ILLINOIS ACTIVITIES TO ADDRESS NUTRIENTS

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Scope of Water Quality Impacts

• Public Water Supplies (nitrate)
  - 83 miles not supporting
  - 3 lakes not supporting
  - 8% of community water supplies have elevated nitrate

• Aquatic Life
  - Phosphorus a contributing cause in 35% of impaired stream miles
Scope of Water Quality Impacts, Cont’d

- Of lake acres impaired for aesthetic use
  - 82% impaired in part by total P
  - 81% impaired in part by aquatic algae
- 30 River/Stream segments impaired in part by aquatic algae
- Illinois is one of the largest contributors of nutrients to the Gulf of Mexico
  - 15 - 19% of total N load
  - 10 – 13% of total P load
## Sources Contributing to Gulf

<table>
<thead>
<tr>
<th></th>
<th>Nitrogen Load</th>
<th>Phosphorus Load</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sewage effluent</td>
<td>16%</td>
<td>47%</td>
</tr>
<tr>
<td>Non-point (primarily agriculture)</td>
<td>84%</td>
<td>53%</td>
</tr>
<tr>
<td>Urban stormwater</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>important, not well quantified</td>
<td></td>
</tr>
</tbody>
</table>
Numeric Nutrient Criteria

- P standards 0.05 mg/L for lakes greater than 20 acres (aquatic life)
- Nitrate standard 10mg/L for public water supplies
- Continuing to work on identifying NNC for flowing waters (aquatic life)
- Exploring a protective standard for low P streams/rivers
Activities Focused on Point Sources

• Phosphorus Effluent Standard – 1 mg/L P for new/expanded discharges
• Anti-degradation – required evaluation has resulted in P and/or N limits
• TMDLs for nitrate and P – WLA has resulted in permit limits
Activities Focused on Point Sources Cont’d

• USEPA letter to limit nutrients to address narrative standard – only approach under existing regulations is TMDLs – considering revised narrative

• Considering technology-based requirement triggered by impairments or facility upgrade.
Major Municipal Facilities

- 168 Without Phosphorus Limits
- 46 With Phosphorus Limits

Legend:
- Blue: With Phosphorus Limits
- Red: Without Phosphorus Limits
All Facilities with Nutrient Limits

- Phosphorus only: 64
- Nitrogen & Phosphorus: 11
Types of Facilities with Limits

- Major Munis w/P Limits Only: 39
- Minor Munis w/P Limits Only: 22
- Industrial w/P Limits Only: 7
- Minor Munis w/N&P Limits: 4
- Major Munis w/N&P Limits: 4

Legend:
- Blue: Major Munis w/P Limits Only
- Red: Minor Munis w/P Limits Only
- Green: Industrial w/P Limits Only
- Purple: Minor Munis w/N&P Limits
- Teal: Major Munis w/N&P Limits
POTENTIAL NUTRIENT RULEMAKING

- Establish revised narrative
- Establish technology-based phosphorus standard
- Establish protection for low P streams
NUTRIENT WORKGROUPS

#1 – Language of narrative
#2 – Tech-based standard
#3 – Determining “significant contribution”
#4 – Low P streams
Potential Updates to the Illinois Narrative WQS
Existing Narrative WQS – “Offensive Conditions”

- Algae and aquatic plant growth of unnatural origin is prohibited
- The regulation was changed in 1990 striking aquatic life use protection language
- Regulation contains no hint as to what is unnatural
Potential Updates to the Narrative

• The presence of algae or aquatic plants in a water body will be considered an offensive condition with regard to aquatic life use, and could be termed cultural eutrophication, when in any 24 hour period, both of the following conditions occur:
  – the dissolved oxygen water quality standard of Section 302.206(b)(1)(A), 302.206(b)(2)(A), 302.206(c)(1)(A) or 302.206(c)(2)(A) is not achieved, and,
  – dissolved oxygen exceeds 100% saturation.
The Dissolved Oxygen Signature of Excess Algae/Aquatic Plants

• Using this pattern of algae impact as the guiding principle of determining when too much phosphorus is present has advantages:
  – Grounded in the DO WQS
  – Easily measured
  – Directly in the cause/effect chain

• Excess Phosphorus ➡ Excess Algae ➡ Low DO = Eutrophication
Workgroup #2 – Technology-Based Standards for Phosphorus

- Triggered when:
  - Cultural eutrophication exists
  - Major upgrade occurs

- Illinois Association of Wastewater Agencies (IAWA) conducted a study to define reasonable, cost-effective performance level for phosphorus nitrogen
Workgroup #2 – Technology-Based Standards for Phosphorus

- Initial recommendation on P effluent standard:
  New construction – 1 mg/L
  Retrofit – 1.5 mg/L
Why Technology-Based Standards?

• No clear cause-effect relationship allowing numeric WQS
  – Other factors drive algae/plant growth in IL streams
• Technology-based limits are proactive
• Technology-based limits get directly to what can be done to reduce phosphorus
  – Regulating ~10% of facilities addresses ~90% of P
• Technology-based limits allow financial planning
• Unmanageable WQBELs are avoided
45% of P in IL streams is from point sources
55% of P in IL streams is from non-point sources
   – Dr. Mark David, U of IL
90% of point source flow will be covered under technology limits
   – If average reduction is from 3.5 mg/L to 1.0 mg/L P

Then ~ 64% of the point source P is removed
Therefore, ~29% of total stream P is removed
Phosphorus Modeling

• Nutrient Workgroup #3 met on February 22, 2012
• The purpose of this group was to determine which point sources of phosphorus are significant to downstream algae or aquatic plant impairment
Phosphorus Modeling (Cont’d)

– Phosphorus modeling possibly could show which discharges need a P limit
– This would help Illinois EPA with the current mandate to regulate P based on the existing narrative standard and help with the drafting of the future regulations for dischargers upstream of waters determined to be culturally eutrophic
Phosphorus Modeling (Cont’d)

• Good discussion occurred on this subject
• It was postulated that P modeling would be difficult
• A criterion, probably an arbitrary one, would be needed in conjunction with modeling to “draw a line in the sand” and determine what is a significant P contribution
• Using the current cut-off of facilities 1 MGD or larger to regulate P at all such sources upstream of algae/plant impaired waters was suggested
Phosphorus Modeling (Cont’d)

• The suggestion to simply regulate P at 1 mg/L at facilities 1 MGD or larger gained some (but probably not complete) consensus

• Illinois EPA will prepare a protocol based on this idea that will include a summary of how this approach would affect P point source discharges and overall P loading to an example watershed – the Upper Des Plaines River.
Illinois Priority Watersheds to Reduce Nutrient Loss

<table>
<thead>
<tr>
<th>Watershed</th>
<th>Target Nutrient</th>
</tr>
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<tbody>
<tr>
<td>Lake</td>
<td>Total Phosphorus</td>
</tr>
<tr>
<td>Bloomington</td>
<td>Nitrate</td>
</tr>
<tr>
<td>Lake Vermilion</td>
<td>Total Phosphorus</td>
</tr>
<tr>
<td>Lake Decatur</td>
<td>Nitrate</td>
</tr>
<tr>
<td>Vermilion River (Illinois Basin)</td>
<td>Nitrate</td>
</tr>
<tr>
<td>Salt Fork</td>
<td>Nitrate</td>
</tr>
<tr>
<td>Vermilion River (Wabash Basin)</td>
<td>Nitrate</td>
</tr>
<tr>
<td>Lake Mauvaise Terre</td>
<td>Total Phosphorus</td>
</tr>
<tr>
<td></td>
<td>Nitrate</td>
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</tbody>
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