Kansas Narrative Criteria and NPDES Permitting for Nutrients

2019 Nutrient Permitting Workshop

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Kansas’ Historic Position on Numeric Nutrient Criteria

- Biological linkages in streams are too fuzzy to establish a hard number *a priori* which will become basis for permit limits
- The response variables are more important than the forcing variables to define impairment, e.g., KS WQS set chlorophyll for Lakes @ 10 µg/l
- Regardless, nutrient concentration and load reduction must happen to fully restore designated uses in Kansas waters
- Initial reductions to be accomplished through implementing TMDLs
KS Narrative Criteria Provide Indicators of Use Impairment

- The introduction of plant nutrients into surface waters designated for domestic water supply use shall be controlled to prevent *interference with the production of drinking water* (K.A.R. 28-16-28e(c)(3)(D)).

- The introduction of plant nutrients into streams, lakes, or wetlands from artificial sources shall be controlled to prevent *the accelerated succession or replacement of aquatic biota or the production of undesirable quantities or kinds of aquatic life* (K.A.R. 28-16-28e(c)(2)(A)).

- The introduction of plant nutrients into surface waters designated for primary or secondary contact recreational use shall be controlled to prevent *the development of objectionable concentrations of algae or algal by-products or nuisance growths of submersed, floating, or emergent aquatic vegetation* (K.A.R. 28-26-28e(c)(7)(A)).
Wastewater Demographics

- Of the 626 incorporated cities in Kansas, 36 now have population over 10,000; the smallest 503 cities have 9% of state population
- 69 large NPDES municipal facilities, discharging 1 MGD or more from mechanical plants, comprise a total design flow of 370 MGD
- 36 mid-major NPDES municipal facilities, discharging 0.5-0.99 MGD, could discharge up to 23 MGD
- More than 300 3, 4 or 5 cell lagoon systems with retention times of 120-150 days, discharge 0.01 – 0.5 MGD (if they discharge at all) and total 31 MGD; they are the norm for small towns distributed throughout the state.
Kansas Landuse/Landcover

Cropland  Woodland  Residential  Urban-Grassland  Urban-Water
Grassland  Water     Commercial/Industrial  Urban-Woodland  Other

SGP/CART Facilities

Data Source - Data Access and Support Center, Kansas Geological Survey

Map by A. Cialella
March 1996
The Land Use Backdrop

- 88% of Kansas land is in cropland
- Only 63 MS4’s, typically 5% of a given watershed (urban islands in a sea of corn)
- In Kansas, land use drives water quality
- Non-point sources remain immune to water quality standards, especially numeric criteria
- Animal ag also prevalent (3rd in cattle; 10th in hogs)
- 99% of land in Kansas is privately held
  - Hostile attitude on government/regulation
  - Absentee ownership confounds BMP adoption
Kansas Nutrient Strategy

- Nutrient Reduction Framework is carried out by TMDLs; Kansas TMDL Vision set stream phosphorus as priority
- Began listing streams for TP in 2008; First TMDLs in 2012
- Ammonia and nitrate have numeric criteria/limits
- TP Technology: BNR-1 mg/l; ENR-0.5 mg/l; LOT-0.3 mg/l
- TMDLs set WLA → Mass-based limits as rolling averages
  - Mass invites reuse and land application disposal
  - Averaging discounts biological treatment variability
- BNR Optimization > ENR Results
- Opens the door to trading opportunities (WLA -> LA)
TMDL Priority Basins 2012 - 2022
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Urban Streams See Impacts at Low Flow

2002 - 2019 Nutrients in Cedar Creek

Flow Percentile Range

Nitrate

Phosphorus

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Nutrients Reduced through BNR

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Nutrients in Cedar Creek 2002 - 2019

Before 2014, Nitrate = 3.54 mg/l; Phosphorus = 0.77 mg/l

After 2014, Nitrate = 2.79 mg/l; Phosphorus = 0.28 mg/l
Rural Streams Lower in Nutrients, but Constant Over Time

Nutrients in Stranger Creek 2002 - 2019

Before 2014, Nitrate = 0.85 mg/l; Phosphorus = 0.26 mg/l
After 2014, Nitrate = 1.06 mg/l; Phosphorus = 0.24 mg/l
Take Away Messages

- Narrative criteria can be effective drivers, e.g., TMDLs
- Concentrate on reducing the status quo, rather than reaching a number
- Once (BNR) investments are made, opportunities arise
  - Optimization
  - Reuse
  - Land Application
  - Trading (Inverse)
- Numeric criteria are thwarted by NPS, by small towns and by politics
- In the end, attaining uses >>>> attaining criteria
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