Presented at

Great Rivers Reference Condition Workshop
January 10-11, Cincinnati, OH

Sponsored by
The U.S. Environmental Protection Agency and The Council of State Governments
KANSAS LARGE RIVER
BIOASSESSMENT APPROACH

January 2006

Kansas Department of Health and Environment
Bureau of Environmental Field Services
Topeka, Kansas
GREAT PLAINS ECOREGION OF NORTH AMERICA
STREAMS INCLUDED IN KANSAS SURFACE WATER REGISTER  
(AND CORRESPONDING TEN-YEAR MEDIAN FLOW CLASSES)

(Source: USGS, 2004)
STREAMS INCLUDED IN KANSAS SURFACE WATER REGISTER (AND CORRESPONDING TEN-YEAR MEDIAN FLOW CLASSES)

(Source: USGS, 2004)
OVERARCHING MONITORING STRATEGY

- Directs resources primarily towards statewide stream, lake, wetland, and fish tissue monitoring programs (Kansas groundwater program suspended in 2002).
- Emphasizes targeted monitoring designs for 303(d) list and TMDL development purposes.
- Emphasizes probabilistic monitoring designs for 305(b) assessment and 303(d) screening purposes.
- Reserves capacity for special water quality studies (e.g., NPDES permits, bioindicator development, water quality criteria, emergency responses, NRDAs).
SCOPE OF PROBABILISTIC STREAM MONITORING EFFORTS IN KANSAS

- Experience gained through State participation in EPA Region VII EMAP initiative (KDWP), National Wadeable Streams Assessment (KDHE), and workshops hosted by Central Plains Center for Bioassessment.

- Routine probabilistic stream monitoring program launched by KDHE this year (field operations scheduled for July, August, and September).

- Approximately 50 randomly selected sites scheduled for visitation this year (200 sites every four years).

- Emphasis on benthic macroinvertebrate (including unionid mussel) assemblages, water chemistry, instream habitat, and landscape variables.

- Currently working with EPA-Corvallis to resolve remaining sampling frame and design issues.
CLASSIFIED STREAM MILEAGE PARTITIONED BY TEN-YEAR MEDIAN STREAM FLOW

Intended scope of probabilistic monitoring efforts

Targeted monitoring emphasis (61% of targeted monitoring sites)

Missouri River (not monitored, but discussions underway)

Stream flow, cfs

Thousands of miles

< 10
10 - 100
100 - 1,000
1,000 - 10,000
> 10,000
## DIAGNOSTIC THRESHOLDS AND RECENT PRECISION ESTIMATES
FOR BIOLOGICAL METRICS UTILIZED IN 305(b) REPORTS

<table>
<thead>
<tr>
<th>ALU Support Category</th>
<th>MBI</th>
<th>KBI</th>
<th>EPT</th>
<th>EPT%</th>
<th>Mussel taxa loss</th>
</tr>
</thead>
<tbody>
<tr>
<td>Full support:</td>
<td>≤ 4.50</td>
<td>≤ 2.6</td>
<td>≥ 13</td>
<td>≥ 48%</td>
<td>≤ 10%</td>
</tr>
<tr>
<td>Non-support:</td>
<td>≥ 5.40</td>
<td>≥ 3.0</td>
<td>≤ 7</td>
<td>≤ 30%</td>
<td>≥ 26%</td>
</tr>
<tr>
<td><strong>Precision, CY 2004</strong></td>
<td><strong>(based on five sets of duplicate samples)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>mean difference:</td>
<td>4.3%</td>
<td>2.0%</td>
<td>6.7%</td>
<td>11.2%</td>
<td>NA</td>
</tr>
<tr>
<td>standard deviation:</td>
<td>2.2%</td>
<td>1.8%</td>
<td>5.9%</td>
<td>12.0%</td>
<td>NA</td>
</tr>
</tbody>
</table>
LONGITUDINAL PATTERNS IN EPT TAXA RICHNESS, ARKANSAS RIVER, KANSAS

- GREAT BEND: n = 22
- HAVEN: n = 23
- WICHITA: n = 22
- ARKANSAS CITY: n = 19

Support for patterns varies across sites, with full support at HAVEN and non-support at ARKANSAS CITY.
LONGITUDINAL PATTERNS IN MACROINVERTEBRATE BIOTIC INDEX, KANSAS RIVER

UPSTREAM TO DOWNSTREAM

MBI

KANSAS CITY
DESGOTO
LECOMPTON
TOPEKA-B
TOPEKA-A
WAMEGO

n = 6
n = 7
n = 6
n = 5
n = 4
n = 3

n = 23
n = 19
n = 15
n = 13
n = 23

MBI score

Upstream

Downstream

Full support
Non-support

3 4 5 6 7 8

3 4 5 6 7 8

WAMEGO TOPEKA-A TOPEKA-B LECOMPTON DESOTO KANSAS CITY

n = 23 n = 13 n = 15 n = 23
LONGITUDINAL PATTERNS IN EPT TAXA RICHNESS,
SPRING RIVER (KANSAS AND MISSOURI)

EPT taxa

n = 10

n = 14

n = 24

WACO, MO

CRESTLINE

BAXTER SPRINGS

Upstream

Downstream

Full support

Non-support

LONGITUDINAL PATTERNS IN EPT TAXA RICHNESS,
SPRING RIVER (KANSAS AND MISSOURI)
DECLINE IN NATIVE MUSSEL ASSEMBLAGES

CUMULATIVE FREQUENCY DISTRIBUTION FOR SITES WITH MINIMUM THREE-YEAR PERIOD-OF-RECORD AND FIVE OR MORE SPECIES HISTORICALLY

EXTIRPATED MUSSEL SPECIES (%)

CUMULATIVE FREQUENCY (%)
BIOLOGICAL INTEGRITY CATEGORIES

(CONCEPTUAL FRAMEWORK)

Class A: Historical reference condition

Class B: Minimally disturbed reference condition

Class C: Fully supportive of designated aquatic life use

Class D: Partially supportive of designated aquatic life use

Class E: Non-supportive of designated aquatic life use

Class F: Grossly non-supportive of designated aquatic life use
MAJOR PERENNIAL STREAMS IN KANSAS
1961 VERSUS 2003
ACKNOWLEDGEMENTS

- Mike Butler
- Ed Carney
- Steve Cringan
- Jim Fry
- Clint Goodrich
- Steve Haslouer
- Eva Hays
- Layne Knight
- Liz Smith
- Tony Stahl
- Tom Stiles
- Craig Thompson
- Jeff Vogel
- Shawn Weber