Central Plains Biological Assessment & Monitoring Workshop

May 14, 2014

at

Simon Laboratories
University of Kansas – West Campus
Lawrence, KS

Kansas Department of Health and Environment
Bureau of Water, Watershed Planning, Monitoring and Assessment
Topeka, KS
Outline

• Overview of KDHE’s ambient stream monitoring programs

• Laying the ground work for the reference stream system approach – the highlights of prior exercises

• Key Points - Kansas
Overview of Stream Monitoring Programs

– Stream Biology Program
  • Established ~ 1972
  • ~1980 established time-based “equal effort” collection method
  • Macroinvertebrates, freshwater mussels
  • ~ 65 stations per year (~222 current and historical sites)
  • Many stations coincide with chemistry stations

– Stream Chemistry Program
  • Established ~ 1967 (resemblance of current operations)
  • Quarterly samples at core (every year) and rotational (every fourth year) stations
  • Parameters include (46 inorganic, 39 organic, 38 radionuclide)
  • ~ 200 core and rotational stations per year (~400 current and historical sites)
Overview of Stream Monitoring Programs

– Stream Probabilistic Program
  • Established 2006
  • Samples for both chemistry and biology
  • Spatially balanced random site selection (~30-50 sites/year)
  • Work collaboratively with targeted programs
  • Unweighted design (i.e., emphasis on smaller stream systems in Kansas)

– Subwatershed Program
  • Established 2010
  • 15 HUC-12 subwatersheds (4x March and October)
  • Limited parameters (atrazine, nutrients, TSS, DO, E. coli)
  • Measure streamflow and attempt to capture runoff event 1 time per year/site
  • Includes a paired watershed study (macroinvertebrates and habitat assessment)
  • Supports activities associated with the Watershed Restoration and Protection Strategy (WRAPS) Program
Overview of Stream Monitoring Programs

KDHE’s BOW Quality Management Plans for these programs are viewable online at: http://www.kdheks.gov/environment/qmp/qmp.htm

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Kansas Reference Stream Study (2009 – 2010)

Study Objectives

1. Identification of least disturbed watersheds and stream reaches in Kansas
2. Determination of major threats to reference caliber of identified stream reaches
3. Formulation of recommendations for protecting and maintaining the condition of identified stream reaches

R.T. Angelo, G.L. Knight, K.T. Olson, T.C. Stiles

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Kansas Reference Stream Study (Highlights)

- Applied alternative method for delineating ecoregions based on multivariate clustering and visualization techniques using the principal component analysis (PCA) statistical procedure and statewide geographical databases obtained for 13 environmental indicators (e.g., climate, soil, topographic)

Kansas quantitative ecoregions

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Kansas Reference Stream Study (Highlights)

- Developed anthropogenic disturbance maps using different colors based on calculated disturbance scores for available geographical databases obtained for 20 measures of landscape alteration (e.g., density of confined livestock, ratio of cropland to total land area, density of stream/road intersections)

Anthropogenic Disturbance Map for Kansas
Kansas Reference Stream Study (Highlights)

- Delineated major threats to reference caliber stream reaches that included...
Kansas Reference Stream Study (Highlights)

- Evaluated the relationship between the watershed disturbance score and instream ecological condition using available species richness data for...

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Study Objectives

1. Conduct field-based validation study for six of the candidate reference streams
2. Develop recommendations with respect to protective stream classifications, minimum desirable flows, and on-site conservation measures
3. Develop protection-based TMDLs for TP and TSS
4. Discuss findings with other agencies, interest groups, landowners, and the general public

T.C. Stiles, G.L. Knight, A.J. Stahl

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The Healthy Watershed Initiative (Highlights)

- Identified several streams that performed very well with regard to calculated disturbance index.
- Rigorous field based evaluations discovered underlying factors (e.g., low head dams or perched culverts, potential lack of permanent flow) that removed them from consideration in this study.

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The Healthy Watershed Initiative (Highlights)

- Refined the anthropogenic disturbance map developed using the watershed disturbance method (Angelo et al. 2010). Black lines depicting Level III ecoregions developed by previous researchers using BPJ (e.g., Chapman et al. 2001).
The Healthy Watershed Initiative (Highlights)

• Chemical & biological sampling over 2011 – 2012
  – All had predominately high quality chemical attributes
  – Complicated by drought conditions (diminished flow and stressed biological communities)
  – In general, streams in this study showed strong biological communities when flows were sustained

Medicine Lodge River – hydrologically connected to 2
The Healthy Watershed Initiative (Highlights)

- **Stream Geomorphological Characterization**
  - Human alterations not captured in the disturbance index (channelization, dredging, levies)
  - Provided stream stability interpretations (e.g., bank cover and stability, channel and bed stability, or erosion potential)
  - Performed by the Watershed Institute (WTI) following the methodology of Rosgen (1996, 2000)
The Healthy Watershed Initiative (Highlights)

• Grouse Creek TMDL for TP and TSS Established
  – TMDLs typically designed for water quality restoration
  – Maintain existing loads at baseflow or normal flow
  – Reduce loads under runoff conditions (margin of safety)
  – The protection of waters has achieved an equal standing to that of restoration under TMDL regulation
  – Although protection based TMDLs are allowed in regulation, very few states (if any) have utilized it for protection of their waters
Key Points - Kansas

• Historically, protection of water and identifying reference waters was considered the preferred alternative to restoring impacted waters, no longer
• Protection now has a connotation of government intercession that locals strongly resist
• Reference waters have an inherent burden of implicit restrictions that might be applied to anything going on in their watershed, hence they are not viewed for the treasured resources that are
Key Points - Kansas

• Complicating this attitude, is the fact that Kansas is 99%+ private land, accentuating the paranoia of landowners over government interaction.

• Therefore, initiatives for stream protection, where the water quality is relatively high, have to be nurtured as local initiatives; it has to be their idea (e.g., Grouse Creek WRAPS).

• By extension, the bandying of reference waters has to be handled gingerly, it doesn't take much for access to be closed off by landowners, thereby foreclosing acquisition of information on what constitutes a high quality water in Kansas.
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1 Current affiliation: U.S. Environmental Protection Agency, Region 7
Thanks for listening…

Questions?
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