

# Waterworks

Kentucky Water Resources Research Institute at the University of Kentucky

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## Watershed Activities in the Kentucky River Basin

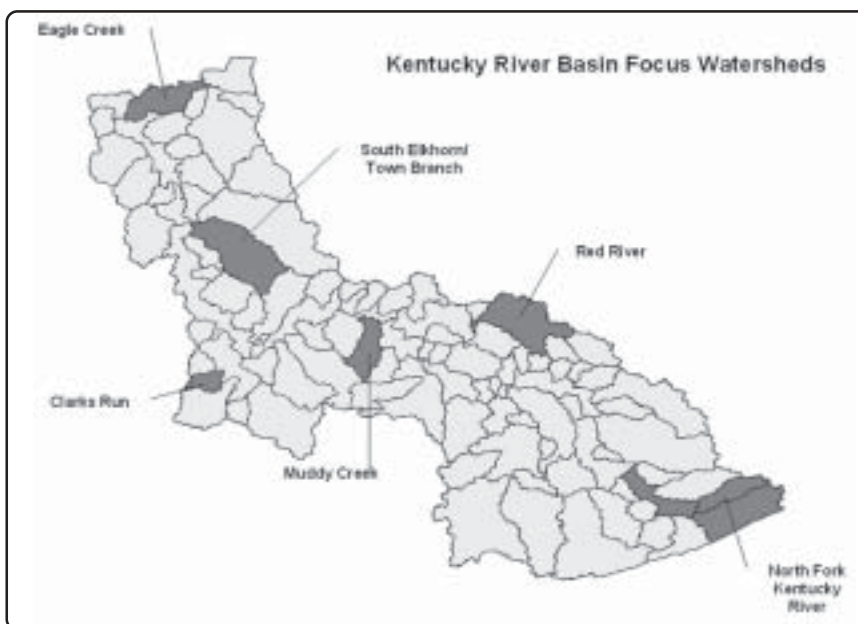
Since 1998, the KWRRI has been contracted by the Kentucky River Authority to conduct outreach and assistance for watersheds within the Kentucky River Basin. As a result of a coordinated, statewide watershed management effort, three priority watersheds were selected from the basin in 2003. These included the Red River Gorge watershed, Eagle Creek mouth watershed and South Elkhorn Creek watershed. Continuing assistance for these three watersheds, along with those of Muddy Creek, North Fork Kentucky River and Clarks Run, is beginning to pay some dividends in the form of local involvement and funding assistance to improve or protect these watersheds.

The following is a synopsis of the status and activities of the six focus watersheds.

### Clarks Run

*Identified Water Quality Issues:* According to a 2002 report by the Kentucky Division of Water (KDOW), Clarks Run does not support aquatic life due to impairments by pesticides, organic enrichment and low dissolved oxygen. Stormwater runoff, municipal point sources, and agricultural runoff are considered major pollutant sources.

*Watershed Activities:* A local group of interested individuals and partners is meeting regularly. They were awarded a 2003 Bluegrass PRIDE grant for a riparian reforestation effort that will involve the planting of nearly 3,000 native tree seedlings along the creek in downtown Danville. This project also includes a lead-up educational effort in the local school systems and the development of a watershed website. An



environmental education fair will also be held on the day of the tree planting event, Saturday, April 24<sup>th</sup>.

The local Clarks Run group also plans to conduct a storm drain stenciling project, which would alert community residents to the fact that wastes dumped down storm drains go straight to the creek. This effort would coincide with Danville's recently developed Stormwater Management Plan, as required by the U.S. Environmental Protection Agency.

### Eagle Creek

*Identified Water Quality Issues:* According to the 2002 KDOW report, Eagle Creek fails to support its swimming use designation due to pathogen contamination. Failing septic systems, straight pipes and agricultural runoff are considered major pathogen sources. Eagle Creek was also selected as one of three priority watersheds under the Kentucky Watershed Management Framework.

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## Meet the Researcher: Adria A. Elskus, Ph.D.



### **Adria A. Elskus, Ph.D.**

Assistant Professor  
School of Biological Sciences  
University of Kentucky

### **Education**

Ph.D., Boston University, 1992  
M.S., University of Rhode Island, 1985  
A.B., Mt. Holyoke College, 1978

### **Current Research**

*Biochemical and Hormonal Effects  
of Incomplete Site Remediation:  
Evaluating Resident Fish Species*

In her current research on the fish population of Russellville, Kentucky's Town Branch/Mud River (TB/MR) system, Dr. Adria Elskus addresses needs specifically outlined by the Water Science and Technology Board. In its *Envisioning the Agenda for Water Resources Research in the 21<sup>st</sup> Century*, the NWRI noted "the need to understand the impact of contaminants on higher organisms, to monitor the time course of recovery following contamination, and to evaluate the effectiveness of management efforts to improve water quality."

Among the pollutants present in today's waterbodies are polychlorinated biphenyls (PCBs), which are known to have "significant sublethal effects in both humans and fish, including altered reproduction, hormone disruption, immunosuppression, and carcinogenesis." High PCB levels have forced the Kentucky Division of Water to post fish advisories on several Kentucky waterways and to undertake remediation of some contaminated sites, including the Town Branch/Mud River (TB/MR) system. Despite these efforts, recent research in her laboratory indicates elevated levels of PCBs in the tissues of resident fish (collaboration with Dr. Wes Birge), as well as elevated levels of the biomarker enzyme, CYP1A, in fish caged in TB sites. As a biomarker, elevated CYP1A occurs only in fish exposed to organic pollutants and indicates that fish are responding, physiologically, to the continued presence of PCBs in the system. With potential consequences of ongoing PCB exposure, including disrupted endocrine systems, the effects on the resident fish population could be far-reaching.

Because chronic exposure to PCBs can lead to PCB resistance, and recent remediation efforts have not achieved desired success in the TB/MR system, Dr. Adria Elskus is attempting to examine whether PCB resistance has developed in resident fish and how such resistance affects the hormone disrupting actions of PCB contamination. Working from the hypothesis that such resistance *has* developed and *does* afford resistance to PCB-related hormone disruption,

Dr. Elskus has collected resident fish from throughout the system – remediated, unremediated, and reference sites – to determine which populations have developed resistance and which have not.

According to Dr. Elskus, "The current clean-up efforts in the TB/MR system provide an unparalleled opportunity to evaluate the effects of chronic chemical exposure and site remediation on local populations. The results of these studies will provide insight into the response of resident fish to present conditions in the TB/MR... Chemical resistance in fish is a recently recognized phenomenon and almost nothing is known regarding the consequences in affected populations. Because resistance has 'costs', tolerant populations may demonstrate heightened susceptibility to further stressors (e.g., site remediation), resulting in unexpected population crashes during cleanup efforts."

Ultimately, Dr. Elskus hopes that her study will assist Kentucky's natural resource managers in decision-making processes involving pollution problems and the potential population issues that accompany remediation. As she puts it, "[T]his study provides managers with biological indicators calibrated in a contaminated/remediated system, that are readily measurable in a wide range of species, are indicative of population effects, and can be used to make predictions as to which species are likely to be most tolerant or least tolerant of chemical stress, and those potentially less resilient to remediation stress."

*Watershed Activities:* A group of local partners, including the Northern Kentucky Health Department, is applying for an EPA Section 319 grant to decrease fecal contamination entering Eagle Creek from straight pipes, failing septic systems and livestock waste. This proposal will include homeowner incentive grants to replace failing systems/straight pipes; an educational and public outreach component; and pre-, during, and post-project water quality monitoring

### **Muddy Creek**

*Identified Water Quality Issues:* According to the 2002 KDOW report, Muddy Creek fails to support its swimming use designation due to pathogen contamination. Agricultural runoff is considered the major source of pathogens.

*Watershed Activities:* Local watershed activists have acquired funding for a Watershed Education Trailer that can be transported to local schools and watershed locations. This trailer contains a variety of watershed demonstration tools that will help educate local schools and the community about the physical dynamics of a watershed and human influences on its water quality.

The Muddy Creek watershed is fortunate to have many and varied supporting agencies working toward its improvement, including the U.S. Fish and Wildlife Service, Bluegrass Army Depot, Kentucky Fish and Wildlife, The Nature Conservancy, Eastern Kentucky University, Kentucky River Watershed Watch, and several local teachers.

### **North Fork Kentucky River & Tributaries**

*Identified Water Quality Issues:* The 2002 KDOW report states that the North Fork of the Kentucky River fails to support its swimming use designation due to pathogen contamination and fails to support aquatic life due to siltation

impairments. Suspected pathogen sources include onsite wastewater systems (septic systems and straight pipes) and municipal point sources. Siltation is believed to be caused by a variety of activities, including urban runoff/storm sewers, habitat modification, agriculture, construction and silviculture.

*Watershed Activities:* A Total Maximum Daily Load (TMDL) plan has been developed for managing pathogen pollutants in the watershed. In conjunction with this plan, the Letcher County Water and Sewer District has been formed to increase the number of residents connected to a sewer system and a centralized wastewater treatment plant. Also, the Kentucky Division of Water is in the process of hiring a watershed coordinator that will likely be based in the North Fork watershed and will largely focus on outreach, education and management activities in this region.

### **Red River**

*Identified Water Quality Issues:* A 1998 KDOW report listed Red River as non-supporting of its swimming use due to pathogen contamination. The draft 2004 report delists the river from the swimming impairment. However, it notes that the River will continue to be monitored for pathogen threats due to citizen monitoring reports of high pathogen levels. The Red River Gorge Watershed is one of the three priority watersheds identified under the Kentucky Watershed Management Framework.

*Watershed Activities:* The Kentucky Rural Water Association has been meeting with local officials and watershed residents to discuss a recently developed Source Water Assessment and Management Plan for the Red River and Beech Fork Reservoir drinking water sources in Powell County. This plan identifies potential contaminant threats to the water supply (and the watershed in general) and makes recommendations to reduce these threats. Although the

Area Development Districts in Kentucky drafted these plans for the counties, discussions such as those being held in Powell County will help local residents understand and become better informed about the status of their drinking water supplies.

### **South Elkhorn Creek (including Town Branch and Wolf Run)**

*Identified Water Quality Issues:* According to the 2002 KDOW report, South Elkhorn Creek only partially supports its swimming use designation due to pathogen pollution. It is also listed for nutrient and siltation impairments, which prevent the stream from fully supporting aquatic life. Town Branch of South Elkhorn is non-supporting due to nutrients, organic enrichment/ low dissolved oxygen, and flow alterations. Town Branch and Wolf Run do not support swimming due to pathogen impairment.

*Watershed Activities:* A local non-profit group has formed to protect and gain public attention for Town Branch. This group, the Town Branch Trail organization, plans to develop a greenway trail along the stream that would connect downtown Lexington with area neighborhoods, parks and historic sites. This group, along with others, is also in the midst of developing an EPA 319 grant proposal to formulate a comprehensive watershed plan for restoring and protecting Town Branch and Wolf Run.

In its FY 2003-04 budget, the Kentucky River Authority allocated funding for watershed grants to local organizations. Six watershed grant applications were submitted by groups in the focus watersheds and will be reviewed by the KRA's Watershed Subcommittee in late March of 2004. These grant awards will provide a boost to local groups and continue the momentum they have already achieved toward protecting these watersheds.

--Malissa McAlister

# KWRI Annual Symposium

Holiday Inn, North - Lexington, KY  
19 February 2004

On February 19, 2004, more than 100 individuals from academia, state government, and water-related businesses and organizations, as well as members of the general public, attended the Kentucky Water Resources Research Institute's Annual Symposium at Lexington's Holiday Inn North. In addition to poster presentations, sessions addressed such topics as groundwater, watersheds, environmental management, nutrients and pesticide, pathogens, and biology.



**Thanks to those who participated in this year's Symposium!  
We hope to see you all again in 2005!**

## BGWSC to Create Water Commission

Almost 400 copies of the Executive Summary of the Bluegrass Water Supply Consortium's regional potable supply study were distributed in early January to local elected officials, interested citizens, state and federal officials, and others. The final draft report may be accessed through the ADD's web site [www.bgadd.org](http://www.bgadd.org) through the link *Water System Regionalization Feasibility Study*.

Seventeen area water utilities in fifteen counties participated in the regional study. Each utility was asked to consider making a non-binding commitment to reserve capacity in the regional plan. Eleven community water systems have since expressed a strong interest in continuing the cooperative approach.

Plans are moving rapidly to create a regional water commission under the provisions of KRS 74. The creation of water commission will give the effort the legal status to incur long term debt and operate a regional water utility that could wholesale potable water to participating water utilities who would then re-sell that water to their own retail customers.

*This article can be seen in its entirety in "Bluegrass Advantage", a publication of the Bluegrass Area Development District, Volume 28, Number 1.*

## KWRRI to Co-Host EPA Phase II Stormwater Strategies Seminar

As of March 2003, certain Kentucky communities were required by the U.S. Environmental Protection Agency (EPA) to submit management plans for handling stormwater runoff. Cities included in this "Phase II" stormwater classification must detail their approaches for meeting six minimum measures. The KWRRI is co-sponsoring a free seminar on meeting two of the minimum measures for Phase II stormwater permitting—public outreach and participation and erosion control for construction activities. Other sponsors of this seminar include the Kentucky Division of Water, Kentucky Waterways Alliance, the Watershed Watches of Kentucky, the Lexington Fayette Urban County Government, and Tetra Tech, Inc.

A video teleconference will enable discussion among seminar participants in Lexington, Louisville, Bowling Green, Owensboro and Northern Kentucky. The group discussion will be followed by an audio-web broadcast of "Erosion Control Compliance with NPDES Phase II," sponsored by the American Public Works Association.

For further information about the seminar and to register, please visit the website <http://www.kywater.org/watch/stormwater/> or call 1-800-928-0045 Ext 473.



## Kentucky Water Awareness Month

May is Kentucky Water Awareness Month (KWAM). Each year, the KWAM Committee, established through the Environmental and Natural Resource Issues Task Force, provides a packet of educational materials to county agents to use in water education programs. These materials can be used during the month of May to promote Kentucky Water Awareness Month or throughout the year. Packets are sent to county extension offices; however, the majority of the information provided can be found on the web at <http://www.ca.uky.edu/enri/kwam.htm>.

## Waterworks

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Previous issues of *Waterworks* can be viewed on the KWRRI web site at <http://www.uky.edu/WaterResources/>



## From Interim Director Jim Kipp

This issue highlights several “watershed” activities in the Kentucky River Basin. These efforts are almost amazing on their own, but also call to mind numerous other initiatives currently in the planning stages in the Commonwealth.

A Watershed Academy is being developed for middle and high school teachers this summer. The University of Louisville, the University of Kentucky, and numerous other partners are working to create a one-week training session to assist classroom teachers in utilizing watershed topics to help integrate teaching across the curriculum in their

schools. A grant through the Kentucky University Partnership for Environmental Education is supporting the effort.

A second Watershed Roundtable tentatively will be held in late July or August. Again, a multi-faceted team is planning a program to facilitate a broad understanding of watershed issues and opportunities across the Commonwealth. Our next newsletter should provide additional information about the Roundtable.

Not all watershed efforts are restricted within the state. Kentucky and Tennessee are cooperating to plan a youth water

camp in early August at Land Between the Lakes. 4-H members who will be entering the 5<sup>th</sup> or 6<sup>th</sup> grades will spend three fun filled days learning about water. By focusing on crossing state boundaries in water resources issues, the camp also will provide opportunities for new friendships and will enhance the potential for future partnerships.

These are just a few examples (there are certainly many others) that make me believe we are, in fact, making significant progress approaching that crucial turning point affecting opinion and action – a watershed.

*--Jim Kipp*