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**Kentucky Water Resources Research Institute
Annual Technical Report
FY 2013**

Introduction

The FY 2013 Annual Technical Report for Kentucky consolidates reporting requirements of the Section 104(b) base grant award into a single document that includes: 1) a description of Kentucky Information Transfer activities, 2) citations for related publications, 3) a summary of student support during the reporting period, 4) notable awards and achievements during the year, and 5) publications from prior year projects.

No funds were requested for general program administration activities. However, travel funds were provided to support the participation of the Director and the Associate Director in the annual meeting of the National Institutes for Water Resources in Washington, DC from February 10-12, 2014.

Research Program Introduction

The activities supported by the Section 104(b) program funds and required matching are interwoven into the overall program of the Kentucky Water Resources Research Institute. Additional research, service, and technology transfer activities were funded through a variety of other sponsors. Memoranda of Agreement projects with the Kentucky Division of Water included 1) Total Maximum Daily Load development for several Kentucky streams and 2) Nutrient Management Stakeholder Engagement in the Floyds Fork watershed near Louisville. The Kentucky River Authority supported watershed management services in the Kentucky River basin and a small grant program to fund local grassroots organizations. The National Institute of Environmental Health Sciences supported research translation activities through the Superfund Public Outreach Program. The Department for Hometown Security funded two projects related to security for water infrastructure. The Kentucky Department for Environmental Protection supported 3 students through an Environmental Protection Scholarship Program coordinated by the Institute (PhD Soil Science, PhD Geology, and BS Geology).

Members of the Institute's Committee on Research and Policy evaluated 14 proposals submitted in response to a request for proposals for student research enhancement grants. Eight projects were selected for support with 104(b) funding by the advisory committee. These small projects were included in the initial FY 2013 application and would have provided funding for undergraduate and graduate student research efforts (2 BS, 5 MS, and 2 PhD students) at 4 different institutions in a variety of discipline areas (biological sciences, forestry, civil engineering, biosystems and agricultural engineering, geosciences, and chemistry). The intent of this approach is to strengthen programs related to water resources and to encourage development of broad-based research capacity related to water in the Commonwealth. Unfortunately, initial delays in funding and an ultimate reduction in available support through the program resulted in no student research enhancement projects conducted with 104(b) funding in FY 2013. The program funds provided were utilized to continue ongoing information transfer activities intended to help support a variety of communication efforts of the institute including several web sites, and the Annual Water Resources Symposium.

Information Transfer Program Introduction

Information transfer activities are an important part of the overall program of the Kentucky Water Resources Research Institute. There are two main components, an annual symposium and the institute web sites. The institute also participated in and supports numerous other technology and information transfer activities throughout the year.

Kentucky information transfer project

Basic Information

| | |
|---------------------------------|--|
| Title: | Kentucky information transfer project |
| Project Number: | 2013KY225B |
| Start Date: | 3/1/2013 |
| End Date: | 2/28/2014 |
| Funding Source: | 104B |
| Congressional District: | KY 6th |
| Research Category: | Not Applicable |
| Focus Category: | None, None, None |
| Descriptors: | symposium, conferences, web site, publications |
| Principal Investigators: | Lindell Ormsbee |

Publications

1. 2014, Proceedings Kentucky Water Resources Annual Symposium, Kentucky Water Resources Research Institute, University of Kentucky, Lexington, KY, March 10, 2014, 80 p
2. Jenkins, Stephanie, Ashley Osborne, and Carmen Agouridis, 2013, Planting along Your Stream, Pond, or Lake, Cooperative Extension Service, University of Kentucky College of Agriculture, Food and Environment, HENV-202, 7 p
3. Osborne, Ashley, Stephanie Jenkins, and Carmen Agouridis, 2013, Stormwater, Cooperative Extension Service, University of Kentucky College of Agriculture, Food and Environment, HENV-203, 6 p
4. Osborne, Ashley, and Stephanie Jenkins, 2013, What is a Watershed?, Cooperative Extension Service, University of Kentucky College of Agriculture, Food and Environment, HENV-204, 6 p
5. Kentucky Water Resources Research Institute, 2013, Kentucky Aquatic Macroinvertebrate Checklist: Common Insects and Other Organisms Found in Kentucky Waterbodies, A Pocket Naturalist Guide, Waterford Press, Inc., Dunedin, FL

Kentucky Information Transfer Activities (2013KY225B)

Problem and Objectives

The Water Resources Research Act requires that Institutes or Centers shall:
(1) plan, conduct, or otherwise arrange for competent applied and peer reviewed research that fosters –

- (A) improvements in water supply reliability;
- (B) the exploration of new ideas that –
 - (i) address water problems; or
 - (ii) expand understanding of water and water-related phenomena;
- (C) the entry of new research scientists, engineers, and technicians into water resources fields; and
- (D) the dissemination of research results to water managers and the public.

(2) cooperate closely with other colleges and universities in the State that have demonstrated capabilities for research, information dissemination, and graduate training in order to develop a statewide program designed to resolve State and regional water and related land problems.

Each institute shall also cooperate closely with other institutes and other organizations in the region to increase the effectiveness of the institutes and for the purpose of promoting regional coordination.

Kentucky information transfer activities are conducted in support of these objectives.

Methodology

Information transfer activities are an important part of the overall program of the Kentucky Water Resources Research Institute. There are two main components, an annual symposium and the institute web sites. The Institute also participates in and supports other technology and information transfer activities throughout the year.

The Associate Director develops the program for the Annual Water Resources Symposium. Presentations in both platform and poster format allow for researchers and practitioners to share progress on planned, ongoing, and completed water-related activities throughout the Commonwealth each year.

The Information Specialist Senior assists with creating program announcements and the proceedings volume for the symposium. She also prepares information for the electronic news releases. She develops and maintains content for several web sites including the main Institute page at: ww.uky.edu/WaterResources/. Links for additional sites describing projects and

activities (for example volunteer sampling results and watershed pages for the Kentucky River basin) are provided on the main web site. Research translation to make results accessible for a variety of audiences is a major goal for all of the technology transfer activities of the unit.

The Institute cooperates closely with other groups and agencies in planning additional technology transfer activities in the Commonwealth. These efforts included support for seminar/lectures, other web sites, an open house during Earth Science Week, and participation in E-Day (Engineering College Open House). Institute staff members serve a variety of support roles on technical committees and advisory panels for agencies and volunteer organizations to help disseminate relevant information about ongoing activities and research results.

Principal Accomplishments and Activities

The Kentucky Water Resources Research Institute at the University of Kentucky was designated as a Center of Excellence for Watershed Management by Region IV of the U.S. Environmental Protection Agency on March 21, 2011. With this designation, KWRRRI became the first such Center of Excellence in Kentucky and the seventh in the Southeast. These centers help communities identify watershed-based problems and assist with the development and implementation of locally sustainable solutions. To become a Center of Excellence, an institution must demonstrate technical expertise in identifying and addressing watershed needs; involvement of students, staff, and faculty in watershed research; the capability to involve the full suite of disciplines needed for all aspects of watershed management; and a willingness to partner with other institutions. During 2013, KWRRRI continued fostering partnerships with a variety of other programs and institutions.

The Kentucky State Science Fair was held 3/30/2013 at Eastern Kentucky University. The Associate Director assisted with judging Earth Sciences projects and with the selection of special awards. This event helps to encourage outstanding middle and high school students interested in science and technology.

The Kentucky Water Resources Research Institute and the University of Kentucky Department of Earth and Environmental Sciences co-sponsored the National Ground Water Association Henry Darcy Distinguished Lecture "Managing Water Beneath the Agricultural Landscape" by Dr. David Rudolph on April 10, 2013.

The Mississippi River/Gulf of Mexico Watershed Nutrient (Hypoxia) Task Force consists of 5 federal agencies, 12 states and the tribes within the Mississippi/Atchafalaya River Basin (MARB). The Task Force was established in 1997 to reduce and control hypoxia in the Gulf of Mexico. Since then, the Task Force has undertaken a variety of efforts to achieve these goals. The 24th meeting of this group was hosted by the Kentucky Division of Water in Louisville, Kentucky on April 18, 2013. KWRRRI participated in the meeting.

Kentucky Water Awareness Month is an educational program of the University of Kentucky Cooperative Extension Service, Environmental and Natural Resources Issues Task Force. The program promotes overall water awareness for citizens of Kentucky during May each year. Materials are developed by a committee at the state level and distributed to all of the 120 county extension offices in the state. Individual county agents are encouraged to tailor the program to fit their county's specific needs and to use the materials to enhance their program efforts. The materials remain available throughout the year for use by classroom teachers, 4-H volunteers, and others interested in water issues through the ENRI internet site: www.ca.uky.edu/enri/

The Kentucky Stormwater Association Annual Conference was held August 13 -15, 2013 in Bowling Green, Kentucky. Participation of the Associate Director in the annual meeting and in quarterly regional meetings helps to keep the institute engaged with the municipal separate storm sewer system communities throughout the Commonwealth. The University of Kentucky is also now a part of the stormwater permit for Lexington, KY.

During the year, the institute worked with University of Kentucky Cooperative Extension Service to create 3 new extension publications targeted to low literacy populations: 1) Planting Along Your Stream, Pond, or Lake; 2) Stormwater; 3) What is a Watershed? These publications are available online at no charge.

1) <http://www.uky.edu/WaterResources/KCEWM/HENV202.pdf>

2) <http://www.uky.edu/WaterResources/KCEWM/HENV203.pdf>

3) <http://www.uky.edu/WaterResources/KCEWM/HENV204.pdf>

The institute also collaborated with Cooperative Extension to create a pocket reference guide to introduce the general public to Kentucky aquatic macroinvertebrates entitled "Kentucky Aquatic Macroinvertebrate Checklist (Common Insects and Other Organisms Found in Kentucky Water Bodies)." These publications were all developed utilizing funds obtained but the institute through the Division of Compliance Assistance in the Kentucky Department for Environmental Protection.

The annual Southeastern Conference Symposium is intended to address a significant scholarly issue utilizing the range of disciplinary strengths of all Southeastern Conference universities. Established by SEC presidents and chancellors, the annual symposium focuses on an issue of global interest. It also showcases the academic excellence and underscores the educational and economic contributions of the SEC's members to the vitality of the Southeast region, nation and world. During summer 2013, the Kentucky Water Resources Research Institute participated in a planning committee (along with colleagues from the University of Florida, Auburn University, Mississippi State University, and the University of Mississippi) to develop a proposal for a 3 day symposium entitled "Water for Sustainable Ecosystems,

Economies, and Communities." The proposal was selected by the university provosts in fall 2013 and will be submitted for consideration by the university presidents in 2014. If the conference proposal receives final approval from the presidents, the symposium will be held in Atlanta in 2016.

A program committee was convened by the Kentucky River Basin Coordinator in early September to begin planning for a Kentucky River Watershed Summit. The plan was to provide an informational and networking opportunity for citizens of the Kentucky River Basin interested in improving water quality through various grassroots approaches. The overall purpose was to provide technical support and to facilitate helpful partnerships for local stakeholder groups at various stages of watershed planning and implementation. A survey was developed by the program committee and distributed to a broad list of invitees to help identify agenda topics of interest and to fine-tune the program. Based upon survey responses, the agenda was finalized and the Summit was scheduled for Saturday November 16, 2013 at the University of Kentucky Center for Applied Energy Research in Lexington (near the midpoint of the basin). Two breakout sessions were planned for the morning (each containing four topics 1) Reaching Out, Engaging Others; 2) Finding and Understanding Water Data; 3) Connecting the Clean Water Act to Your Watershed; and 4) What is Green Infrastructure). Informational roundtables and booths were planned after lunch (The Kentucky River Water Trail; Monitoring Water Quality; Why Watershed Planning Helps; Agricultural Best Management Practices for Protecting Water Quality; and Funding Watershed Initiatives). Speakers were arranged for each of these topics. Although Summit registration was offered at no charge to participants, the number of confirmed attendees was ultimately insufficient to justify holding the meeting. Current plans are to coordinate the Summit at a future date with another activity to assist in attracting a larger audience. It may also be helpful to investigate holding the event at more than one venue within the basin to cut down on volunteer travel expense and driving time.

The Kentucky River Watershed Watch (KRWW) is a non-profit (501c3) organization that was formed in 1997 to support a citizen monitoring effort, and 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 in the Kentucky River Basin (www.krww.org). The majority of KRWW's activities, including training workshops, field test kits, mailings and sample analysis are made possible through grant funding from a variety of sources. Volunteers throughout the organization conduct all other KRWW operations. KRWW operates on an annual cycle which includes an Annual Watershed Protection Conference in January, training workshops in the late winter/early spring, four synoptic sampling events (May, July/August, and September) and an annual picnic in late summer. In 2006, the Kentucky Geological Survey was contracted to create an online, interactive database to provide easy access to Kentucky River Watershed Watch water quality sampling results. A new database and map viewer tools are currently being developed to provide historical water quality sampling results from all eight of the Watershed Watch programs representing the entire state of Kentucky. Board members and

the data manager are working closely with the Kentucky Geological Survey to provide easy, direct access to all Watershed Watch sampling data in Kentucky. Student workers employed by KWRRI assisted in support of the statewide water quality database that will make all of the volunteer sampling information available online. The Director of KWRRI serves as a scientific advisor to the group.

The Kentucky Water Resources Research Institute collaborated with KRWW in holding a Green Infrastructure Conference on 10/10/2013 at the Locust Trace Agri-Science Campus of the Fayette County School System. The agenda included presentations about existing local green infrastructure efforts followed by breakout sessions and a walking tour of the net-zero energy campus.

An open house was held on Wednesday evening 10/16/2013 in association with Earth Science Week. This event was co-sponsored with the Kentucky Geological Survey. KWRRI staffed a water exhibit for the elementary, middle school, and high school students and their parents who attended the event (approximately 200 people).

Cyberseminars provided through the Consortium for the Advancement of Hydrologic Sciences, Inc. were made available on the University of Kentucky campus for interested faculty, staff, students, and local professionals. The initial University of Kentucky membership in CUAHSI was underwritten by the KWRRI.

KWRRI participated in the University of Kentucky E-Day on 2/22/14. Engineers Day is a celebration of everything engineering has to offer from building bridges to discovering new medications to writing the software that powers our cell phones. Engineers and computer scientists do the things that make our 21st-century world work. E-Day comes at the end of Engineers Week, an annual event sponsored by a coalition of more than 100 professional societies, major corporations and government agencies dedicated to promoting math and science literacy and ensuring a diverse and well-educated future engineering workforce. KWRRI provided and staffed an Enviroscope® Watershed/Nonpoint Source Model to demonstrate the we all live in a watershed and the combined effects of pollution from many small sources can have a real impact on the quality of our shared water resources.

The Kentucky Water Resources Annual Symposium was held on March 10, 2014. Although the date of the symposium fell outside of FY2013, most of the planning and preparation occurred during the fiscal year. Two concurrent sessions provided time slots for 28 oral platform presentations. Fifteen posters were presented during a separate poster session. Approximately 120 people attended the meeting. Abstracts for all of the presentations were distributed to participants on the day of the meeting: Proceedings of the Kentucky Water Resources Annual Symposium, 2014, Kentucky Water Resources Research Institute, Lexington, Kentucky, 80 p. The full proceedings document is also available online through a link on the institute web site. The document includes contact information for all authors and presenters and

an abstract for each presentation. Symposium participants also receive a list of attendees providing basic contact information for each individual who pre-registered for the symposium. Attendees include researchers, personnel from local, state, and federal agencies, undergraduate and graduate students, participants from volunteer groups and NGOs, and members of the general public. Conference registration fees are kept low through partial subsidy of symposium expenses (using 104(b) technology transfer and matching funds) to ensure accessibility to individuals from all potential audiences. Since 2005, the symposium has provided an opportunity to annually acknowledge outstanding water-related contributions by individuals in Kentucky. Awards named for former directors are presented during the noon luncheon. Recipients in 2014 included: James C. Currens, Kentucky Geological Survey, Bill Barfield Award for Water Research; Derek R. Guthrie, Metropolitan Sewer District (retired), Lyle Sendlein Award for Water Practice; and Brian C. Reeder, Department of Biological Sciences, Morehead State University, Bob Lauderdale Award for Water Quality.

Maintenance of the institute web site provides open access for those interested in the activities of the Institute as well as providing links to related sites and information maintained by others. Creation and maintenance of the web site are ongoing throughout the year. Links on the site provide direct access to the Association of State Dam Safety Officials, the Kentucky Research Consortium for Energy and the Environment, the Kentucky River Watershed Watch Sampling Database, the National Institutes for Water Resources, PRIDE, the UK Superfund Basic Research Program Research Translation Core, the Environmental Research and Training Laboratory, the Kentucky Geological Survey, the Tracy Farmer Center of Sustainable Environment, and the Kentucky Center of Excellence for Watershed Management.

USGS Summer Intern Program

None.

| Student Support | | | | | |
|------------------------|-------------------------------|-------------------------------|-----------------------------|----------------------------|--------------|
| Category | Section 104 Base Grant | Section 104 NCGP Award | NIWR-USGS Internship | Supplemental Awards | Total |
| Undergraduate | 2 | 0 | 0 | 0 | 2 |
| Masters | 1 | 0 | 0 | 0 | 1 |
| Ph.D. | 0 | 0 | 0 | 0 | 0 |
| Post-Doc. | 0 | 0 | 0 | 0 | 0 |
| Total | 3 | 0 | 0 | 0 | 3 |

Notable Awards and Achievements

The Southeast Conference Proposal entitled "Water for Sustainable Ecosystems, Economies, and Communities" was selected by the provosts from SEC institutions to be presented to the university presidents and chancellors for final approval for the 2016 symposium in Atlanta, GA

Publications from Prior Years

1. 2012KY208B ("Determining groundwater flow velocities and discharge rate at the Kentucky Horse Park Royal Spring conduit monitoring station") - Conference Proceedings - Currens, James C., Brittany Shelton, Charles J. Taylor, Junfeng Zhu, and Stephen Webb, 2014, Kentucky Horse Park Karst Water Instrumentation System (KWIS) Monitoring Station, in Proceedings Kentucky Water Resources Annual Symposium, Kentucky Water Resources Research Institute, University of Kentucky, Lexington, KY, p 21-22
2. 2010KY137B ("A coupled hydrologic and biogeochemical modeling approach to understand if in-stream depositional zones are a carbon source or sink to the atmosphere") - Conference Proceedings - Ford, William and Jimmy Fox, 2014, Watershed-Scale Stable Isotope Simulation of the Fluvial Organic Carbon Budget Using the ISOFLOC Model, in Proceedings Kentucky Water Resources Annual Symposium, Kentucky Water Resources Research Institute, University of Kentucky, Lexington, KY, p 35
3. 2011KY170B ("Quasi-real time sediment discharge measurements using inexpensive experimental technology") - Conference Proceedings - Stewart, Robert, and Jimmy Fox, 2014, Time Average Velocity Characteristics of Decelerating Open Channel Flows, in Proceedings Kentucky Water Resources Annual Symposium, Kentucky Water Resources Research Institute, University of Kentucky, Lexington, KY, p 37-38
4. 2012KY204B ("Field-scale water and bromide transport as affected by land use and rainfall characteristics") - Conference Proceedings - Landrum, Carla, Daehyun Kim, Demetrio Zourarakis, and Tom Mueller, 2014, Spatiotemporal Relevance of Soil Moisture's Interaction with Measured Soil Terrain Parameters, in Proceedings Kentucky Water Resources Annual Symposium, Kentucky Water Resources Research Institute, University of Kentucky, Lexington, KY, p 39-40