

# 2002 USEPA Nutrient Criteria

*Draft Aggregations of Level III Ecoregions  
for the National Nutrient Strategy*



# Plan: Working Hypothesis

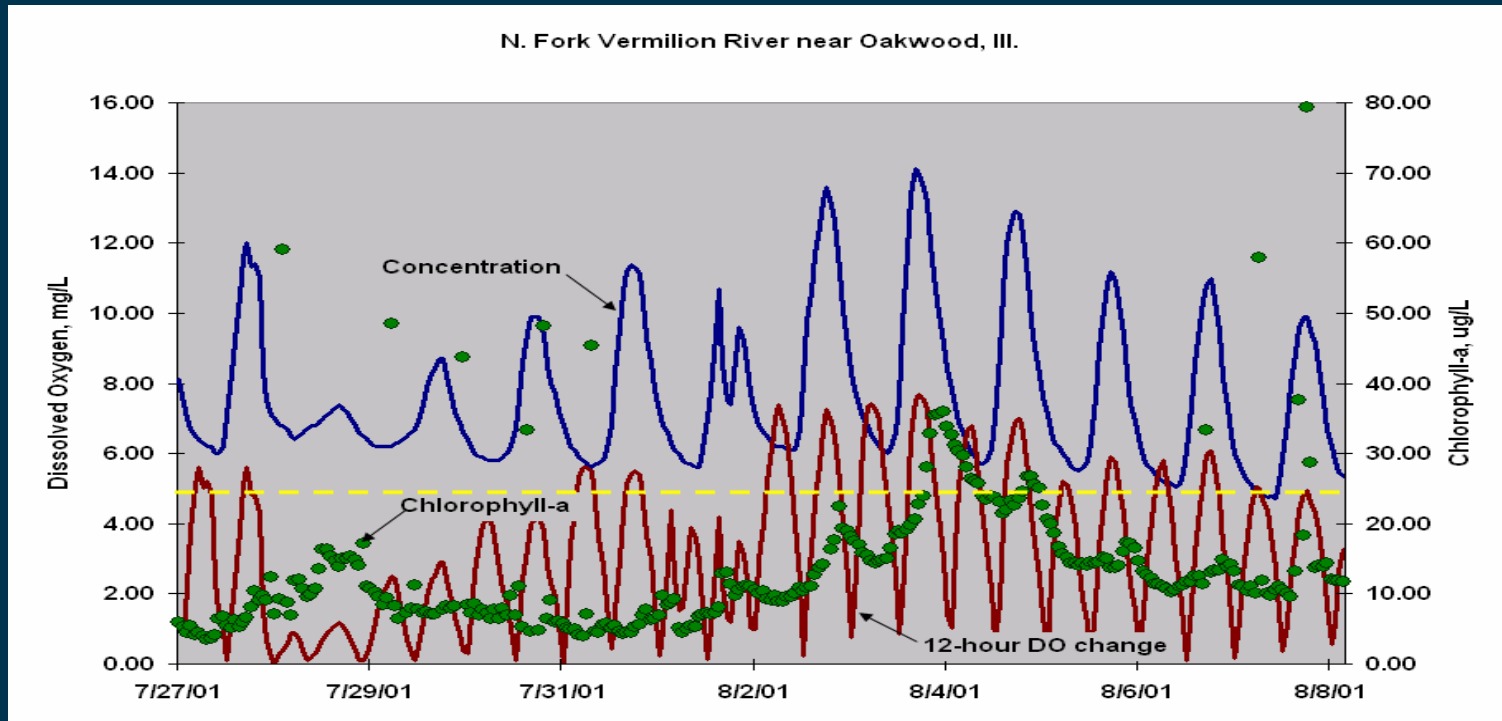
## Cause-Effect Relationships

Nutrients

Algae / Plants

Dissolved Oxygen

Fish / Bugs



# Workgroups

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**Illinois Nutrient Standards Workgroup**

**Illinois Nutrient Standards Science Committee**

**USEPA Regional Technical Assistance Group**

# Research

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## Council on Food and Agricultural Research (C-FAR)

- **University of Illinois**
  - **Illinois State Water Survey**
  - **Illinois State University**
  - **Illinois Natural History Survey**
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- *Effects of Phosphorus Mediated through Algal Biomass in Illinois Streams*
- *Spatial and Temporal Relationships among Nutrients, Dissolved Oxygen, and the Biotic Integrity of Illinois Streams*
- *Controls on Dissolved Reactive Phosphorus and Particulate Phosphorus in Illinois Streams*
- *Seasonal Dynamics of Nutrients, Algae, and Dissolved Oxygen in Agriculturally Dominate Headwater Streams*
- *Establishing the Causes and Thresholds of Nutrient Impairment in Agriculturally Intensive Illinois Watersheds in Support of Nutrient Criteria and TMDL Development*

# Monitoring

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**Before / After Studies at several treatment facilities implementing phosphorus removal technologies**

## **Measurements of:**

- **Water chemistry**
- **Aquatic biology**
- **Algae and plant biomass**
- **Sediment chemistry**
- **Habitat characteristics**
- **Diurnal dissolved oxygen**

# Monitoring (cont)

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## Continuous Monitoring Studies

(dissolved oxygen, pH, temperature, specific conductance)

### **8 sites across the state, 2001-03 (w/USGS)**

- Range of water-quality, latitude, land-use

### **IEPA, at Intensive Basin Survey Sites**

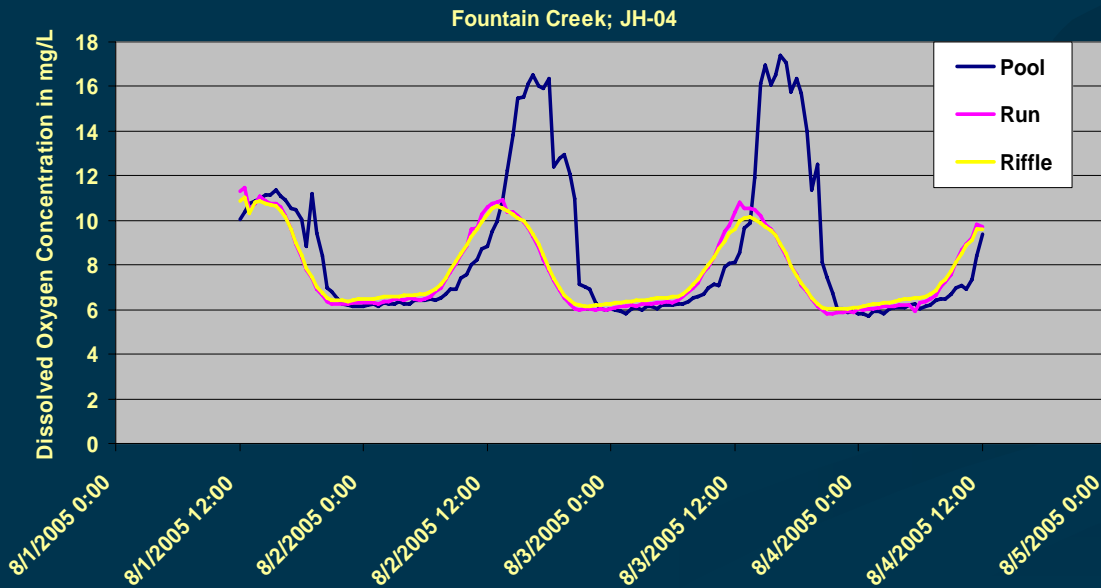
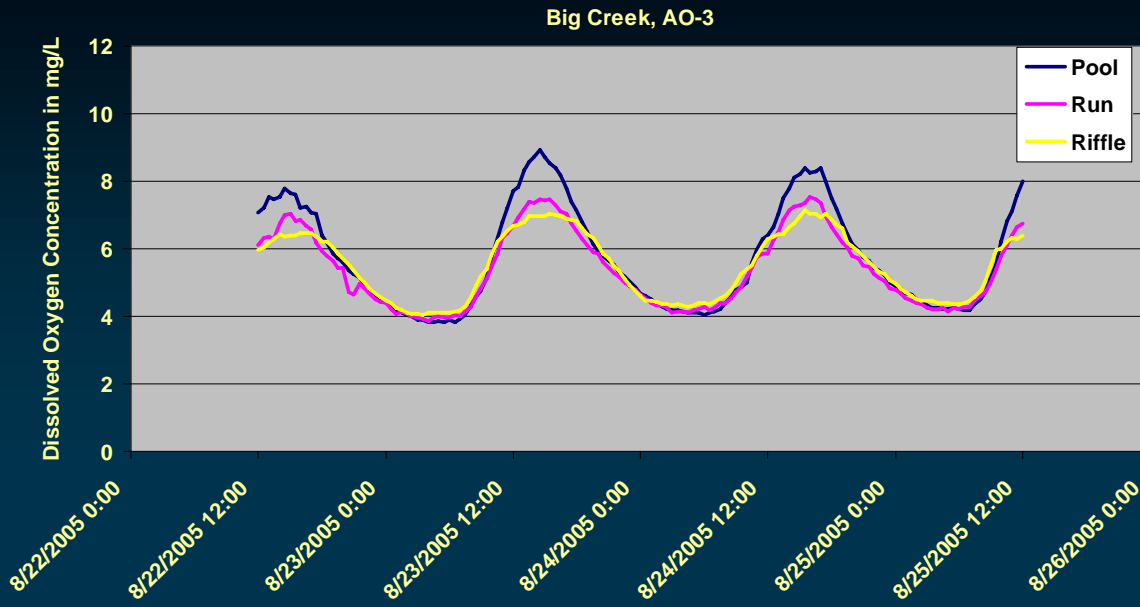
- 2004 -15 sites (72-hour period)
- 2005 - 24 sites throughout Illinois (Riffle / Run / Pool segments)
- 2006 - 35 sites throughout Illinois - (two 7-day periods)
- 2007 - 40 sites throughout Illinois - (two 7-day periods)

# Monitoring (cont.)

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## Algae

- **Sestonic Chlorophyll-a at 32 AWQMN sites beginning in 1999**
- **Periphyton (and sestonic)**
  - ✓ 9 IBS sites in 2006
  - ✓ 30 IBS sites in 2007



D.A. = 119 sq. mi.  
 Velocity = 40 cm/s  
 Depth = 0.32 m  
 Shading = 23%  
 Chl-a peri. = 15.5 mg/m3  
 Chl-a phyto. = 9.89 ug/L  
 TN = 1.57 mg/L  
 TP = 0.17 mg/L  
 Substrate = silt/clay  
 Temperature = 20.5 C  
 Biological Metrics (habitat, invertebrates, fish)

# Data Analysis

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- Problems with ambient monitoring nutrient data 1999-2004.
  - Recent and ongoing evaluation of data and application
  - Recent (2005-06) data now becoming available.
- Available biological data; 2000-06.
- Historical lack of historical periphyton data  
(recent data collected 2004-07)
- Increasing database of continuous monitoring data
- Assistance from USEPA / N-STEPS with analyses found to be useful in other states  
(Nutrient Scientific Technical Exchange Partnership and Support)

# Observations

- Complexity of relationships among nutrients, algae, oxygen, biological communities and physical habitat confounds analyses.
- Periphyton and macroalage found to be important in small streams, where present, whereas phytoplankton more important in larger rivers.
- Nutrients generally do not limit algal biomass in Illinois Streams.
- Light availability and substrate composition are at least as influential on algal communities as nutrient concentrations.
- Relationships difficult to establish because Illinois lacks a wide range of conditions

# Plan: Timeline

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**Winter 2003** – State Plan submitted to USEPA (agreed to)

**2003-07** – Research, Monitoring, Data evaluation, Discussions

**Spring 2008** – Prepare petition for nutrient standards for the IPCB

**Fall 2008** – File IPCB petition

**Spring 2009** – Prepare implementation rules for nutrient standards

**Fall 2009** – IPCB adopts nutrient standards

 **1-year extension of original timeline**

# National Status

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- Most Region 5 states (and most states across the nation) are in the final stages of data collection and in the process of data analysis
- Most states opted (at least initially) to look for cause-effect relationships
- Only a few states have completed standards for entire classes of waters (4-5 for streams/river and 4-5 for lakes/reservoirs)

# Regional Status

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## Michigan and Ohio

- Correlative relationships between nutrients and biological communities
- Change point or threshold analyses

## Indiana

- Looking for cause-effect relations
- No strong and consistent relations found yet, considering additional and alternative analyses

## Wisconsin and Minnesota

- Examining relations among nutrients and biology, assess which are most important

# Regional Status

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## Minnesota Lakes

Multiple lines of evidence approach:

- User perception surveys
- Historical reconstruction using coring and diatom analyses
- Percentile approach (75% of reference waters concentrations, 25% all waters concentrations)

# Nutrient Standards: Potential Options

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- **Specific to water body, water-body type or designated use**
- **Seasonal or temporal standard**
  - warm weather only? Biologically sensitive periods?
- **Trigger feature for P standard**
  - Applicable to water bodies without reasonable potential for eutrophication based upon habitat and/or physical features and historical data.
  - Chlorophyll standard to act as trigger
  - Upstream sources and downstream destinations considered
- **Adopt USEPA criteria, or have it promulgated**

# Nutrient Standards: Potential Options

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## ➤ **Conditional standard**

If habitat, substrate, turbidity, light availability, dissolved oxygen and other influential variables are conducive to or indicative of problematic algal growth, then a standard would be put in place, which could have point-source permits and non-point source best management practice implications.

## ➤ **Do not adopt a standard and focus on permits and BMPs**

## ➤ **Establish “reference” conditions for different types and sizes of water bodies**

## ➤ **Watershed loading based standard**

- considers both point- and non-point loading

- Achievability through treatment technology and BMPs

# **Illinois Nutrient Standards Workgroup**

November 6, 2007 @10:00 a.m.

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