is easy. Simply register yourself, your business or your organization and begin taking steps to reduce your environmental

impact. If you are part of a pledge team, be sure to select your team name when you register so your pledge is credited to the team. If you do not have a team, just sign up individually and take your first step to changing the future of Kentucky.

- **Green Team** - www.greenteam.ky.gov

  The Green Team was the idea of Kentucky's First Lady Jane Beshear. The program website highlights many low-cost measures and simple practices that the Governor and First Lady have implemented at the Governor's Mansion that may also be employed by most homeowners, such as installing low-flow showerheads and energy-efficient light bulbs, washing clothes in cold or warm water, and turning off electronic devices and unplugging them when not in use. The First Lady encourages citizens of Kentucky to join the Green Team by signing up online to help preserve Kentucky's natural beauty for many generations to come.

- **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.

- **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.

- **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.

- **Kentucky Excellence in Environmental Leadership (KY EXCEL) Program** - dca.ky.gov/kyexcel

  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** - www.uky.edu/WaterResources

  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 Watershed Leadership Academy (KWLA)** - kywla.org

  The Kentucky Watershed Leadership Academy project will train local leaders and provide them with the tools and skill sets to successfully champion the development and implementation of watershed-based plans. The objective of this phase of the project is to develop an in-depth training program to provide key leadership and technical skills for watershed plan development. The goals of this project are to 1) Improve Kentucky's water quality through the development and implementation of watershed-based plans, and 2) Build watershed knowledge among watershed coordinators, local governments, citizen groups and other interested stakeholders. The KWLA is housed at KWRRI.

- **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.

- **Water Watch** - water.ky.gov/ww/Pages/default.aspx

  The 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 water.ky.gov/ww/Pages/EnviroscapeMaterials.aspx.

- **Watershed Watch in Kentucky** - www.wwky.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 an Interbasin Coordinating Committee 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 kgs.uky.edu/kgsmap/krww/viewer.asp.

- **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.

15.3.3. Regional

- **Big Sandy River Basin Coalition** - www.bigsandybasin.org

  The Big Sandy River Basin is located along the intersection of three states, Kentucky, Virginia, and West Virginia. Approximately 54% of the basin is in Kentucky, of which 46% is evenly distributed in Virginia and West Virginia. The basin consists of four major hydrologic units, the Big Sandy, the Tug, the Upper Levisa, and the Lower Levisa. These four hydrologic units drain north to the Ohio River. The Big Sandy River Basin Coalition began loosely in 1999. Since then the organization has become formal, acquiring

501(c)(3) status in 2001. In eight short years, the Big Sandy River Basin Coalition, Inc. has accomplished many improvements to water quality. Just some of their achievements include 1) a tri-state litter clean up, 2) the first tributary watershed group to develop a formal working relationship with ORSANCO, 3) recipient of funding from the Water Quality Improvement Fund in 2006 to address streambank restoration, and abandoned mined land. Educational goals of the Big Sandy River Basin Coalition include (but are not limited to) educating educators about watersheds and their health, developing a tri-state watershed curriculum, sponsoring watershed tours and workshops, increasing public involvement, and educating legislators.

- **Big Sandy Watershed Watch (BSWW)** - water.ky.gov/wsw/Pages/BigSandyWSW.aspx

  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.

- **Bluegrass PRIDE** - www.bgpride.org

  Bluegrass PRIDE is a 501(c)(3) organization dedicated to providing environmental resources and information to schools, community groups, local governments and citizens in Central Kentucky. Since the organization was founded in 2001, it has continually pursued its mission by providing outreach programs that focus on household hazardous waste, rain barrels, environmentally-friendly lawn care, waste reduction, rain gardens, energy efficiency and more.

- **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(c)(3) 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.

- **Red River Watershed Association (RRWA)** - www.redriverwatershed.org

  The Red River Watershed Association is a community-based organization made up of Kentucky and Tennessee residents. Members are all stakeholders in the watershed, farmers/landowners, homeowners, business people, agency representatives, local government representatives, concerned parents, environmentalists, and others, who are dedicated to enhancing and protecting the quality and quantity of water in the creeks and streams that flow into the Red River. They accomplish this mission through education, by promoting cooperation with communities, business, and agencies, and by encouraging responsible stewardship.

  Initiated by the Cumberland River Compact in 2000, the RRWA held its first solo meeting in 2001 and was deemed a 501(c)(3) nonprofit organization in September 2002. The RRWA holds public meetings and sponsors special events, including training workshops and water quality education programs, canoe trips, stream clean-ups, and stream bank restoration and habitat improvement projects. They are forging positive relationships with key environmental agencies and community groups and have a strong partnership with Austin Peay State University's Center for Field Biology.

- **Reforest the Bluegrass (RTB)** - www.lexingtonky.gov/index.aspx?page=542

  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. SRWW is fiscally sponsored by Kentucky Waterways Alliance. Interested persons may register online or by calling 1-800-928-0045.

- **Tradewater / Lower Green Watershed Watch** - water.ky.gov/wsw/Pages/TradeWaterLowerGreenWSW.aspx

  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 KDOW 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)** - water.ky.gov/wsw/Pages/UpperGreenRvrWSW.aspx

  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. UGRWW is fiscally sponsored by Kentucky Waterways Alliance. If you are interested in becoming a Watershed Watch volunteer, you may register online or by calling 1-800-928-0045.

The Upper Green River Watershed is rated by the Nature Conservancy and the Natural Heritage Program as the fourth-most important watershed in the United States and the most important watershed in Kentucky to protect for fish and mussel species. It is the most biologically diverse river in the entire Ohio River ecosystem and hosts 71 mussel species and over 150 fish species. This watershed contains Mammoth Cave National Park, Kentucky's largest spring, Lost River Cave, Hidden River Cave, Cub Run Cave, and the only segments of the Green River deemed Wild River (26 miles) and Exceptional Waters (66 miles).

15.4. 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.

15.4.1. 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.

- **EE in Kentucky - Grant listings** - eeinkentucky.org/core/item/topic.aspx?s=0.0.113.37933&tid=85010

  EE in Kentucky hosts a grants database listing funding opportunities by monthly deadlines as well as ongoing grants. This diverse listing of corporations, government entities and nonprofits offer an array of environmental education funding possibilities to students, teachers, nonprofits, community groups and individuals.

- **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.

15.4.2. Specific Grant Opportunities

- **319(h) NPS Grants** - water.ky.gov/Funding/Pages/NonpointSource.aspx

  319(h) is the section of the Clean Water Act dealing with nonpoint source pollution. Each year KDOW applies to US EPA to receive 319(h) funding. KDOW 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 KDOW website or see Appendix A.

- **American Water** - www.amwater.com/corporate-responsibility/environmental-sustainability/environmental-stewardship-and-innovation/environmental-grant-program.html

  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** - www.thecoca-colacompany.com/citizenship/application_guidelines.html

  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. As of 2011, stipends of $65,000 to $163,000 per impervious acre were approved based on the type of green infrastructure installed. 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** - www.toyota.com/about/philanthropy/education/toyota_usa/

  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.

15.5. Objective and Strategies

The Kentucky Division of Water endeavors to reduce nonpoint source pollution across the Commonwealth. Environmental education and outreach is the foundation for change in attitudes and behaviors toward watersheds and water quality in the Commonwealth. KDOW aims to strengthen existing partnerships, build new relationships, and increase efforts in providing knowledge to citizens, businesses and local governments. Helping people understand NPS is the main avenue to foster the changes we know are necessary to see sustainable improvements in watersheds across Kentucky. To achieve the stated goal of **managing nonpoint source pollution in Kentucky**, KDOW has developed an objective and four strategies to remain a leader in environmental education and continue providing quality educational services to citizens.

Objective 11: Support education and outreach.

Strategy 1: Support education and outreach programs across Kentucky.

Strategy 2: Revise the nonpoint source website and continue social media development.

Strategy 3: Develop a watershed planning education and outreach toolkit.

Strategy 4: Support the Watershed Watch program in Kentucky and training of volunteer water quality monitors.

Objectives and strategies associated with the second NPS Program goal can be found in Section 2.7 of the full NPS Management Plan. For a complete list of NPS pollution goals, objectives and strategies, see Appendix B of the full plan.

16. Measures of Success

16.1. Summary

It is often difficult to measure the success of a large and diverse program like Nonpoint Source Pollution Control. Some of the ways we determine success are measured in the achievement of goals and objectives as outlined in Appendix B. We also measure success through things like training and retention of quality employees, timely contract issuance and the reporting of success stories to US EPA. We have included below details on some of the ways we measure success that aren't part of a specific project, but are part of the workings of the program as a whole.

16.1.1. 319(h) Grant Projects - Base vs. Incremental Funding

KDOW groups 319(h) grant projects into two different funding categories: base and incremental. A base project is a project that involves the study and planning of a watershed, education and outreach, and/or technological demonstrations. Base projects typically drawdown money slowly because the schedule of events takes the entire length of the project timeframe. An incremental project is a project that implements the recommendations of a watershed based plan. Incremental projects typically drawdown large amounts of money quickly because of associated construction costs and expenses for equipment and materials. Incremental funding cannot be used for base projects, but base funding can be used for incremental projects.

When applying to KDOW for a 319(h) award, one of five project types must be selected on the application. The project types, described below, can be either base or incremental. However, with the US EPA funding requirement for incremental projects, odds are higher for receiving funding on this type of project.

- **Watershed Based Plan (WBP) - Base**

  A watershed based plan is an in-depth examination of a watershed involving extensive data collection through sampling and monitoring. After data is compiled and analyzed, changes and improvements are recommended to affect improvements in the watershed. Typically, WBP projects last for several years because of the extended time spent collecting a sufficient amount of data for analysis. Monitoring is performed in both wet and dry seasons. Invoicing for these types of projects is steady throughout the project timeframe, but there are usually not large expenses at any one time because of the general work plan.

- **WBP Implementation - Incremental**

  Watershed Based Plan Implementation involves utilizing the data from a WBP to make changes within the watershed. These changes range from physical changes, such as

fencing livestock out of a particular section of stream, or replacing a straight pipe with a functional septic tank. Education and outreach is also used to affect behavior changes in individuals and communities. Examples of education and outreach include teaching people to refrain from dumping trash into a sinkhole or to read manufacturer directions before applying fertilizer. Implementation projects typically spend grant funds quicker than other projects because of the expenses associated with construction costs and materials. These costs occur quickly once a project begins and they take a significant amount of a project's budget.

- **Best Management Practice (BMP) Technology Demonstration - Base or Incremental**

  A best management practice technology demonstration project is a demonstration of solid, proven ways to manage water pollution. These projects are geared towards public awareness so that the technology will spread and foster new interest, awareness, and actions the project's community and surrounding areas. These projects can range from urban rain gardens to agricultural demonstrations. Funding is typically drawn down at a steady rate throughout the project timeframe. Expenses associated with construction costs tend to increase the grant spending rate, but there are usually some educational components associated with the milestones that keep the projects from finishing too early.

- **Education/Outreach Technology Transfer - Base**

  These projects seek to modify behavior by raising awareness, developing programs that utilize social marketing as a change agent and providing technical training on NPS issues. Education projects can be directed toward adult or K-12 audiences or as outreach to nonformal audiences. Technology transfer projects deliver technical information (materials, workshops, training, etc.) to audiences that will implement appropriate BMPs. Projects should contain elements that will direct behavior change. Education projects typically run the course of their project timeframe without finishing early. Because of this, the grant spending rate is usually steady throughout the project without any excessive expenditure at any particular time.

- **Other (with explanation of project provided) - Base or Incremental**

  Some examples of other projects include stream evaluations, restorations and assessments. These projects are typically focused on one goal and do not necessarily include numerous objectives. Grant spending rates can vary on these projects based on the work being performed. Some projects are steady throughout the grant timeframe. Other projects may have large invoices at the onset of the project because of materials and construction costs.

When an award is offered to a grant applicant, that applicant signs a contract with the Commonwealth of Kentucky and becomes known as a subgrantee. For more information on the contract, see Section 16.4.

16.2. Budget/Fiscal Management

In recent years, the Division of Water has made significant progress in its effort to increase the spending rate, or drawdown, on the federal 319(h) grant balances. This involved not only taking a new approach toward subgrantee polices but also examining internal policies. Significant changes were made in the way KDOW has traditionally operated. The outcome has demonstrated a steady reduction in the 319(h) grant drawdown percentage. It has also increased the efficiency of the NPS Program and the quality of the subgrantee projects.

Initially, the US EPA 319(h) grant was based on a seven year term. In 2008, KDOW began reducing project maximum length for subgrantees from seven years down to five years to accommodate agency paperwork processing times as well as project delays. Then in 2011, the US EPA amended the grant term from seven years down to five years. To counter this federal reduction in allocated time, KDOW again changed policies and now limits project timeframes to a maximum of three years.

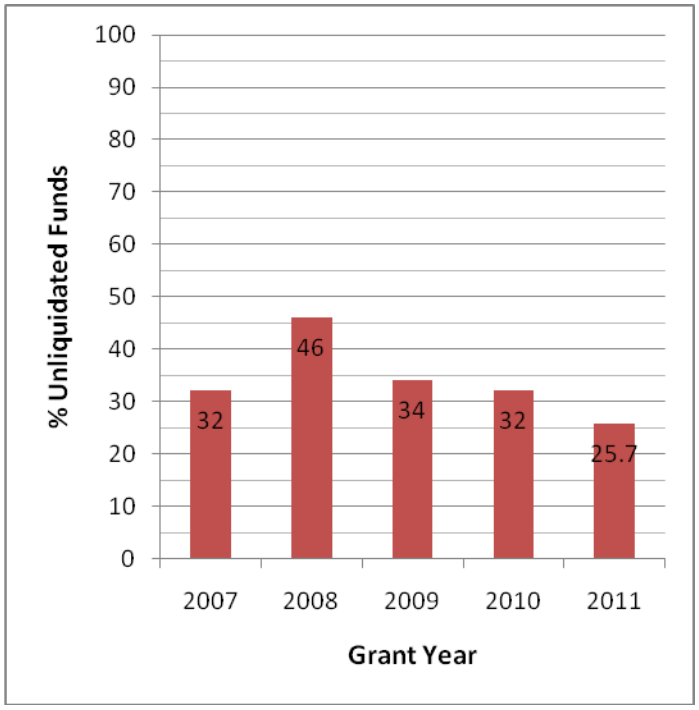

Figure 16.1: Unliquidated grant funds, 2007-2011.

Once funding is made available by US EPA, the NPS Program staff work to determine that all money is obligated. In the event that a project does not use all of its funding, the remaining balance is reallocated into another project as soon as possible.

US EPA tracks the rate of drawdown to ensure prompt expenditure of federal dollars. US EPA has a target drawdown rate of 20% per year to help ensure that the money is spent in approximately five years. Figure 16.1 shows the drawdown rate for KDOW and the division's subgrantees. When the US EPA began tracking the drawdown rate for each project year there were a large number of Watershed Base Plan projects. WBP type projects are very complex and tend to take the full time allowed for a subgrantee. The WBP projects historically moved at a steady pace but did not decrease drawdown the way that WBP implementation projects do. Currently there are several watershed base plans ready to implement, and it is expected that future projects based on these plans will drawdown funding even quicker.

Prior to 2008, it was not uncommon for the division to fund watershed planning and implementation in the same project. This policy was examined closely and it was determined that this was not the most efficient way of funding a project. Projects are now separated into three phases. The initial phase is now a project that collects monitoring data and provides an analysis report. The second phase project is the Watershed Based Plan. The third phase project is the implementation of the WBP. Separating a single project into these separate phases allows each subgrantee to focus on a smaller scope of work and complete the project on time in an efficient manner. This increases drawdown because projects do not drag out. Funds are spent evenly throughout the smaller projects rather than spent heavily towards the end of a single, large project.

The NPS program has benefitted from internal improvements at KDOW, as well. The NPS staff conducted a complete review of the grant process using Lean Tools, such as Value Stream Mapping and Eight-Step Problem Solving. Improvements to internal procedures have led to more streamlined and efficient contract development, approval of quarterly notices, project deliverables, and report production.

A portion of the 319(h) federal monies is retained by KDOW to cover personnel and other operating expenses. Review of internal drawdown procedures on annual federal grants now ensures that personnel within KDOW use the correct time codes to account for hours worked. The NPS Program has made an effort to drawdown internal personnel funding in a more consistent manner. In addition, basin coordinators and the Wild Rivers coordinator now use specific time codes that pull directly from federal funding.

In an effort to drawdown federal funds more efficiently, personnel funding has been reallocated into contractual projects. Beginning in 2011, KDOW allotted a majority of the 319(h) federal dollars to subgrantee projects and away from personnel. Funding for the 2011 project year will provide one person-year of funding to support NPS Program staff divided between eight individuals in the Watershed Management Branch and the Resource Planning and Program Support (RPPS) Branch. That rate is significantly lower than previous years. The balance of the staff salaries shall be funded from previous grant years.

Although there are further improvements to be made, the enhanced efficiency of KDOW has demonstrated that the program is on a steady course of increased drawdown. Current and future projects are on track to take advantage of improved protocols. Project managers have a better understanding of the need for steady and consistent drawdown. Invoicing by subgrantees occurs quarterly and milestones are met. As a result of these changes, a new level of accountability is ingrained within the program.

16.3. Personnel

Staff for the NPS program are broadly categorized as technical staff or grant staff. Each group has a separate supervisor and branch manager and allows for a checks-and-balances system within the program. Thus, each Section 319(h) project has both an administrative and technical contact to ensure timely project implementation, product and report review, and approval.

Technical advisors (TAs) are located in the Watershed Management Branch, Nonpoint Source and Basin Team Section. They provide program/project oversight and their duties include reviewing and approving project deliverables and reports. TAs also provide one-on-one assistance and guidance to project contractors and participate in project meetings, field days, demonstrations and other project activities. Technical advisors are required to make one project site visit for every subgrantee each year to ensure the project remains on track and that KDOW is available to provide assistance as needed. In addition, TAs provide the division with advice in their areas of expertise, which include agriculture, education and outreach, forestry, geology, groundwater, low impact development and green infrastructure, on-site wastewater, soil conservation, and stormwater.

Grant administrators (GAs) are located in the Resource Planning and Program Support Branch, Grant Management Section. They serve as the single point of contact and all information is routed through them before being passed on to the TAs. This enables the subcontractors to deal with one person for all document routing and improves communication and coordination. This ensures GAs are kept current with project statuses including products, deliverables, successes and concerns. GAs are also responsible for grant and contract administration, which includes developing and submitting grant applications, reviewing grant conditions and making recommendations on grant acceptance, monitoring grant fiscal status, development and execution of legal contracts (Memorandums of Agreement), review and approval of invoices, and review and approval of project Final Reports and Grant Close-Out Reports.

The NPS Program staff includes the following:

- **2000 – 2003: 12 Full-Time Employees (FTEs)**
  - NPS Section Supervisor
  - One Environmental Education Specialist
  - Three Technical Advisors
  - Two Grant Administrators
  - Three Environmental Biologists
  - Two Administrative Assistants

- **2003-2007: 11 FTEs**

  A reorganization in February 2003 moved the NPS grant administrators to the Resource Planning and Program Support Branch although they remain program staff.

  - NPS Section Supervisor
  - One Environmental Education Specialist
  - Three Technical Advisors
  - Two Environmental Biologists
  - One Administrative Assistant
  - Grants Management Section Supervisor
  - Two Grant Administrators
- **2007-current: 8 FTEs**

  Reorganization in the spring of 2007 placed all KDOW monitoring staff in the Water Quality Branch (WQB). The WQB receives a 319(h) grant each year for monitoring and assessment for nonpoint source pollution; as a result, the WQB staff are not included in the total for the NPS Program staff.

  - NPS Section Supervisor
  - One Environmental Education Specialist
  - Three Technical Advisors
  - Grants Management Section Supervisor
  - Two Grant Administrators

16.4. Contract timeframe

Memorandums of Agreement (MOAs) are developed and based upon US EPA approved work plans that are designed to support the goals and objectives of the Kentucky Nonpoint Source Pollution Control Plan. A MOA is developed for each project funded as a sub-grant under the 319(h) grant. MOAs contain the same level of specificity and detail as the approved work plans, including outputs, milestones, and reporting and record retention requirements. They are written for the duration of the grant, with project timelines outlined into the contract. Older grants had a time frame of up to seven years, while more recent grants have a shortened timeframe of three years in an attempt to reach a 20% drawdown rate.

16.5. Project and Program Reporting

To meet the 319(h) grant program conditions, a tremendous amount of reporting is required for the Kentucky Nonpoint Source Pollution Control Program. Reports include project Progress Reports, updates to US EPA's Grant Reporting and Tracking System (GRTS), project Final Reports, Grant Close-Out Reports, Annual Reports, Grantee Performance Reports, Financial Status Reports, and other US EPA and agency required reports. Additional information on each of these reports is given below.

- **The Grant Reporting and Tracking System (GRTS) -** iaspub.epa.gov/pls/grts/f?p=110:199:1543442316791257
  The Grants Reporting and Tracking System (GRTS) is the primary tool for management and oversight of the US EPA's Nonpoint Source Pollution Control Program. GRTS pulls grant information from US EPA's centralized grants and financial databases and allows grant recipients to enter detailed information on the individual projects or activities funded under each grant. State grant recipients are required to report annually in GRTS their progress in meeting milestones, including reductions of NPS pollutant loadings and on improvements to water quality achieved by implementing NPS pollution control practices. GRTS enables US EPA and states to demonstrate the accomplishments achieved with the use of 319(h) grant funds. The data entered into GRTS can be searched by state, grant year or location.
- **319 Annual Report**
  Section 319(h) of the Clean Water Act requires states to report annually on their progress in meeting milestones, and to report available information on reductions of nonpoint source pollution loadings and on improvements to water quality resulting from implementation of NPS management programs. This reporting requirement is addressed in all NPS contracts so project contractors understand and commit to providing information for this Annual Report requirement. The Annual Report is used in assessment of satisfactory progress for the program.
- **Close-out Reports**
  US EPA requires states to formally close-out expired Section 319(h) grants by developing and submitting a Grant Close-Out Report subject to US EPA review and approval. Grant Close-Out Reports are prepared by NPS grant administrators at the end of the grant period and include grant fiscal information and all individual project Final Reports. To ensure all products and deliverables are received and all required reports are complete, final invoices are neither approved nor processed for payment until the project Final Reports have been received, reviewed and approved by the Division of Water for each project.
- **Financial Status Reports**
  40 CFR Section 31.41(b) requires grantees to submit financial status reports using Standard Form 269 or 269(a) to report the status of funds under each grant. Staff with the Energy and Environment Cabinet's GAPS Fiscal Management Branch complies with this reporting requirement. GAPS Branch staff provide NPS grant administrators with copies of the Section 319(h) grant Financial Status Reports.

16.6. Success Stories

Section 319(h) NPS Success Stories highlight water bodies identified by states as being primarily nonpoint source-impaired and having achieved documented water quality improvements. Projects described on this site have received funding from Clean Water Act (CWA) Section 319(h) and/or other funding sources dedicated to solving nonpoint source impairments. Water quality improvements are demonstrated through the achievement of water quality standards

for one or more pollutants/uses (i.e., removal from the state's CWA Section 303(d) list of impaired waters); measured in-stream reduction in a pollutant; or measured improvement in a parameter that indicates stream health such as increases in fish or macroinvertebrate counts. These stories also describe innovative strategies used to reduce NPS pollution, the growth of partnerships and a diversity of funding sources. Kentucky has developed three success stories since the revision in reporting requirements in 2007. For more information, visit US EPA's website at water.epa.gov/polwaste/nps/success319/info.cfm.

16.6.1. Fleming Creek

The Fleming Creek watershed is contained almost entirely within Fleming County, in northeastern Kentucky (Figure 16.2) and is part of the Licking River Basin. The mainstem is 39 miles long and it drains an area of 61,670 acres.

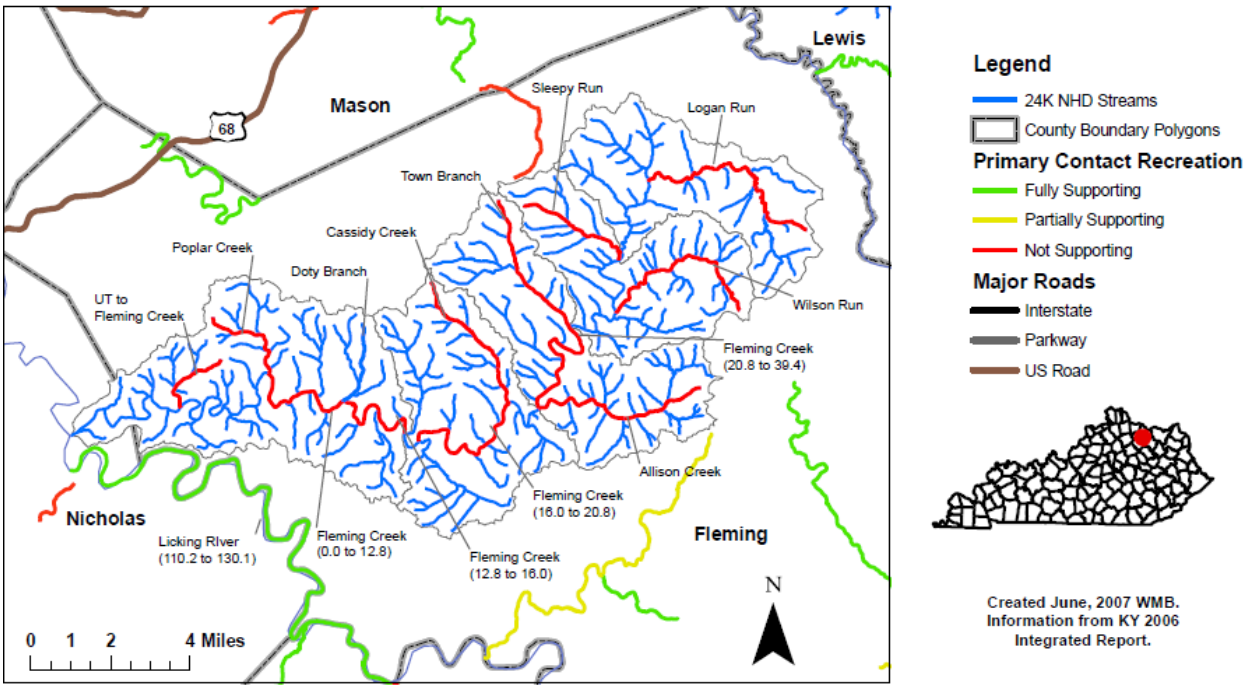

Figure 16.2: Fleming Creek Watershed, Primary Contact Recreation support status map.

In 1989 and the early 1990s, the Fleming Creek Watershed Nonpoint Source Demonstration Project was initiated by a group of local landowners concerned about water quality condition and the Fleming Creek Water Quality Oversight Committee was formed. As a result of this groups' sustained commitment, substantial resources have been dedicated to remediating the water quality problems in Fleming Creek.

A total of 75.2 stream miles in the Fleming Creek Watershed do not support the Designated Use of Primary Contact Recreation (PCR) because of high pathogen levels and 53.7 stream miles do not support the Designated Use of Warmwater Aquatic Habitat (WAH or Aquatic Life) because of nutrients, organic enrichment, low dissolved oxygen and noxious aquatic plants (KDOW, 2002). A Total Maximum Daily Load (TMDL) for pathogens has been approved (KDOW, 2001).

Pre- and post-BMP water quality monitoring between 1992 and 1994 did not indicate improvements. Therefore, the watershed was adopted as a Clean Water Action Plan initiative in 1999. Subsequent monitoring by a project contractor and KDOW has been conducted and biological recovery has been documented. A 4.8 mile stream segment of Fleming Creek (RM 16.0 – 20.8) has been determined to fully support its designated use of Warmwater Aquatic Habitat and has been delisted from the state's 303(d) list of impaired waters (KDOW, 2007 and US EPA, 2007). In addition, pathogen data results indicate a trend of increasing recovery in the lower watershed.

Extensive financial assistance through Clean Water Act, 319(h) Nonpoint Source implementation grants, the state cost share program, and the various Farm Bill programs, have been targeted in the watershed by the numerous partners in the project and watershed restoration efforts continue. Fleming Creek is also a candidate watershed that may be proposed to the Agriculture Water Quality Authority for a compliance evaluation pilot to determine the effectiveness of individual Agriculture Water Quality Plan implementation. A TMDL for nutrients and organic enrichment is currently under development for the watershed (KDOW, 2007).

16.6.2. Rock Creek

Rock Creek originates in Pickett County, Tennessee, and flows across the state line into McCreary County, Kentucky. After crossing the state line, Rock Creek flows for 21 miles before entering the Big South Fork of the Cumberland River. The upper portion of Rock Creek has been designated by Kentucky as a state Wild River and an Outstanding State Resource Water. However, below the stream's juncture with White Oak Creek, acid mine drainage has severely affected aquatic life. In 1990, Kentucky listed Rock Creek on the 303(d) list as non-supporting for aquatic life and swimming. A TMDL for pH in Rock Creek has been approved.

The Rock Creek Task Force was formed in order to restore the lower Rock Creek Watershed. This group includes twelve state and federal agencies and conservation organizations. The Kentucky Division of Abandoned Mine Lands led the implementation of Phase 1 of the Rock Creek restoration project in spring 2000. Coal refuse that contributes to acidic conditions in runoff was removed from the banks of the creek, and open limestone channels and a modified vertical flow wetland system were installed to further neutralize acidic drainage. Water in the creek was further treated with monthly applications of limestone sand to reduce acidity.

Funding for this project (total project cost $970,000) included 319(h) Clean Water Action Plan grant ($200,000) from the US EPA through the Kentucky Division of Water, Appalachian Clean Streams Initiative ($280,000), Personal Responsibility in a Desirable Environment grant ($250,000) from National Oceanic and Atmospheric Administration, Kentucky Abandoned Mine Land Grant ($160,000), and US Geological Survey cost share ($80,000).

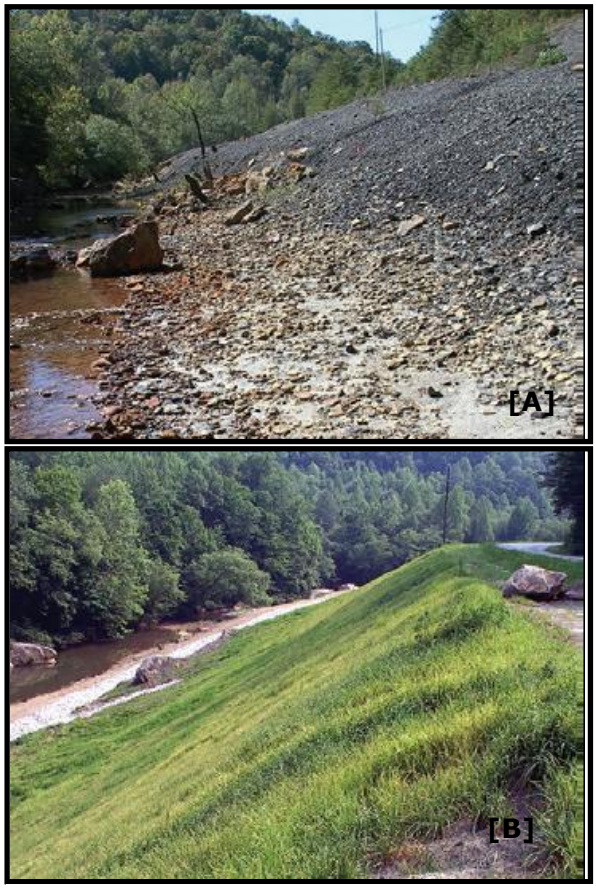

Figure 16.3: Rock Creek bank, before [A] and after [B] restoration.

Activities have dramatically improved the water quality in the lower Rock Creek watershed, as shown in Figure 16.3. Acid loading into the Big South Fork of the Cumberland River from Rock Creek has decreased from a monthly average of 110 metric tons to near zero. Removing 25,000 cubic yards of coal refuse from streamside areas and revegetating the banks of Rock Creek have reduced the sediment entering the stream by 500 tons annually. Fish populations are improving in the lower Rock Creek watershed, and the number and diversity of fish species are increasing. Stations that once supported no fish are now supporting fish. Because of these improvements, Rock Creek has been reclassified from full nonsupport to partial support for aquatic life and swimming on the 2002 Kentucky 303(d) list.

16.6.3. Clark's Run

To address water quality impairments, watershed stakeholders initially convened in May 2006 to form part of the Dix River Watershed Council and work on the Dix River Watershed Plan.

From this larger Council, the Clark's Run Focus Group was formed to implement the watershed plan in Clark's Run, and will continue to do so in the future.

Partners in the Clark's Run watershed have focused on improving water quality in several ways. The Clark's Run Environmental and Educational Corporation (CREEC) formalized in 2005 to enhance water quality and educate residents in the watershed. CREEC has conducted water monitoring, worked on streamside greenways system with interpretive trails and education facilities, conducted riparian reforestation efforts and assisted with educational outreach in the community. CREEC has partnered with the City of Danville's stormwater utility to help fulfill the city's stormwater requirements. Additionally, the stormwater utility has created a user service fee, which generates funds for improvements to the stormwater system. The stormwater utility has been implementing portions of the watershed plan within the municipality to improve water quality. KDOW has also completed a bacteria TMDL for the Dix River Watershed.

The City of Danville has recently adopted several ordinances that focus on the improvement of water quality by restricting activities that may negatively affect local streams. They have adopted an Erosion and Sediment Control Ordinance, "…to protect property, prevent damage to the environment and promote the public welfare in Danville by guiding, regulating, and controlling the design, construction, and use of excavation, grading, and other similar activities which disturb or break the topsoil or result in the movement of soil." They have also enacted an Illicit Discharge Ordinance to regulate non-stormwater discharges into the watershed. The wastewater treatment plant for the City of Danville has recently been upgraded to include a new facultative lagoon, two new clarifiers, settling tanks and UV disinfection process.

In 1995, surveys of aquatic macroinvertebrates (Macroinvertebrate Biotic Index, MBI) and fishes (Kentucky Index of Biotic Integrity, KIBI) were conducted by KDOW in two locations on Clark's Run (see Figure 16.4, next page). In 2008, the KDOW performed the same surveys on Clark's Run. Because of the improvements at the Clark's Run/KY 52 site, Segment 2 was assessed in October 2009 to be fully supporting its aquatic life use designation. This represents a move from non-support to full support of the aquatic life use for this segment of Clark's Run. While the Clark's KDOW site did not improve sufficiently to move out of the partial support category, one of the two impaired segments in the Clark's Run watershed now supports aquatic life use.

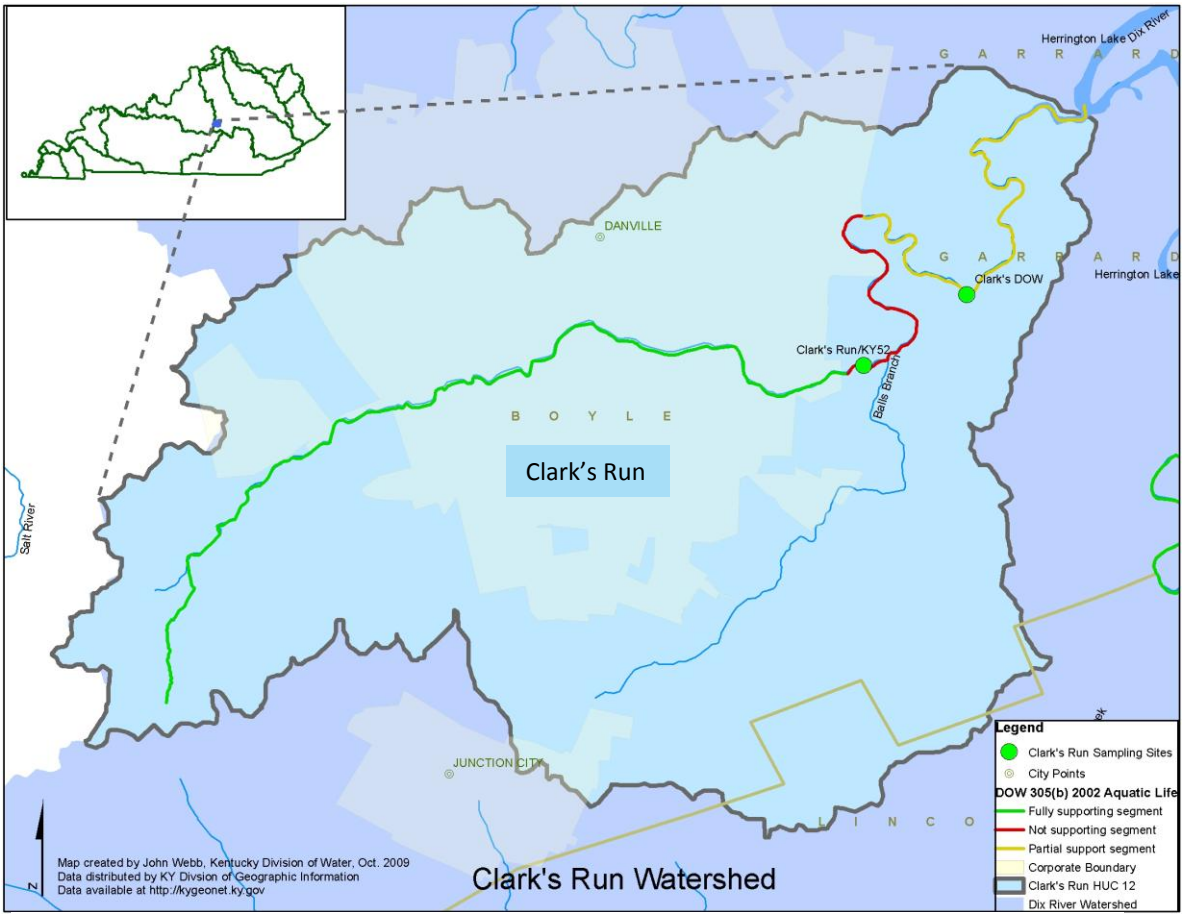

Figure 16.4: Clark's Run Watershed, Aquatic Life support status

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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 water.ky.gov/Funding/Pages/NonpointSource.aspx. If you have any questions, e-mail Nonpoint Source Grants at james.roe@ky.gov or contact a Nonpoint Source staff member at 502-564-3410.

Appendix B: NPS Management Goals, Objectives and Strategies

NPS Management Plan Goals, Objectives and Strategies							
Goal 1: Manage nonpoint source pollution in Kentucky			**Targeted Completion**				
Objective 1:	Decrease input of pollutants from agricultural sources.		2013	2014	2015	2016	2017
	Strategy 1:	Support projects that educate the agricultural community and install best management practices for agricultural impacts.	X	X	X	X	X
	Strategy 2:	Work with Division of Conservation on nonpoint source agricultural issues and support staff as outlined in the Memorandum of Understanding.	X	X	X	X	X
	Strategy 3:	Continue participation in the State Technical Committee, Agricultural Water Quality Authority and Kentucky Agriculture Science Monitoring Committee.	X	X	X	X	X
Objective 2:	Decrease input of pollutants from developed lands.		2013	2014	2015	2016	2017
	Strategy 1:	Support projects that demonstrate green infrastructure (LID) and good stormwater management. Provide technical assistance for Urban/LID/Stormwater/Smart Growth efforts throughout the Commonwealth.	X	X	X	X	X
	Strategy 2:	Continue partnerships with Stormwater/Developed area groups locally, regionally and statewide.	X	X	X	X	X
	Strategy 3:	Participate in Division of Water development of revised Construction, General and MS4 permits.			X	X	
Objective 3:	Decrease NPS pollution impacts from forestry activities		2013	2014	2015	2016	2017
	Strategy 1:	Support statewide and regional projects that focus on scientific and sustainable forestry management with water quality being a primary concern.	X	X	X	X	X

	Strategy 2:	Participate in the Forest Conservation Act BMP board and continue partnerships with US Forest Service and KY Division of Forestry.	X	X	X	X	X
	Strategy 3:	Provide subgrantee funding to the KDF to regularly conduct an assessment of Forest Conservation Act BMP compliance.	X				X
Objective 4:	Protect and assess Kentucky's groundwater.		2013	2014	2015	2016	2017
	Strategy 1:	Support the assessment of groundwater impacts from nonpoint source pollution in Kentucky.	X	X	X	X	X
	Strategy 2:	Provide technical assistance regarding groundwater protection and the development of groundwater and wellhead protection plans.	X	X	X	X	X
	Strategy 3:	Support the use of best management practices that protect and infiltrate groundwater.	X	X	X	X	X
Objective 5:	Decrease human sewage in Kentucky's water bodies.		2013	2014	2015	2016	2017
	Strategy 1:	Support projects that decrease sewage impacts to watersheds and provide technical assistance to the Division for BMPs for onsite sewage treatment.	X	X	X	X	X
	Strategy 2:	Develop partnerships with Department for Public Health and local health departments.	X	X			
	Strategy 3:	Benchmark nonpoint source onsite programs in other states and investigate the implementation of an educational program.	X				
Objective 6:	Promote identification and protection of healthy watersheds.		2013	2014	2015	2016	2017
	Strategy 1:	Purchase lands in the Wild Rivers corridors and provide technical assistance regarding conservation easements.	X	X	X	X	X
	Strategy 2:	Support projects in Special Use Waters.	X	X	X	X	X
	Strategy 3:	Identify healthy watersheds and pilot a Healthy Watershed program for Kentucky.		X	X		
Objective 7:	Protect and restore waters at risk from recreational impacts.		2013	2014	2015	2016	2017

	Strategy 1:	Support projects that protect Outstanding State Resource Waters and other Special Use Waters with known recreational impacts.	X	X	X	X	X
	Strategy 2:	Promote green infrastructure with dual use as recreation areas.	X	X	X	X	X
	Strategy 3:	Provide technical assistance for CWSRF funded projects addressing NPS impacts from marinas.	X	X	X	X	X
Objective 8:	Decrease nonpoint source pollution from resource extraction.		2013	2014	2015	2016	2017
	Strategy 1:	Support and provide technical assistance for projects in areas of Brownfields, acid mine drainage, abandoned mine lands and other resource extraction activities.	X	X	X	X	X
Objective 9:	Support projects developing natural stream process and wetland understanding.		2013	2014	2015	2016	2017
	Strategy 1:	Support education for professionals in stream restoration techniques.	X	X	X	X	X
	Strategy 2:	Provide technical assistance regarding natural stream processes for watershed based plans.	X	X	X	X	X
	Strategy 3:	Support projects assessing and monitoring natural stream processes.	X	X	X	X	X
Objective 10:	Protect water supplies from nonpoint source impacts.		2013	2014	2015	2016	2017
	Strategy 1:	Provide technical assistance for projects protecting source water and promoting groundwater recharge.	X	X	X	X	X
	Strategy 2:	Integrate a checkpoint for water quantity management in BMP implementation plan development.	X				
Objective 11:	Support education and outreach.		2013	2014	2015	2016	2017
	Strategy 1:	Support education and outreach programs across Kentucky.	X	X	X	X	X
	Strategy 2:	Revise nonpoint source website and continue social media development.	X		X		X

	Strategy 3:	Develop a watershed planning education and outreach toolkit.	X				
	Strategy 4:	Support the Watershed Watch program in Kentucky and training of volunteer water quality monitors.	X	X	X	X	X
Goal 2: Continue development of Kentucky Nonpoint Source Program			**Targeted Completion**				
Objective 1:	Meet federal requirements.		2013	2014	2015	2016	2017
	Strategy 1:	Increase federal drawdown and reach 20% goal.		X			
	Strategy 2:	Update GRTS at least twice a year.	X	X	X	X	X
	Strategy 3:	Submit NPS Annual Report.	X	X	X	X	X
	Strategy 4:	Submit NPS Success Story.	X	X	X	X	X
	Strategy 5:	Continue review of QAPPs for all NPS funded monitoring.	X	X	X	X	X
Objective 2:	Enhance programmatic capacity.		2013	2014	2015	2016	2017
	Strategy 1:	Update the Nonpoint Source Management Plan.				X	X
	Strategy 2:	Develop electronic filing system for NPS documents.		X	X		
	Strategy 3:	Develop Memorandums of Understanding with additional state or federal partners.	X	X	X		
Objective 3:	Provide technical assistance and support to the division regarding watershed impacts.		2013	2014	2015	2016	2017
	Strategy 1:	Participate in the development of the Kentucky Nutrient Reduction Strategy.	X	X	X	X	X
	Strategy 2:	Provide information for Integrated Report and TMDL implementation narratives.	X	X	X	X	X

Objective 4:	Develop and promote the watershed perspective.		2013	2014	2015	2016	2017
	Strategy 1:	Update the Watershed Framework.	X	X			
	Strategy 2:	Pilot the Kentucky Watershed Leadership Academy.		X	X		
	Strategy 3:	Develop the Center of Excellence for Watershed Management.	X	X	X	X	X
	Strategy 4:	Participate in the update of the Elements of a State Monitoring and Assessment Program document.		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, 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:
    - <u>Scoping and information gathering (monitoring)</u> - 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.
    - <u>Basin assessment</u> - Data analysis and summary.
    - <u>Prioritization and targeting of resources</u> - 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.

To access the most recent version of the Watershed Management Framework, please visit water.ky.gov/watershed/Pages/WMFReference.aspx.

Appendix D: Public Comments on NPS Management Plan

The Energy and Environment Cabinet placed the 2012 Nonpoint Source Management Plan on public notice via press release, online and in cabinet publications. The 30-day public comment period occurred May 1 – 31, 2012. 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 and through the Division of Compliance Assistance publications Green Dot and SNIPS. In response, four comments were received; three changes were made to the NPS Management Plan as a result. The comment summary and resulting actions appear in the table below.

Comment Summary	Source	Resulting Action
General Comment – Suggestion to impose a fee on lawn chemicals sold in critical watersheds.	Public	No action taken. Such actions fall under the purview of FIFRA, federal law.
General Comment – Clarify that agencies in Kentucky cannot regulate by guidance.	Agency	No action taken. This is understood and KDOW is not attempting to regulate anything with the publication of the NPS Management Plan.
Forestry Section, Strategy 3 (draft pg 60) – Concern that KDOW is committing to funding.	Agency	No action taken. KDOW is committed to supporting forestry efforts as they apply to watershed and water protection.
Forestry Section 8.2, last sentence (draft pg 52) – Please check statement for accuracy.	Agency	Sentence revised to clarify description of Designated Use Waters.
Appendix C – Add more information on role of TMDL NPS calculations (load allocations) in NPS management.	Agency	Appendix C revised to include more on TMDLs.