Illinois Nutrient Science Advisory Committee

Dr. Candice Bauer
Section Chief
NPDES Branch
USEPA Region 5
Chicago, IL
312-353-2106
Bauer.candice@epa.gov

Clean Water Action Plan:
Restoring and Protecting America's Waters
Ambient Water Quality Criteria Recommendations

Information Supporting the Development of State and Tribal Nutrient Criteria

Rivers and Streams in Nutrient Ecoregion VI

54. Central Corn Belt Plains

Ambient Water Quality Criteria Recommendations

Information Supporting the Development of State and Tribal Nutrient Criteria

Rivers and Streams in Nutrient Ecoregion IX

72. Interior River Lowland
# NUTRIENT ECOREGIONS IN ILLINOIS

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Ecoregion 54</th>
<th>Ecoregion 52</th>
<th>Ecoregion 53</th>
<th>Ecoregion 72</th>
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<tr>
<td>Cent Corn Belt</td>
<td></td>
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<tr>
<td>Driftless Area</td>
<td>72.5</td>
<td>70</td>
<td>80</td>
<td>83</td>
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<td>SEWI Till Plain</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Intr Rv Lowland</td>
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<tr>
<td>Miss Aluvl Plain</td>
<td></td>
<td></td>
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<tr>
<td>TP (ug/L)</td>
<td>0.663</td>
<td>0.15</td>
<td>0.65</td>
<td>0.539</td>
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<tr>
<td>TKN (mg/L)</td>
<td>1.798</td>
<td>1.73</td>
<td>0.94</td>
<td>0.215</td>
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<td>NO2+NO3 (mg/L)</td>
<td>2.95</td>
<td>1.51</td>
<td>1.3</td>
<td>1.669</td>
<td>0.71</td>
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</table>

TN (reported, mg/L)
A Review of Stream Nutrient Criteria Development in the United States
M. A. Evans-White, * B. E. Haggard, and J. T. Scott

Table 5. Benthic macroinvertebrate total nitrogen and total phosphorus criteria determined by various statistical analyses.

<table>
<thead>
<tr>
<th>Dependent variable</th>
<th>Criteria estimation method†</th>
<th>TN$ estimated criteria</th>
<th>TP§ estimated criteria</th>
<th>Citation</th>
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<td>Percentage of EPT Individuals</td>
<td>regression tree</td>
<td>1.68 mg L$^{-1}$</td>
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<td>Wang et al, 2007</td>
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<td>Percentage of EPT taxa</td>
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<td>Wang et al, 2007</td>
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<td>Hilsenhoff Biotic Index</td>
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<td>1.14</td>
<td>0.09</td>
<td>Wang et al, 2007</td>
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<td>Taxa richness</td>
<td>regression tree</td>
<td>0.87</td>
<td>0.04</td>
<td>Wang et al, 2007</td>
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<td>Percentage of EPT$\dagger$ Individuals</td>
<td>2DKS</td>
<td>0.98</td>
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<td>Wang et al, 2007</td>
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<td>Percentage of EPT taxa</td>
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<td>Wang et al, 2007</td>
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<tr>
<td>Hilsenhoff Biotic Index</td>
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<td>Taxa richness</td>
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<td>Taxa richness</td>
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<td>0.15</td>
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<td>Mean pollution tolerance value</td>
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<td>0.06</td>
<td>Weigel and Robertson, 2007</td>
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<td>Taxa richness</td>
<td>nCPA</td>
<td>1.04</td>
<td>0.05</td>
<td>Evans-White et al, 2009</td>
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<tr>
<td>Primary consumer richness</td>
<td>nCPA</td>
<td>1.14</td>
<td>0.05</td>
<td>Evans-White et al, 2009</td>
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<tr>
<td>Gathering consumer richness</td>
<td>nCPA</td>
<td>0.93</td>
<td>0.06</td>
<td>Evans-White et al, 2009</td>
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<td>Scraping consumer richness</td>
<td>nCPA</td>
<td>NS</td>
<td>0.05</td>
<td>Evans-White et al, 2009</td>
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<td>Shredding consumer richness</td>
<td>nCPA</td>
<td>NS</td>
<td>0.05</td>
<td>Evans-White et al, 2009</td>
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</table>

† 2DKS, two-dimensional Kolmogrov Smimov test; nCPA, nonparametric changepoint analysis.
+ Total nitrogen.
§ Total phosphorus.
\dagger Ephemeroptera, Trichoptera, and Plecoptera.
Fig 9.1 Implementation of the Illinois NLRS

**Illinois Nutrient Loads**

- New funding sources?
- Enabling legislation?
- BMP implementation

1. Priority watersheds
2. Practices
3. Numeric nutrient criteria

4. Monitoring
5. Public reporting
6. Adjust strategy

**Responsible party:**

1. Policy Working Group and Illinois EPA
3. Nutrient Science Advisory Committee
4. Nutrient Monitoring Council
5. Public reporting—Illinois EPA and IDOA
   - Biennial meeting
   - Biennial report
6. Adjust strategy/adaptive management—based on annual reports, determined by Policy Working Group
Nutrient Science Advisory Committee
Committee Charge

- Determine the numeric criteria for nutrients most appropriate for Illinois waterbodies based on the best science available.
- Consider whether standard should be statewide or watershed specific.
Convened November 2015

- Monthly teleconferences; ~ 10 to date
- Quarterly face-to-face meetings; ~ 4 to date (next week)

Dr. Walter Hill resigned from the committee

- New member: Dr. Chris Peterson (Aquatic Ecologist) Loyola University Chicago

- 18-24 month timeframe; expected to conclude work early 2018.

- Summary of activities and meetings available on the NLRS website.
Based upon Environmental Risk Assessment principles

1. Planning / Problem Formulation
   ✓ Develop conceptual model(s) of biological response to potential stressors
     - initial model developed, refinement in process

2. Analysis
   ✓ Effort to identify and evaluate potential data sets to use in updated
     stressor-response analysis. (solicited suggestions and hosted webinar)

     were most appropriate for the initial analyses, but several watershed- or
     regionally-based data sets can be valuable for watershed or site-specific
     standards.

   ✓ Many questions / clarifications / implications of data set characteristics
     have been and continue to be evaluated.
2. Analysis (continued)
   ✓ US EPA has provided funding and a contract with Tetra Tech, Inc. to provide an updated analysis of Illinois EPA data. This is a considerable iterative and ongoing discussion and analysis effort.

3. Synthesis / Characterization
   ✓ Refine and evaluate candidate criteria
   ✓ Evaluate uncertainties
   ✓ Consider combined criterion approaches (seasonal, response variables, multiple stressors)
   ✓ Ensure all uses are considered and consistent with the CWA and State regulations

4. Report – Candidate standards and supporting data, methodology, and analyses.
Fig 9.1 Implementation of the Illinois NLRS

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NMC Charges (Revised 10/26/15)

1. Coordinate the development and implementation of monitoring activities (e.g., collection, analysis, assessment) that provide the information necessary to:

   a. Generate estimations of 5-year running average loads of Nitrate-Nitrogen and Total Phosphorus leaving the state of Illinois compared to 1980-1996 baseline conditions; and

   b. Generate estimations of Nitrate-Nitrogen and Total Phosphorus loads leaving selected NLRS identified priority watersheds compared to 1997-2011 baseline conditions; and

   c. Identify Statewide and NLRS priority watershed trends in loading over time using NMC developed evaluation criteria.

2. Document local water quality outcomes in selected NLRS identified priority watersheds, or smaller watersheds nested within, where future nutrient reduction efforts are being implemented (e.g., increase in fish or aquatic invertebrate population counts or diversity, fewer documented water quality standards violations, fewer algal blooms or offensive conditions, decline in nutrient concentrations in groundwater).

3. Develop a prioritized list of nutrient monitoring activities and associated funding needed to accomplish the charges/goals in (1) and (2) above.
Basins cover almost 75% of the land area in the State.
But what about:

- generating loading estimates and loading trends for some or all 18 priority watersheds?
- trying to show local water quality improvements (outcomes)?
Total P and Nitrate Export from Illinois Rivers: 1980-2015 Update

Mark B. David, Gregory F. McLsaac and Corey A. Mitchell
University of Illinois
Prepared for the Illinois Nutrient Monitoring Council, Gregg Good, IL EPA Chair
August 30, 2016
Background

- Eight major rivers used to estimate Illinois export of nitrate and total P
  - Rock, Green, Illinois, Kaskaskia, Big Muddy, Little Wabash, Embarras, Vermilion
- Previously estimated through 2011
  - Added 2012 to 2015 water years
  - Same methodology (interpolation for nitrate, WRTDS* for total P)
- Examined trends in water, nitrate, and total P
  - Compared to 1980-1996 baseline period

*Note: For total P calculated with WRTDS, the greatest uncertainty about loads and concentrations is at the end of the record, so that future estimates for the 2011-2015 period could change when additional data become available.
Summary

- total P losses have increased
  - not clear why, although changes in flow and point source P discharges appear to be important factors
- nitrate losses are decreasing
  - likely due to improved agricultural N balances
- 5-year averages seem appropriate for evaluating how we are doing
- continue annual load and trend analysis
UPDATES ON ILNRS

- Illinois Nutrient Loss Reduction Strategy Website