Mar 10th, 11:00 AM

# Session 1C

Kentucky Water Resources Research Institute, University of Kentucky

# CURRY'S FORK WATERSHED PLAN: DATA PONDERING, ENGAGING EXPERT ADVICE, CLEANER WATER PLANS

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Curry's Fork of Floyds Fork runs through the heart of Oldham County and is listed as a 1st priority 303(d) stream by the Kentucky Division of Water (KDOW). In 2006, KDOW awarded Oldham County Fiscal Court a $1.6 million grant through the 319(h) Nonpoint Source Implementation program to develop and implement a comprehensive Watershed Plan (WP). The plan, completed and accepted by the state in 2012, is one of the most comprehensive plans developed in Kentucky.

The sampling and assessment program was developed to identify critical pollutants of concern and to target subwatersheds for protection and restoration actions. The monitoring program included water sampling, physical habitat assessments, biological assessments, and fluvial geomorphic assessments.

Assessing this myriad of data to isolate priority pollutants of concern and target subwatersheds for BMP implementation could not adequately be accomplished by one or two individuals. The internal Watershed Plan team, comprised of the county engineer, Strand engineering consultants, and an independent watershed advisor, provided oversight on the development of the plan. The internal team formed a Water Quality Data Analysis Team, comprised of aquatic biologists, engineers, watershed managers, total maximum daily load developers, nutrient specialists, and watershed modelers, to assess multiple data conclusions from numerous monitoring approaches. The efforts of the Team resulted in Priority Pathogen Protection and Restoration maps and detailed data summaries for the Curry's Fork Technical Committee. The Technical Committee, comprised of local officials and technical experts, used the water quality data summaries and extensive GIS data to identify pollutant sources and remediation efforts - the core of the Watershed Plan.

Over 100 recommendations or Best Management Practices (BMPs) were identified to improve water quality and meet water quality standards in Curry's Fork. The Technical Committee then ranked the BMPs which were then placed into four categories: High, Medium, Low and Other BMPs for Future Consideration. Sixty-three priority BMPs were further developed and included in the Watershed Plan for protecting and improving water quality. The BMPs were targeted at specific pollutants within specific subwatersheds. These BMPs have been the guide by which the watershed coordinator, the internal team, and the Technical Committee have led the effort with BMP implementation.

Collecting detailed fluvial geomorphic and sediment data and presenting the data in a way that was most useful for developing BMPs also enabled development of a Stream Restoration Priority Map and a Habitat, Riparian, and Sediment Priority Map. These maps provide a quick visual representation of extensive and complex fluvial geomorphic data and the resulting BMP recommendations for both habitat improvement and stream restoration efforts.

# IMPROVING OVERALL STREAM FUNCTION, HYDRAULICALLY AND ECOLOGICALLY (OPPORTUNITY MEETS NECESSITY)

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Working with the Kentucky Department of Fish and Wildlife Resources, Stantec designed the Elm Fork and Minors Creek Restoration Project to improve the ecological habitat in the streams while also reducing the stress and erosional forces on the systems. The streams were designed and constructed in a manner that provides an array of ecological opportunities including varying velocities and depths, various substrates and vegetation, and strong groundwater interaction. The project, located on the Kleber WMA property in Owen County Kentucky, incorporates Priority I and II design techniques and includes various riffle forms, various native substrates, deep pool habitat, groundwater dams, and oxbow wetlands/depression areas. Prior to construction, the stream reaches were overwhelmed with high shear stresses due to steep flow gradients and/or reduced floodplain access. The combination of mature trees along the streams and the cost of earthwork lead the design toward performing most of the restoration work within the existing channel, which also took advantage of existing habitat features and deeper pools throughout the site. Deeper pools augmented with a few groundwater dams provide sustained deep water habitat through the dryer months while also aiding in maintaining reasonable water temperatures through groundwater interaction. The different riffle forms constructed throughout the project provide various habitat features for macro-invertebrates while also supporting lower gradient profiles and creating permanent pool depths between them. The riffles and pools were designed to improve the hydraulic function of the streams while also improving the ecological condition and diversity of the streams. The network of pools allows spring water and surface flow to slowly move through the system and interact with the groundwater hydrology. Root wads and other woody debris generated from accessing the streams were put back into the site through in-stream structures to provide natural habitat features and varied substrates in the channel. The rock used in the constructed riffles was native material harvested from on site or mined on an adjacent property. The result is a functioning system of various riffle and pool features that support and enhance the stream both ecologically and hydraulically.

*About the Speakers:* **Wanda Lawson** P.E**.** is a Stream Restoration Designer and Project Manager with Stantec who has been working on stream restoration projects for over 10 years across the United States. Mrs. Lawson holds a Bachelors of Engineering degree from the University of Kentucky. **Oakes Routt** P.E. is a Stream Restoration Construction Manager with Stantec who has been working on stream restoration projects the last 6 years across the United States. Mr. Routt holds Bachelors and Masters of Engineering degrees from the University of Kentucky.

# IMPROVING URBAN STREAM WATER QUALITY THROUGH STREAM RESTORATION AT MONTESSORI MIDDLE SCHOOL OF KENTUCKY (MMSK), PRE-RESTORATION WATER QUALITY AND BANK EROSION MONITORING


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Improving stream water quality and restoring physical stream stability and habitat have been shown to increase aquatic life and stream health. Improving stream stability and habitat is a product of most stream restoration projects. There are also several measures that can be installed at the outlet of impervious areas to treat or filter out non-point source pollutants. However, the question still remaining is: How do you "clean up" polluted water from an urban watershed once it is already in the stream?

The headwater stream on MMSK property in Fayette County, a tributary to South Elkhorn Creek, is a typical urban watershed stream in the Bluegrass Region in Central Kentucky. It has many of the issues and ailments of urban waterways in this area including anthropogenic alterations such as channel straightening and dredging, channel erosion and upstream migrating headcuts, draining of adjacent wetlands, sewer/utility lines, non-point source pollution from urban runoff, and limited riparian forest buffer.

MMSK received a Class B Infrastructure Stormwater Quality Projects Incentive Grant from the Lexington Fayette Urban County Government (LFUCG) to restore approximately 900 feet of degraded stream on their property. The grant is funded by the LFUCG Water Quality Management Fee and is administered by the LFUCG Division of Water Quality.

The project gathered a year's worth of pre-restoration water quality and bank erosion data to establish existing non-point source pollution levels. This presentation highlights the results of the initial monitoring phase of the project.

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# IMPROVING URBAN STREAM WATER QUALITY THROUGH STREAM RESTORATION AT MONTESSORI MIDDLE SCHOOL OF KENTUCKY (MMSK), DESIGN AND CONSTRUCTION OF THE RESTORATION PROJECT


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The project gathered a year's worth of pre-restoration water quality and bank erosion data to establish existing non-point source pollution levels. Those data were then used to design a restoration project to reduce pollution. In addition to the improved stream habitat from the addition of riffles and pools, the stream was designed to be stable (i.e. not significantly erode) in the 100 year flood. This presentation highlights innovative techniques, such as hyporheic aquifers, constructed wetlands, and floodplain access during small flows, used to improve stream water quality as part of stream restoration in an urban watershed.

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