

Coming Soon to a Permit Near You . . .

The Next Generation of Nutrient Management

Nutrients – Are Technology Controls the Solution?



Today's Speakers

- Barbra Biggs
Government Affairs Officer, Metro Wastewater Reclamation District, CO
- Jon Devine
Senior Attorney, Natural Resources Defense Council
- Nathan Gardner-Andrews
General Counsel, National Association of Clean Water Agencies
- Mike Tate
Chief, Bureau of Water, Kansas Department of Health and Environment

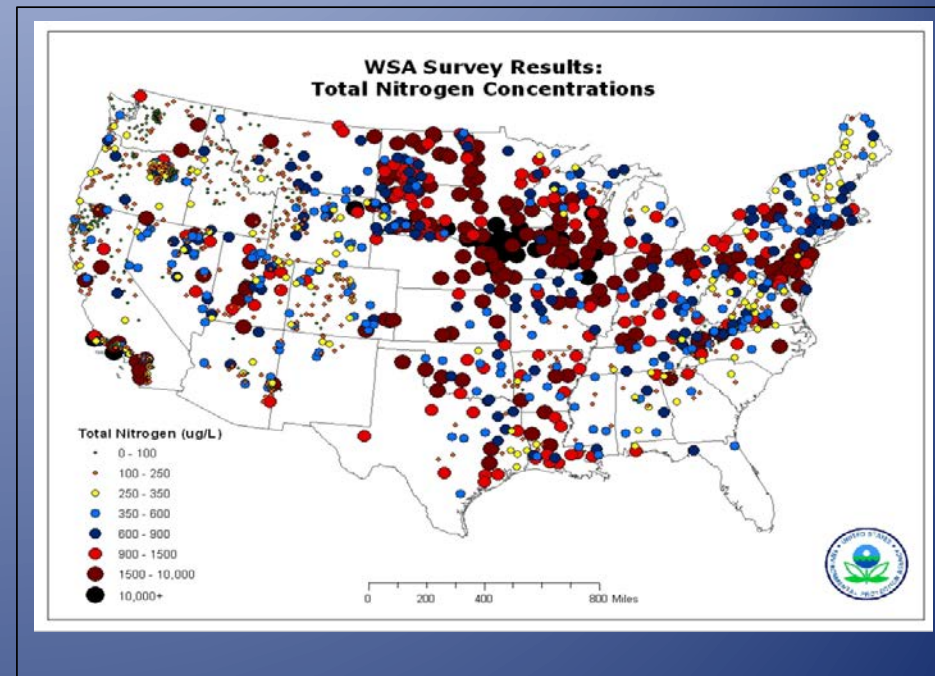
Nutrient Control by Wastewater Treatment Plants

Jon Devine

Natural Resources Defense Council

Nitrogen & Phosphorus Pollution is a Major Problem Nationwide

- EPA: “Nutrient pollution is one of America's most widespread, costly and challenging environmental problems, and is caused by excess nitrogen and phosphorus in the air and water.”



Nitrogen & Phosphorus Pollution Have a Number of Adverse Effects



Nutrients contribute to a host of water quality problems, including:

- Causing an overabundance of algal growth and resulting low oxygen levels;
- Nitrate toxicity to infants; Diminishment of aquatic community structure and function; and
- Harmful – even toxic – algal blooms.

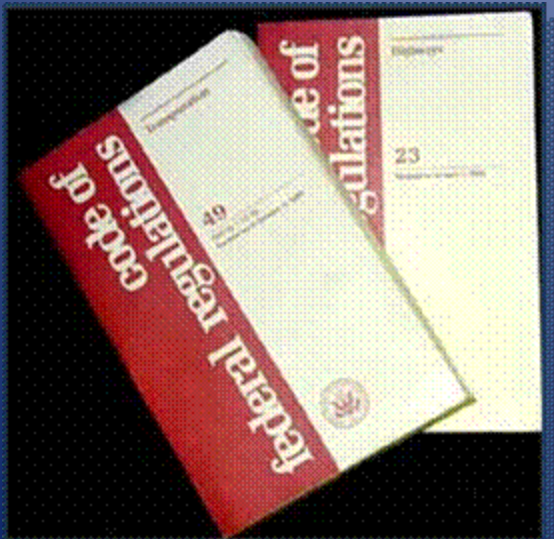
Wastewater Treatment Adds Nitrogen and Phosphorus to Our Waters

Sewage treatment plants are important contributors to loadings of nitrogen and phosphorus pollution.

According to EPA's cleanup blueprint for the Chesapeake Bay, "[i]n 2009 municipal wastewater treatment facilities contributed an estimated 17 percent of the total nitrogen and 16 percent of the total phosphorus loads delivered to Chesapeake Bay."



Clean Water Act Requires POTWs to Meet “Secondary Treatment” & EPA to Define It



• CWA § 304(d)(1): By Dec. 1972 *“and from time to time thereafter”* EPA must publish “information, in terms of amounts of constituents and chemical, physical, and biological characteristics of pollutants, on the degree of effluent reduction attainable through the application of secondary treatment.”

• CWA § 301(b)(1)(B): POTWs must achieve pollution limits “based upon secondary treatment as defined by the Administrator”

EPA Hasn't Materially Updated Secondary Treatment Rule Since 1985

- The rules today are narrower than originally – they apply to suspended solids, BOD, and pH now, reflecting elimination of fecal coliform limits and narrowing of pH requirements
- Ironically, during the development of the CWA in 1972, the Public Works Committee stated that “secondary treatment” was to be viewed in “its broadest context,” not limited to suspended solids & BOD.



EPA Has Rejected Prior Attempts to Address Nutrients from POTWs



“Amendments to the regulations might be warranted if [nitrogenous oxygen demand] from POTWs posed a significant threat to waters of the United States.”

- EPA argued that case-by-case approach to controlling nutrients based on water quality was appropriate.
- EPA did not claim that controlling nutrients is prohibited by CWA.

“The Petition does not offer any indication of the inadequacy of water quality based permitting...”.

Conservation Groups’ 2007 Petition

- Petitioners included NRDC, ELPC, Sierra Club, Waterkeeper Alliance, Missouri Coalition for the Environment, Midwest Environmental Advocates, Prairie Rivers Network, Iowa Environmental Council, Minnesota center for Environmental Advocacy, American Rivers & Gulf Restoration Network
- Argued that EPA was overdue in updating its published information on pollutant removal capacity of “secondary treatment” and that information should include ability to control nutrients.
- Also argued that “secondary treatment” regulation should be amended to reflect new EPA published information on nutrient control.

**BEFORE THE UNITED STATES ENVIRONMENTAL PROTECTION
AGENCY
OFFICE OF WATER
OFFICE OF WASTEWATER MANAGEMENT**

Petition for Rulemaking)
Under the Clean Water Act)
)
Secondary Treatment Standards for)
Nutrient Removal)
)

For the reasons discussed in detail below, the Natural Resources Defense Council, the Environmental Law and Policy Center of the Midwest, the Sierra Club, the Waterkeeper Alliance, the Missouri Coalition for the Environment, Midwest Environmental Advocates, the Prairie Rivers Network, the Iowa Environmental Council, the Minnesota Center for Environmental Advocacy, American Rivers, and the Gulf Restoration Network (“Petitioners”) hereby petition the Environmental Protection Agency (“EPA” or “the agency”) to promptly fulfill its obligation under the Clean Water Act to publish information on the state of effluent treatment technology for publicly owned treatment works (“POTWs”). In particular, Petitioners seek a statement from the agency that specifies the “degree of effluent reduction attainable” at the present time “through the application of secondary treatment” for nutrient pollution. 33 U.S.C. § 1314(d)(1). Separately, Petitioners request that EPA issue generally-applicable nitrogen and phosphorous removal requirements for wastewater treatment plants. Petitioners contend that limits of 0.3 mg/l total phosphorus (“TP”) and 3 mg/l total nitrogen (TN) are consistently attainable using current technology. In addition, limits of 1.0 milligrams per liter (mg/L) TP and 8.0 mg/L TN averaged yearly can be met with existing technology that uses only improved conventional biological treatment processes. Moreover, biological processes capable

NACWA Response to Secondary Treatment Petition

- Letters to EPA in February 2008, September 2009, and June 2010; multiple meetings with EPA staff
- Objection to legal and technical basis for petition as outlined by Petitioners – petition should be denied
- POTWs have made & will continue to make efforts to address nutrients, but requested changes to secondary treatment regs are illegal and inappropriate

Key Legal Objections

- Structure & legislative history of CWA make clear nutrient removal was not intended to be part of secondary treatment
 - Legislative History of 1972 CWA indicates Congressional understanding that nutrient removal was beyond secondary
 - 1981 CWA amendment removed requirement for advanced treatment beyond secondary at POTWs
- Petitioner's arguments on secondary treatment have previously been rejected by EPA and upheld by the courts
 - 10th Circuit Court of Appeal upheld EPA denial of similar petition & Petitioners this time present no new or different arguments

Key Technical Objections

- Petitioners misunderstand secondary treatment as defined by CWA & overstate ability of secondary treatment to address nutrients
 - Advanced/tertiary required to remove N & P
- “One Size Fits All” approach that requires costly upgrades w/out regard to local WQ need
- Fails to address non-point source issues
- Can lead to additional environmental consequences

NACWA Path Forward

- NACWA will continue discussions with EPA to ensure appropriate response to lawsuit and denial of petition
- NACWA Board has approved NACWA intervention in case to defend POTW perspective
- NACWA will continue to highlights clean water utility efforts on nutrients, but demand accountability from other sources

Questions?





Nutrient Reduction in Kansas: An Alternate Approach

National Association of Clean Water Agencies
June 20, 2012

Mike Tate, PE
Kansas Department of Health and Environment

*Our vision: healthy Kansans living in safe and sustainable environments
The state belongs to all of us - Kansas Don't Spoil It*



Kansas Nutrient Reduction Plan

- Concepts
 - Nutrient reduction in surface water is needed
 - Criteria problematic at this time – disproportionately affects point source
 - More time and study needed to develop
 - Establish cause/effect relationships through WRAPS/TMDLs
 - Manage reductions adaptively
 - Likely to delay water quality improvements
 - Arguments over the “right” numbers – as in Florida
 - NPS largely unregulated – criteria won’t change that
 - Still must find ways to implement reduction measures
 - Cooperative implementation pays more dividends than mandates
 - Protect downstream waters
 - Particularly Gulf of Mexico and Oklahoma reservoirs
 - Protect in-state waters
 - Particularly drinking water reservoirs

In a Nutshell

- Reduce TN/TP loads leaving KS border by 30%
- Target NPS TN/TP reductions
 - Equitable reduction for both sources
- Major NPDES – Biological Nutrient Removal
 - Annual Average of 1.5 mg/L TP / 8.0 mg/L TN
- Better target nonpoint source (NPS) funds
- Specific Nutrient Criteria derived through TMDL and/or WRAPS efforts

Why Major Point Sources?

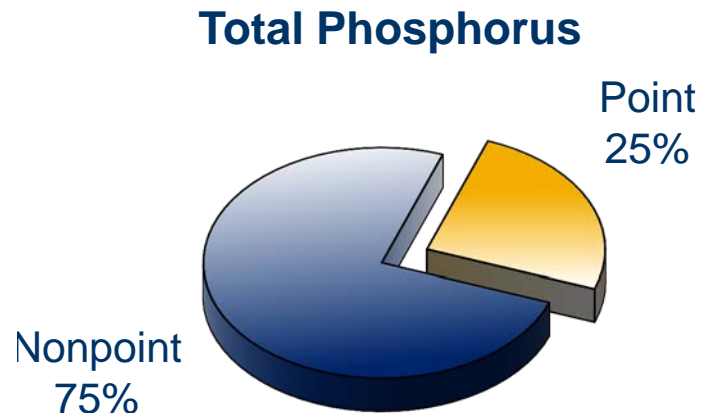
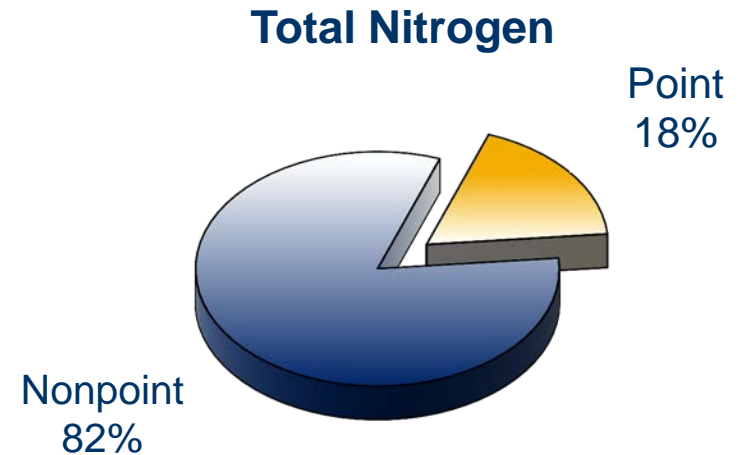
- Kansas has lots of land, relatively few people
 - Small rate base = higher rates
 - 51% of municipal WWTFs serve <500 people
 - 66% of municipal WWTFs serve <1,000 people
 - 85% of municipal WWTFs serve <5,000 people
 - The largest 10% of WWTFs treat 2/3 of flow
 - Lagoon systems are >70% of treatment infrastructure
- Treatment has an “economy of scale”
 - The smaller the population
 - The more expensive per person to treat
- Settled on major (>1 MGD) for technology-based trt.
 - More affordable and better able to operate

After Work Is Done, Lock In w/Criteria

- Indicators cited in narratives are achieved
- Ambient levels of nutrients have been reduced through management and treatment
- Numeric criteria may now be developed reflective of those new ambient levels
- Future activities are bound to maintain numeric criteria
 - WW NPDES
 - MS4 NPDES (municipal stormwater)
 - CAFO NPDES/State Permitted
 - NPS - WRAPS

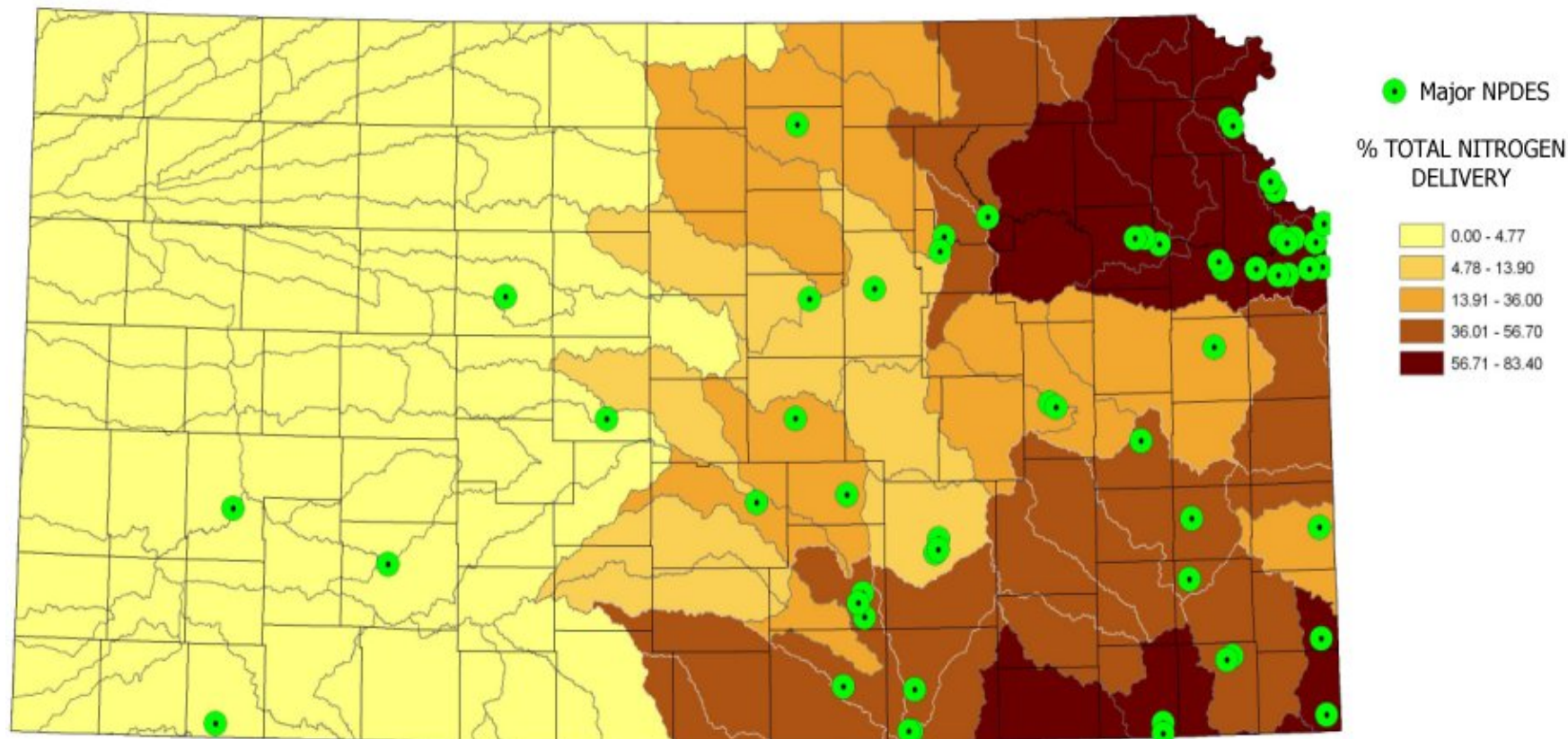
The PS/NPS Debate

- Nutrient “budget”
 - Looked at water exiting borders
 - Total Nitrogen
 - Total Phosphorus
 - Looked at WWTF effluent
 - PS Nitrogen
 - PS Phosphorus
 - Estimated NPS from other data
 - $\text{NPS Nitrogen} = \text{Total} - \text{PS}$
 - $\text{NPS Phosphorus} = \text{Total} - \text{PS}$



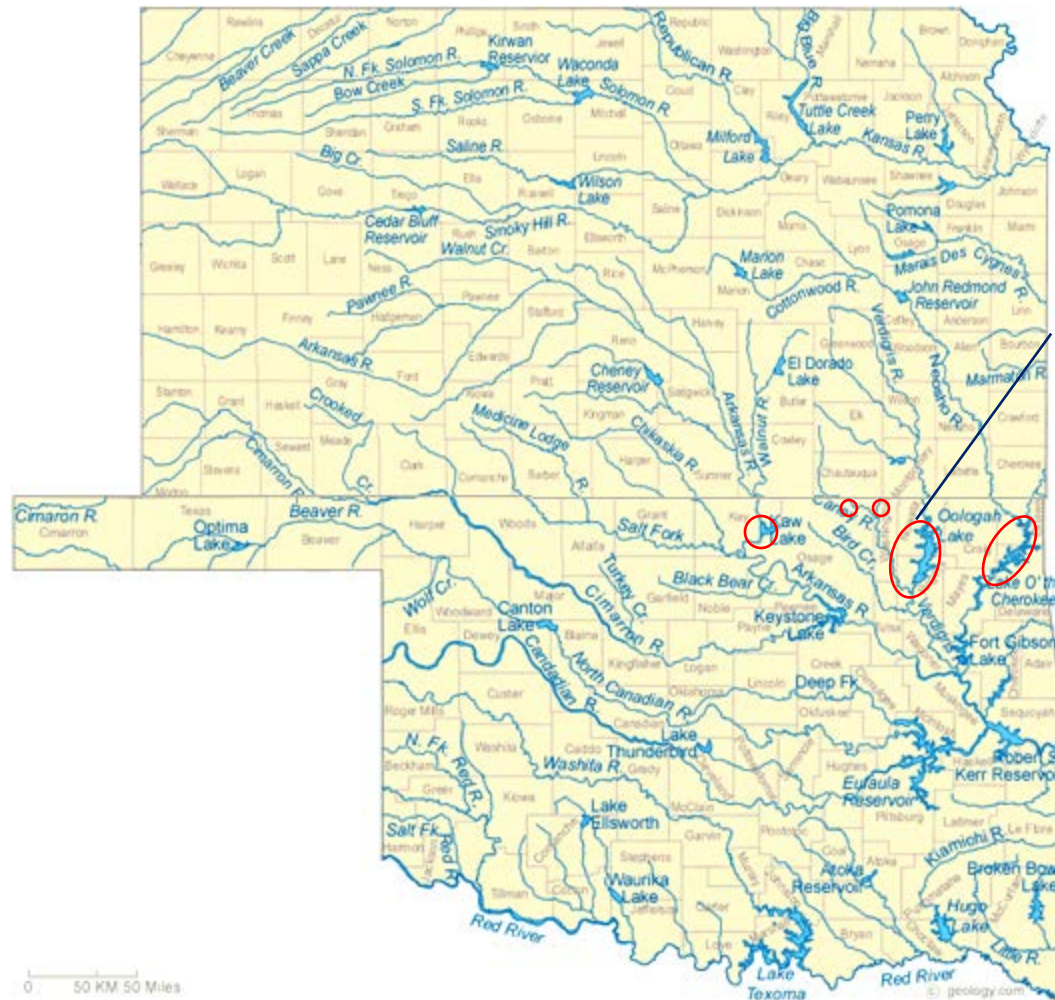
Gulf TN Transport/Large WWTFs

Percent Nitrogen Delivered to Gulf of Mexico by Hydrologic Unit Code



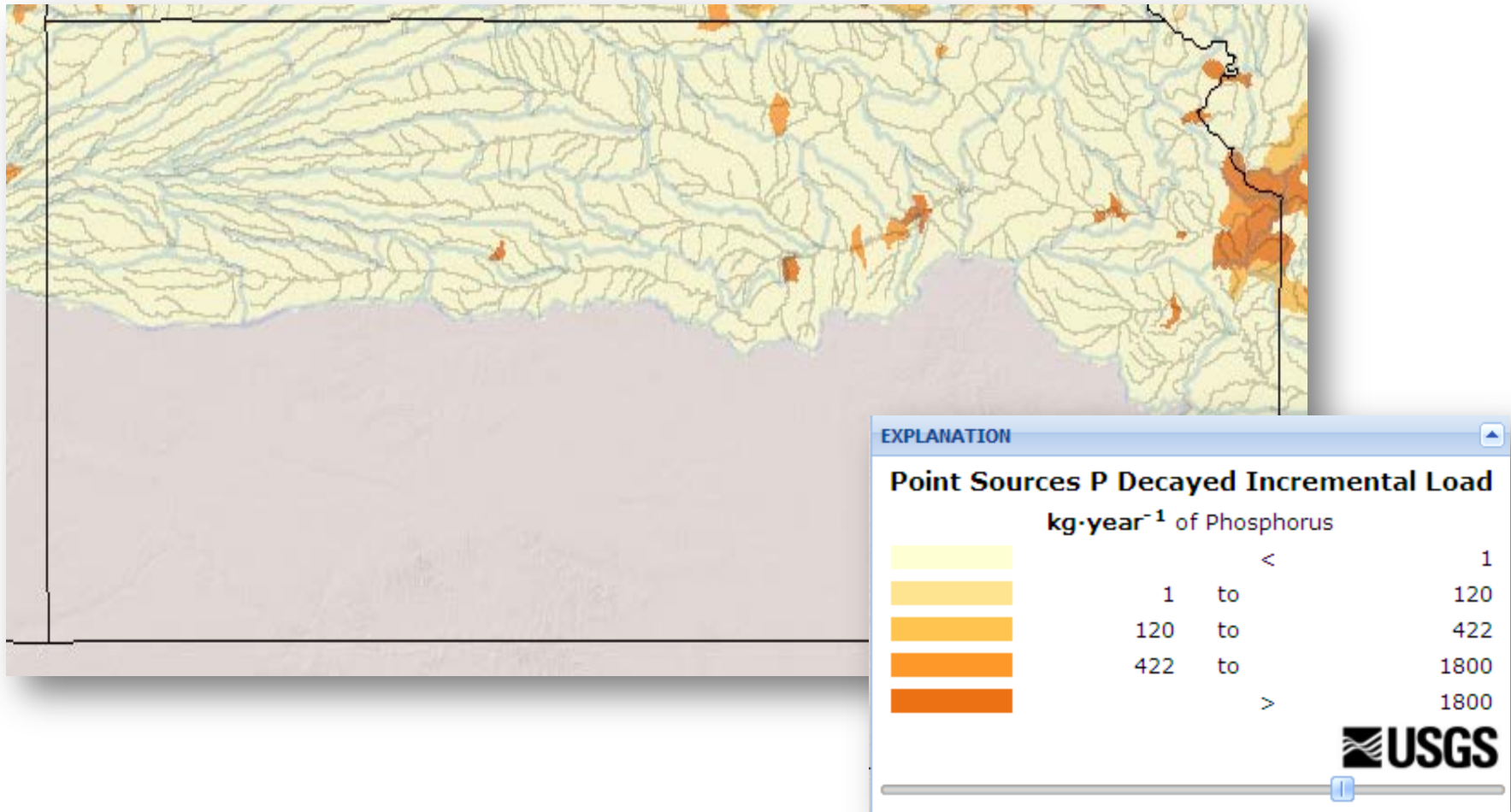
- Large = >1 MGD Design Flow (Approx. 10,000 Population)
- Large = 85% of Permitted Wastewater Flow in Kansas

Other Impacts – 5 Federal Res. in OK

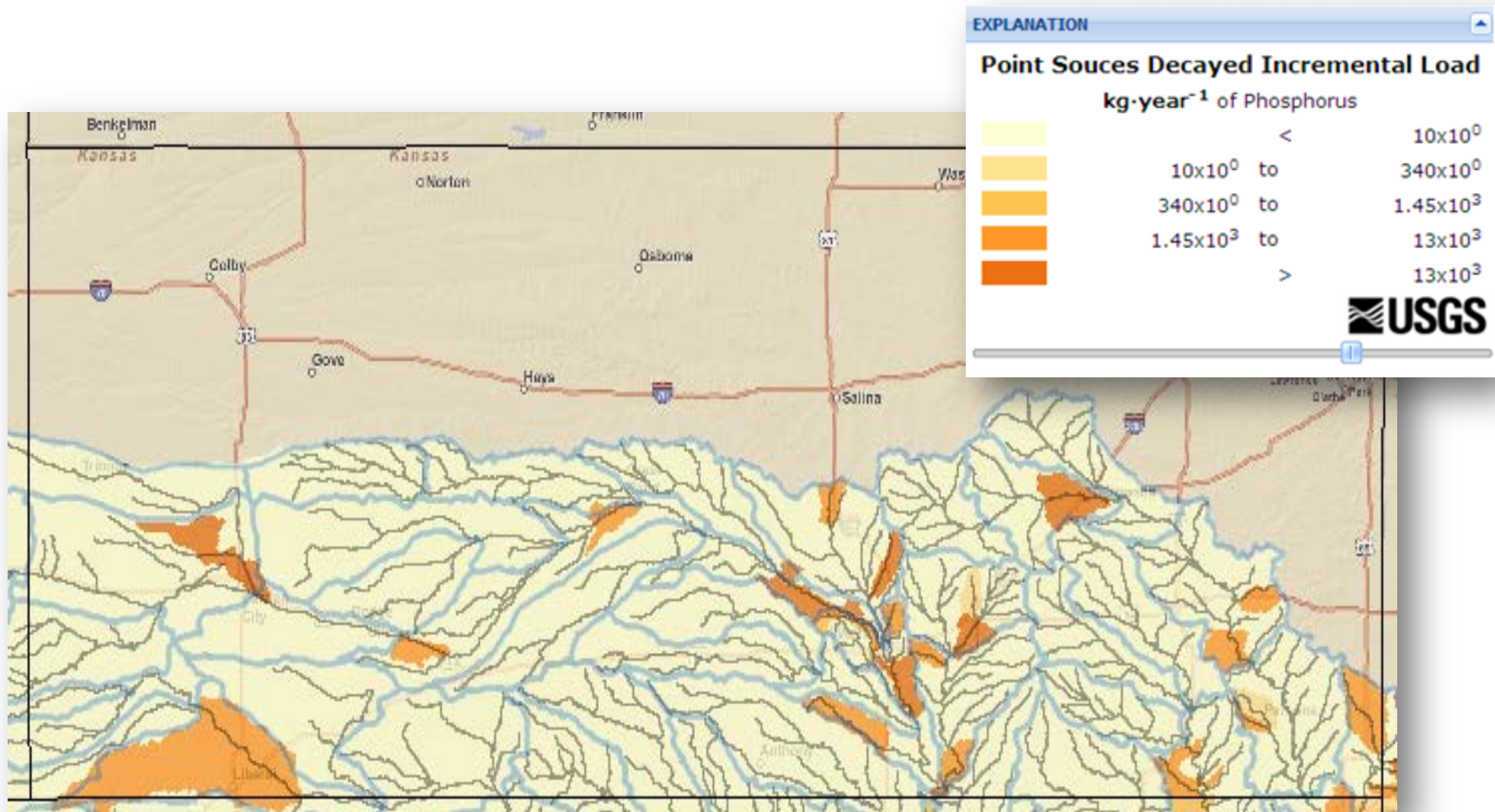


Oologah Lake - 50% of
Tulsa's Water Supply

2011 USGS Data – KS River Basin



2011 USGS Data – Ark River Basin



Point Source Community Support

- Good support
 - Initial skepticism on impact of point source
 - Gulf of Mexico studies showed PS at 3-5% of load
 - USGS SPARROW modeling began changing opinions
 - Much of KS has lower flow streams/PS is bigger impact
 - Realization nutrients need to be attacked
 - Being a player to ensure equitable PS treatment
 - Early involvement on a “professional to professional” basis
 - Helped define “BNR” levels
 - Strong support for annual averages
 - Allowance for building adaptively
 - BNR may be first step, so plan for potential expansion

KS Consultant Derived Capital Costs

| | \$ / gal | | |
|----------|---------------------------|---------------------------|---------------------------|
| | BNR TN 8/TP 1.5 | ENR TN 5/TP 0.5 | LOT TN 3/TP 0.3 |
| Average* | 4.28 | 5.50 | 6.08 |
| Median* | 3.80 | 4.83 | 4.86 |
| Minimum* | 0.11 | 0.12 | 0.97 |
| Maximum | 10.89 | 11.44 | 14.24 |

* \$0 costs excluded

How Are We Doing?

*Our vision: healthy Kansans living in safe and sustainable environments
The state belongs to all of us - Kansas Don't Spoil It*



BNR Scoreboard – Jan 2012

| | Built | Design | Study | Total |
|---|-------|--------|-------|-------|
| Nitrification <i>Ammonia</i> | 54 | 0 | 6 | 60 |
| De-Nitrification <i>Nitrate</i> | 43 | 1 | 16 | 60 |
| P-Reduction | 26 | 0 | 34 | 60 |

90% Nitrify now

72% Denitrify now or will soon

43% Reduce TP now or will soon

Avg. Cost - \$4/gal

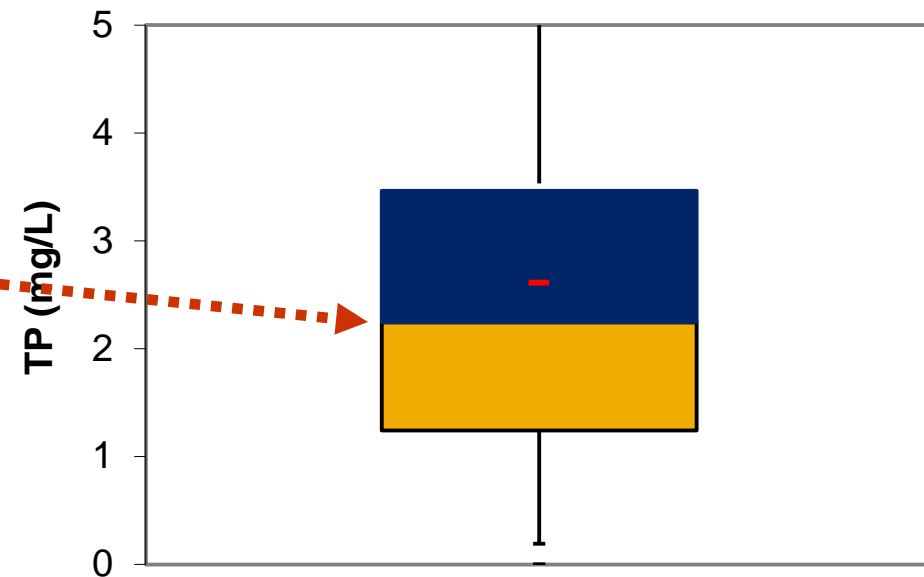
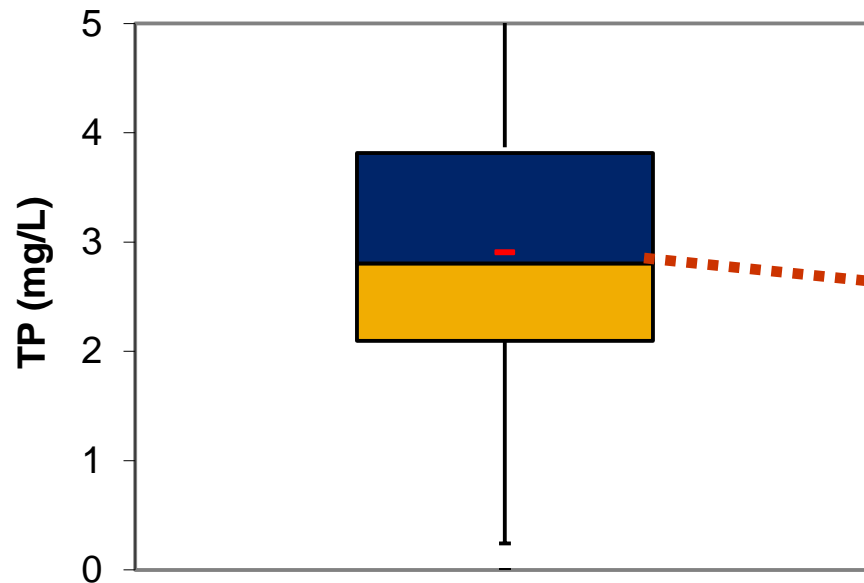
Est. Total Cost - \$0.8 B

Nutrient Performance

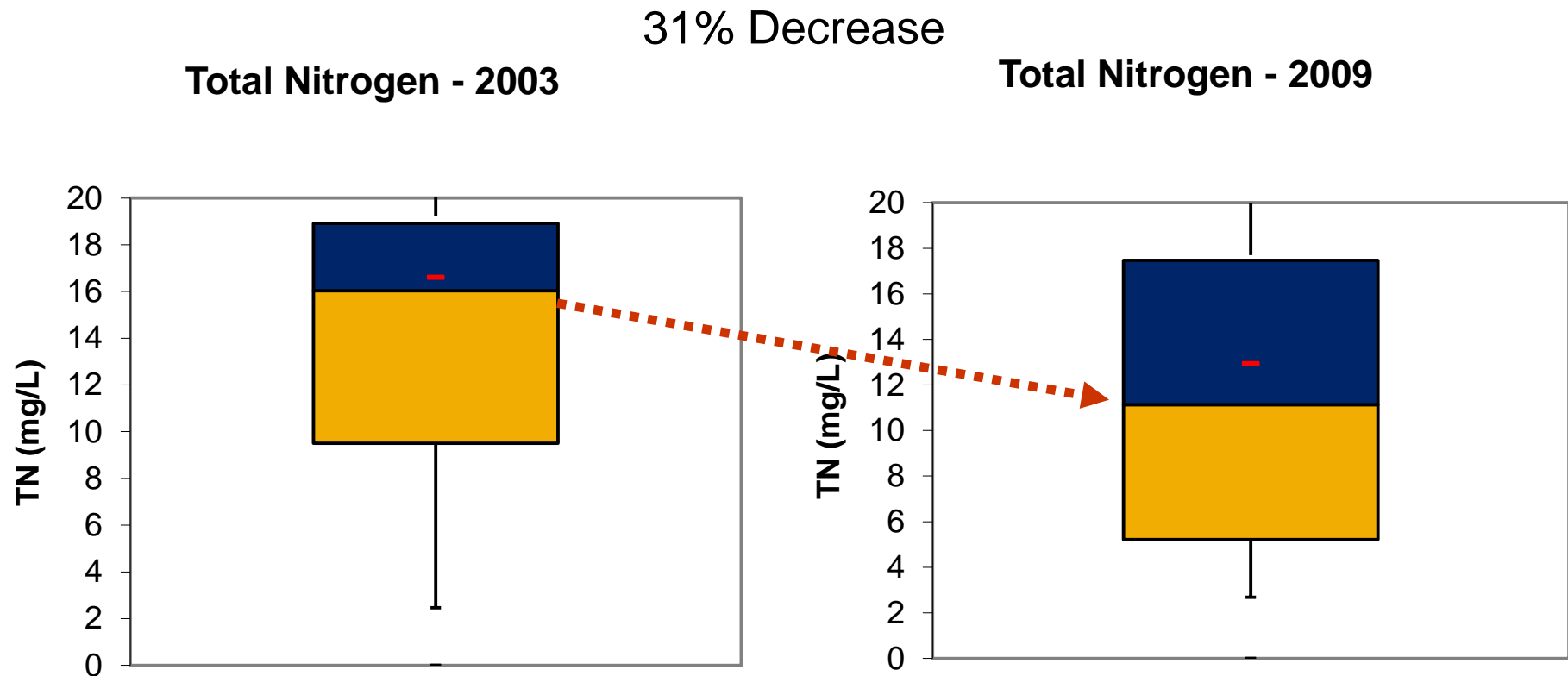
21% Decrease

Total Phosphorus - 2003

Total Phosphorus - 2009



Nutrient Performance



Final Thought



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Questions?

