# Nutrient TMDLs and Permitting for Small Towns

*Are all facilities to be treated equally?*

ACWA/EPA Nutrients Permitting Workshop

November 7, 2018

# Agenda

- Background/Issues
- Ideas on TMDLs and Small Towns
- Practical Examples of TMDL Implementation
- Discussion

*The views expressed in this presentation are those of the authors and do not necessarily reflect the views or policies of their respective employers*

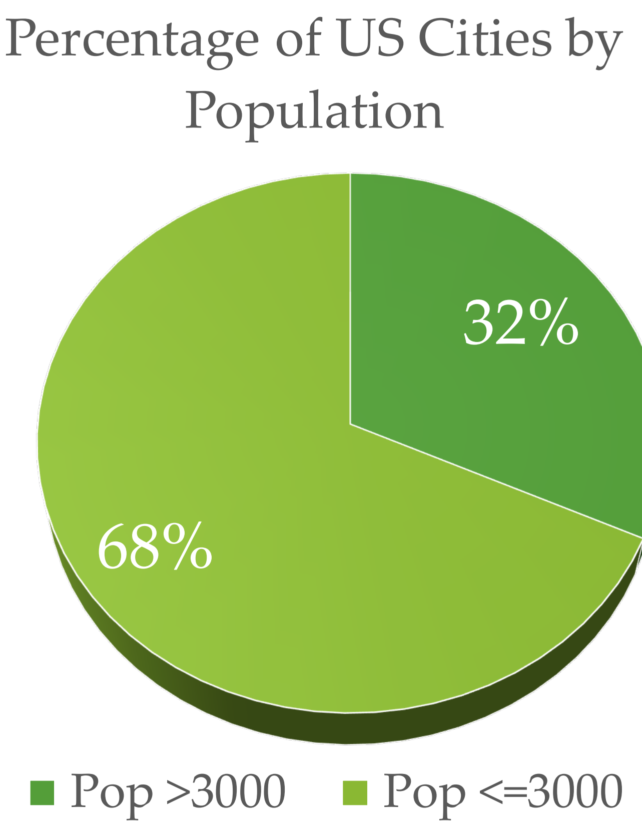
# Background/Issues

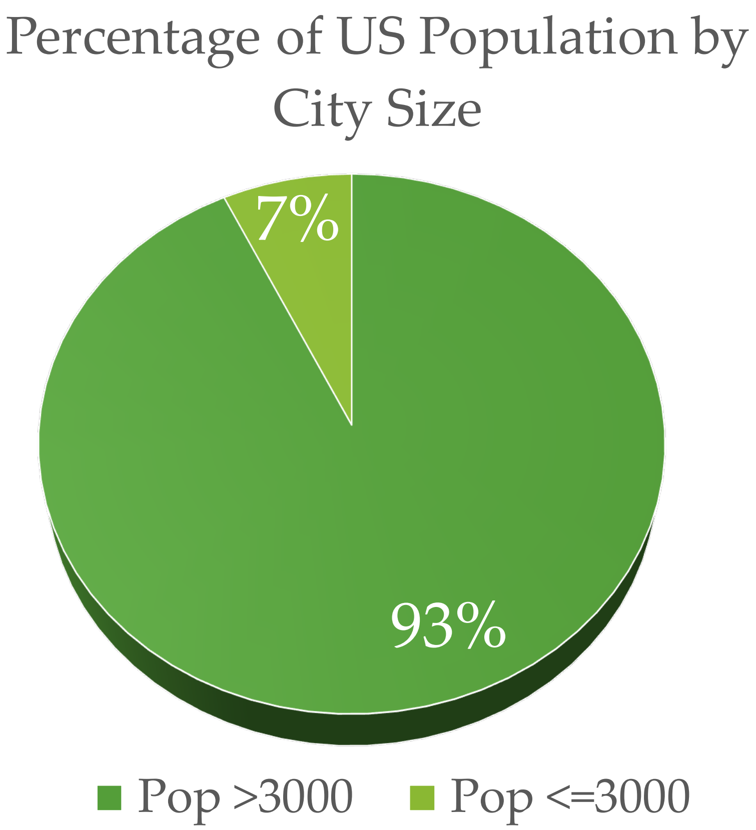
- Discussion raised in Boise last December
  - Increasing pressure to adopt Numeric Nutrient Criteria (NNC)
    - This may disproportionately affect POTWs, particularly small POTWs
  - The majority of POTWs serve a population (e.g. <3000) where construction and O&M of nutrient reduction technologies may be unaffordable
    - Large number of dischargers, small fraction of the permitted discharge flow
  - Nutrient reduction strategies remain a high priority for ACWA, states, EPA, environmental NGOs, and municipalities
  - Are variances for perhaps half or more of POTWs a reasonable solution?
  - How can the NPDES program best accommodate nutrient reduction?
- The small group that brought up issue in Boise has met informally
  - Debated the issue a little more/kicked around some ideas
  - Discussed at Columbus, OH Nutrient Permitting meeting June, 2018

# Spoiler Alert!

- *Are all facilities to be treated equally?*
  - **No!!**
  - Nothing requires TMDLs to treat all facilities equally/proportionately
    - WLA can be sliced up in a variety of ways
      - Watershed permitting
      - Technology based WLAs
      - Load-based permits vs concentration-based permits
        - Declining population may equal declining load, but not declining concn.
      - Trading
      - Combinations of above
      - TBD
- But first a little context

# Large and Small Communities

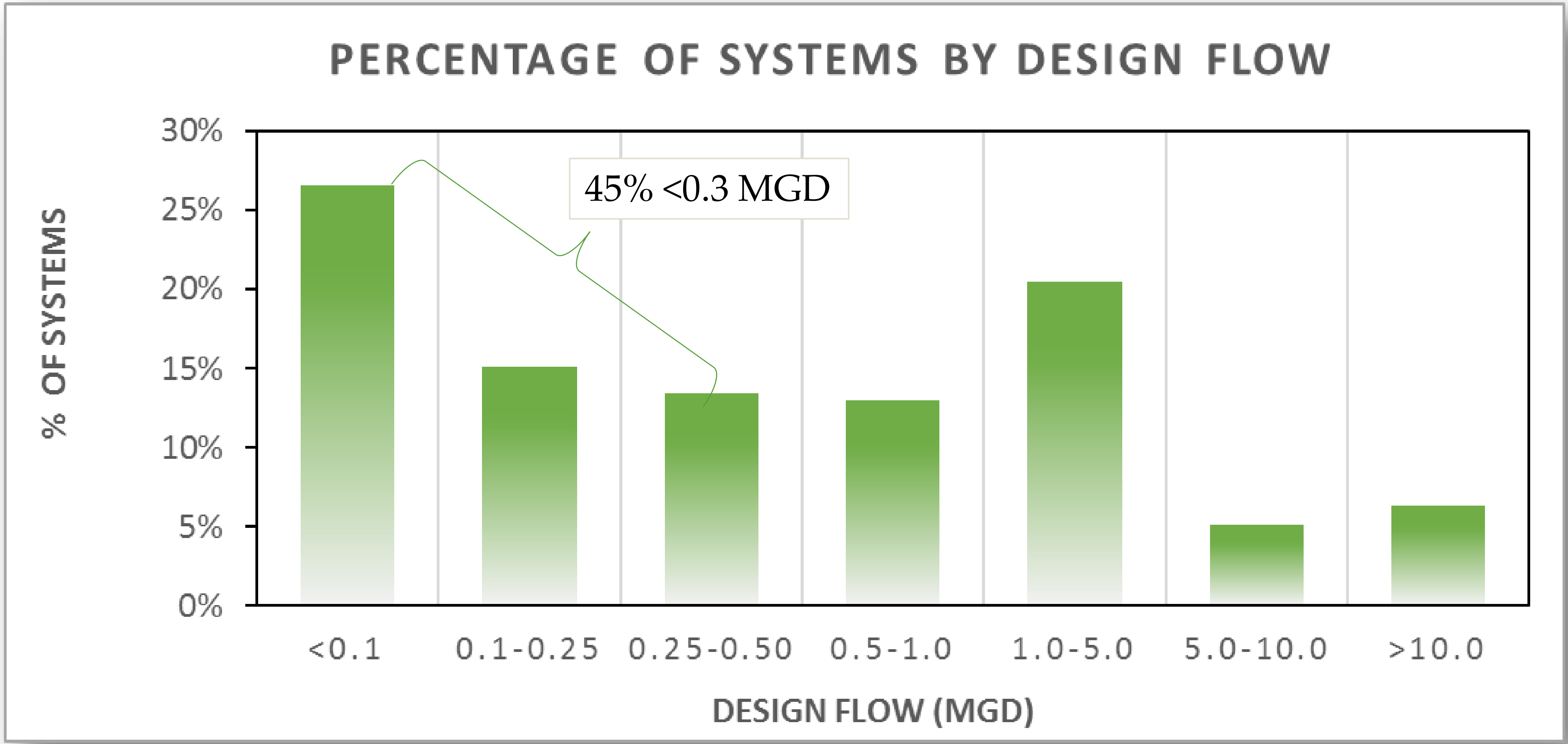



Based on 2010 Census Data

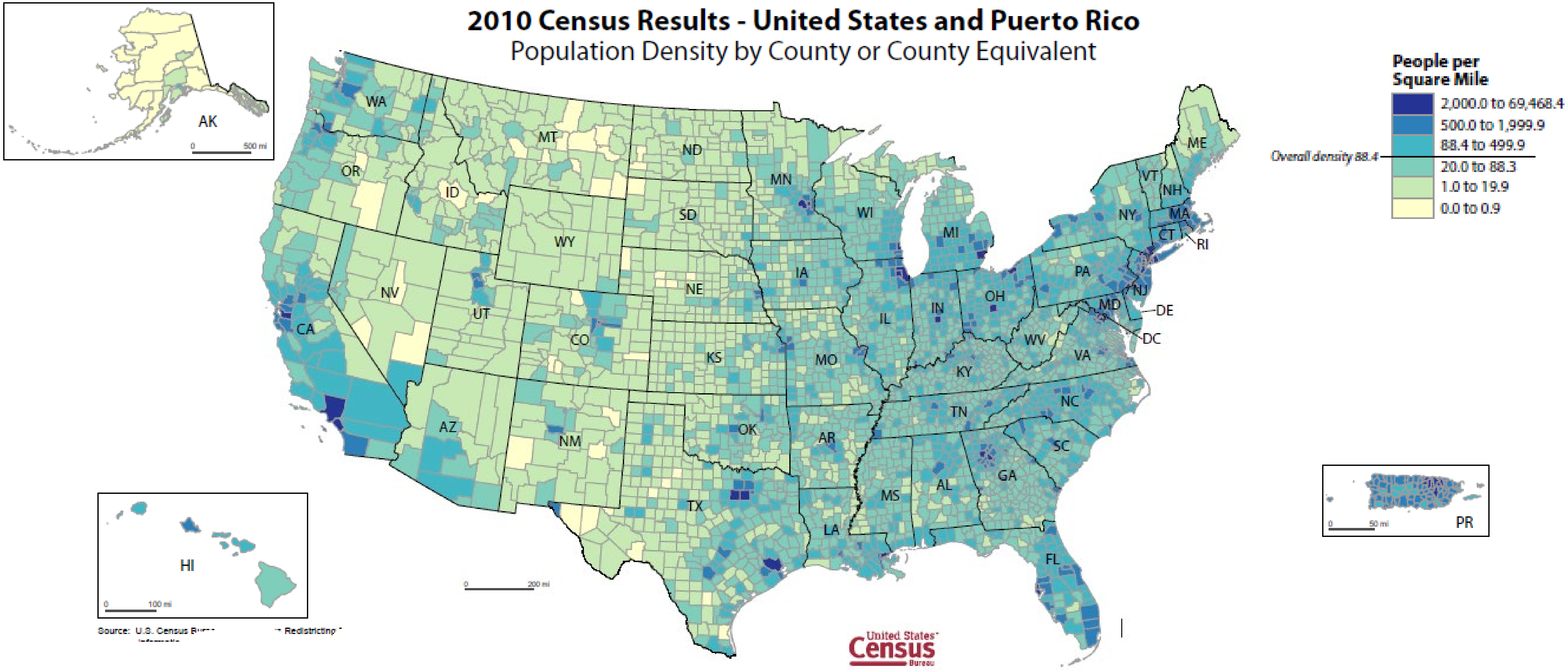
7% of US Population Lives in 2/3 of our Communities

# Large and Small POTWs

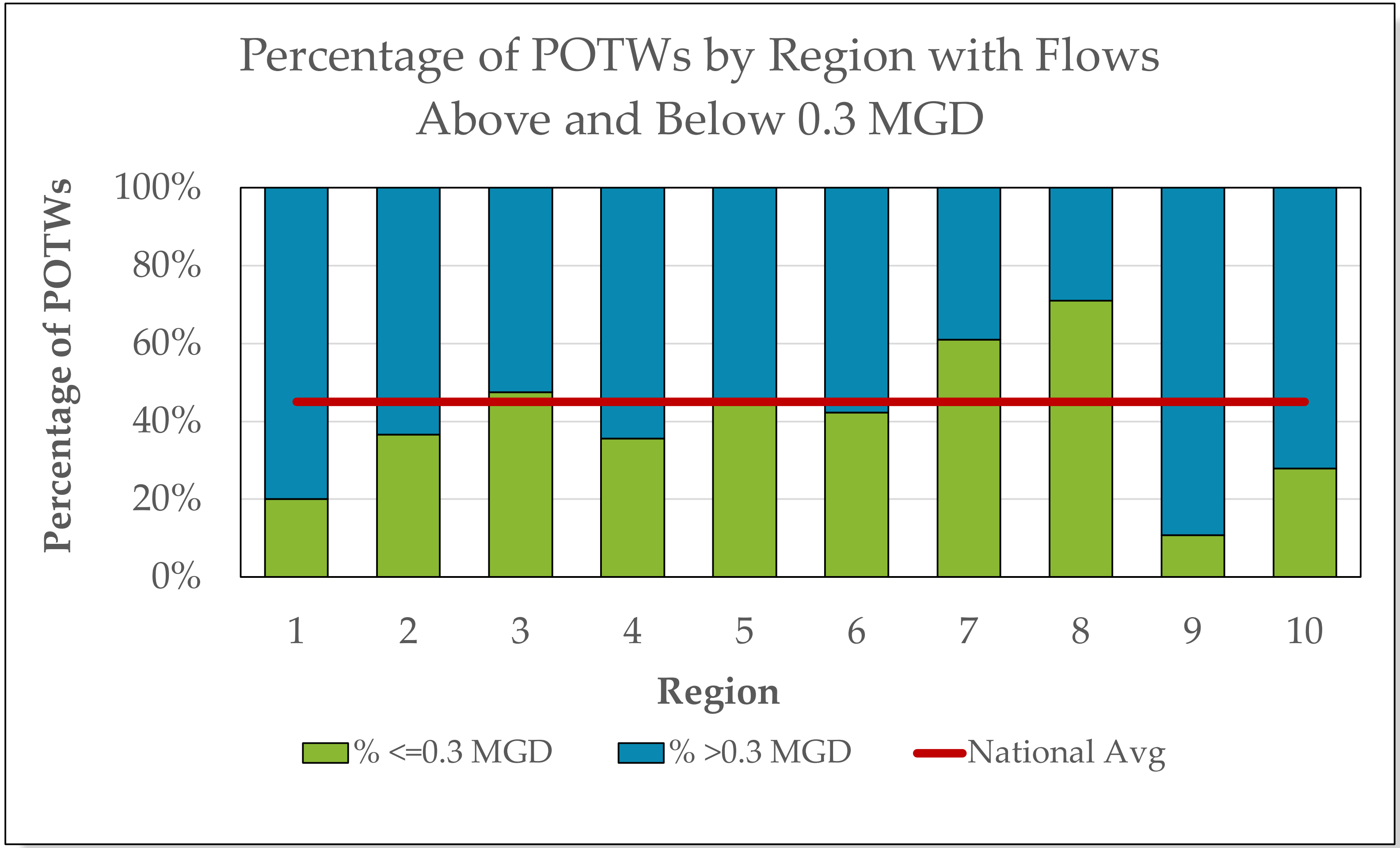



**Based on ICIS Data**

# Large and Small Communities

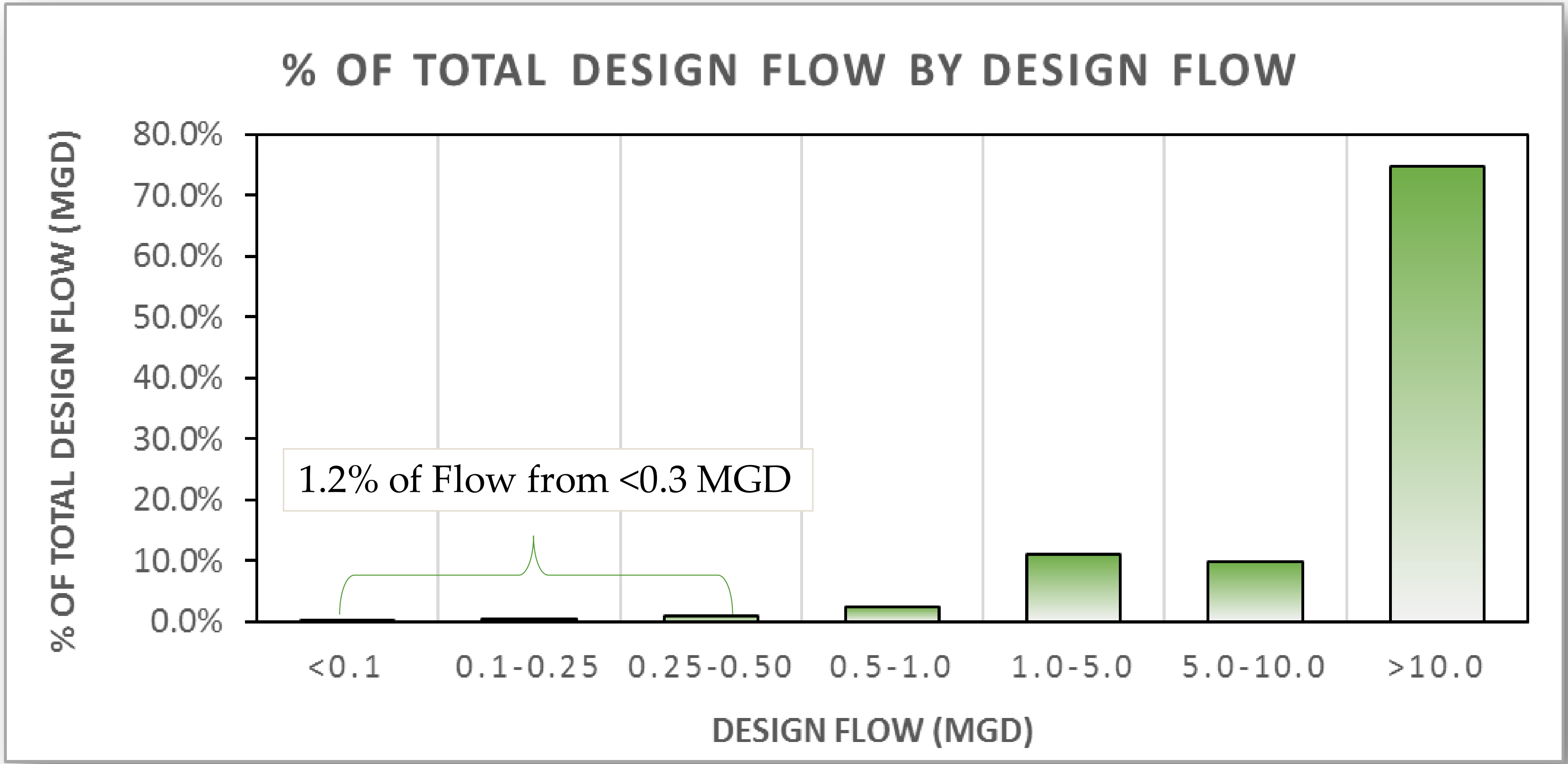


# Large and Small POTWs



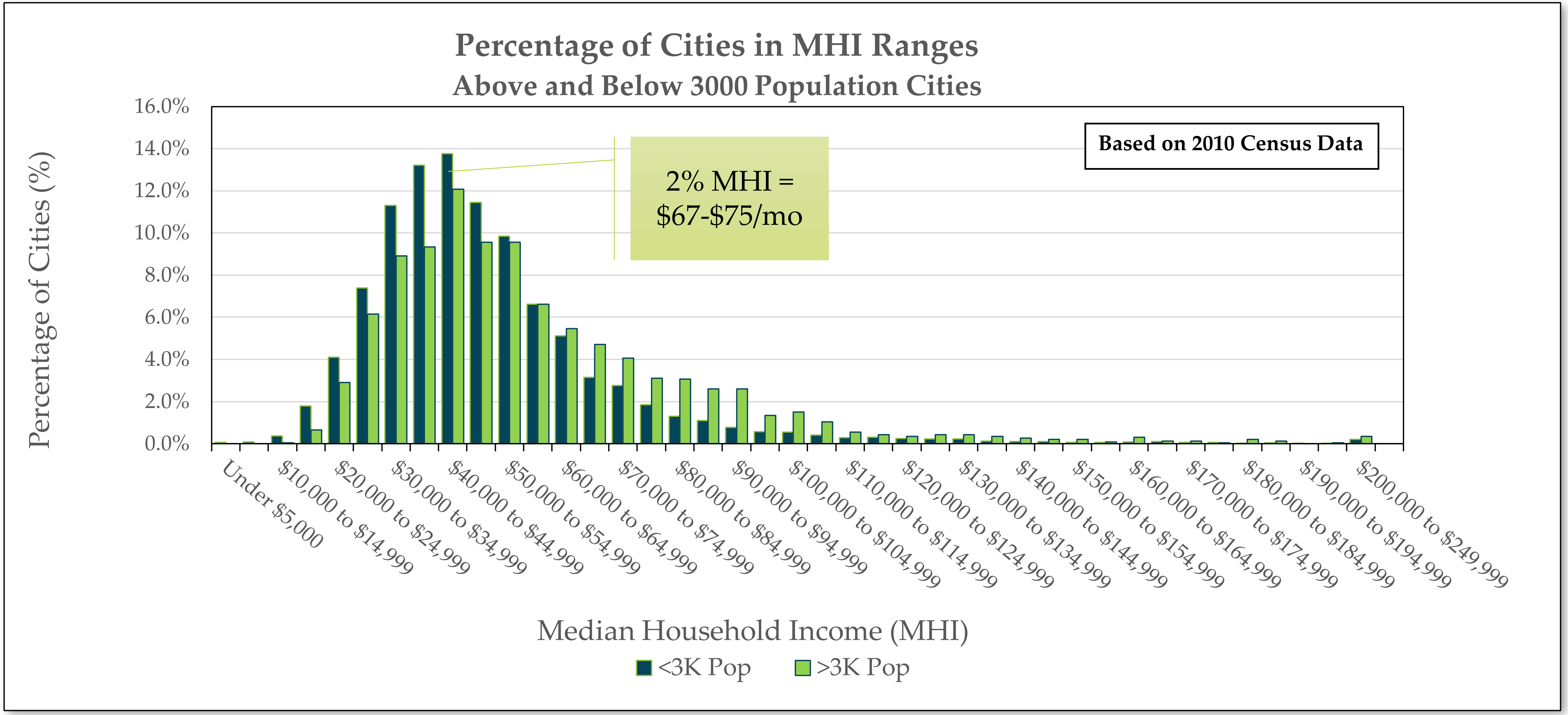

**Based on ICIS Data**

# Large and Small POTWs

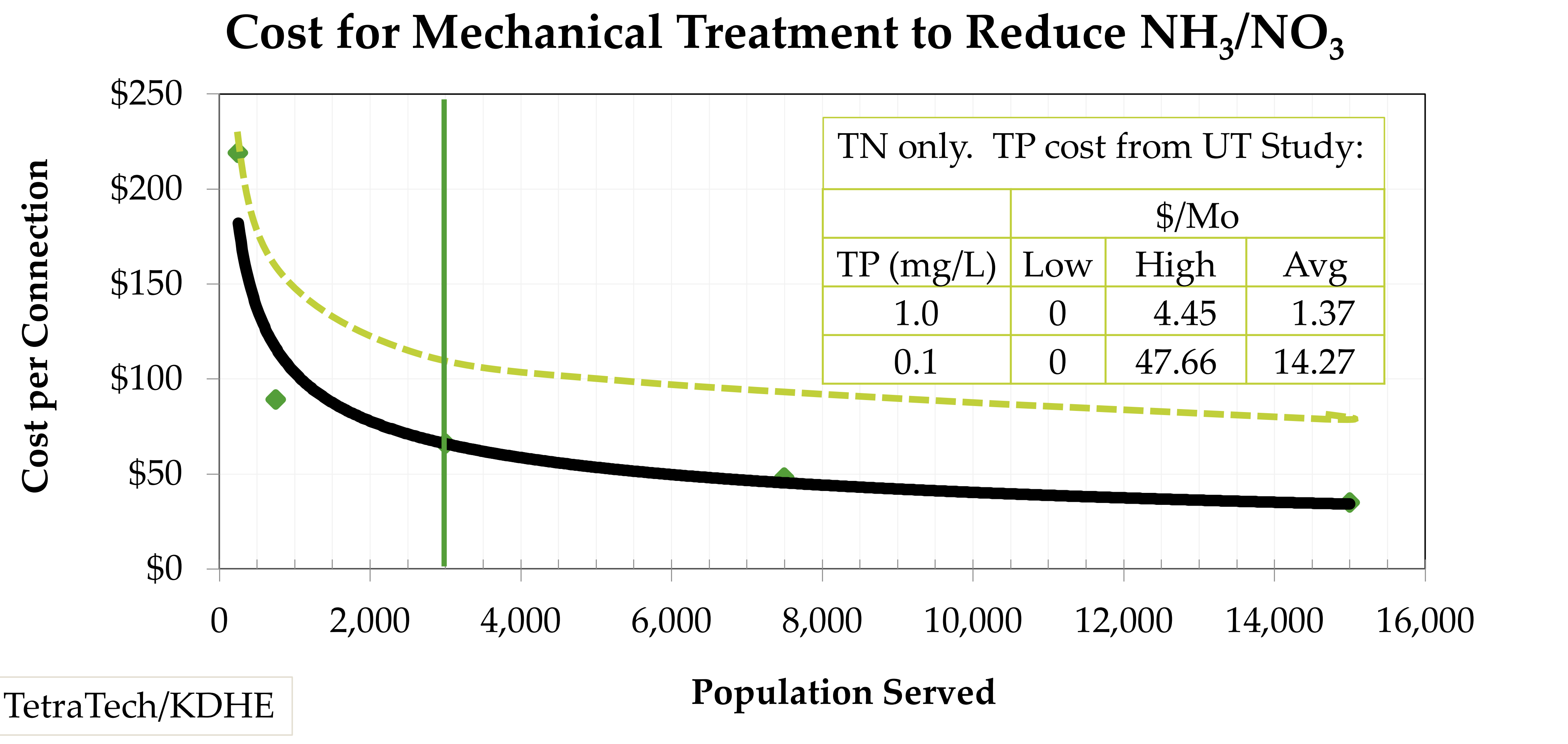



Based on ICIS Data

# Income and Small Communities



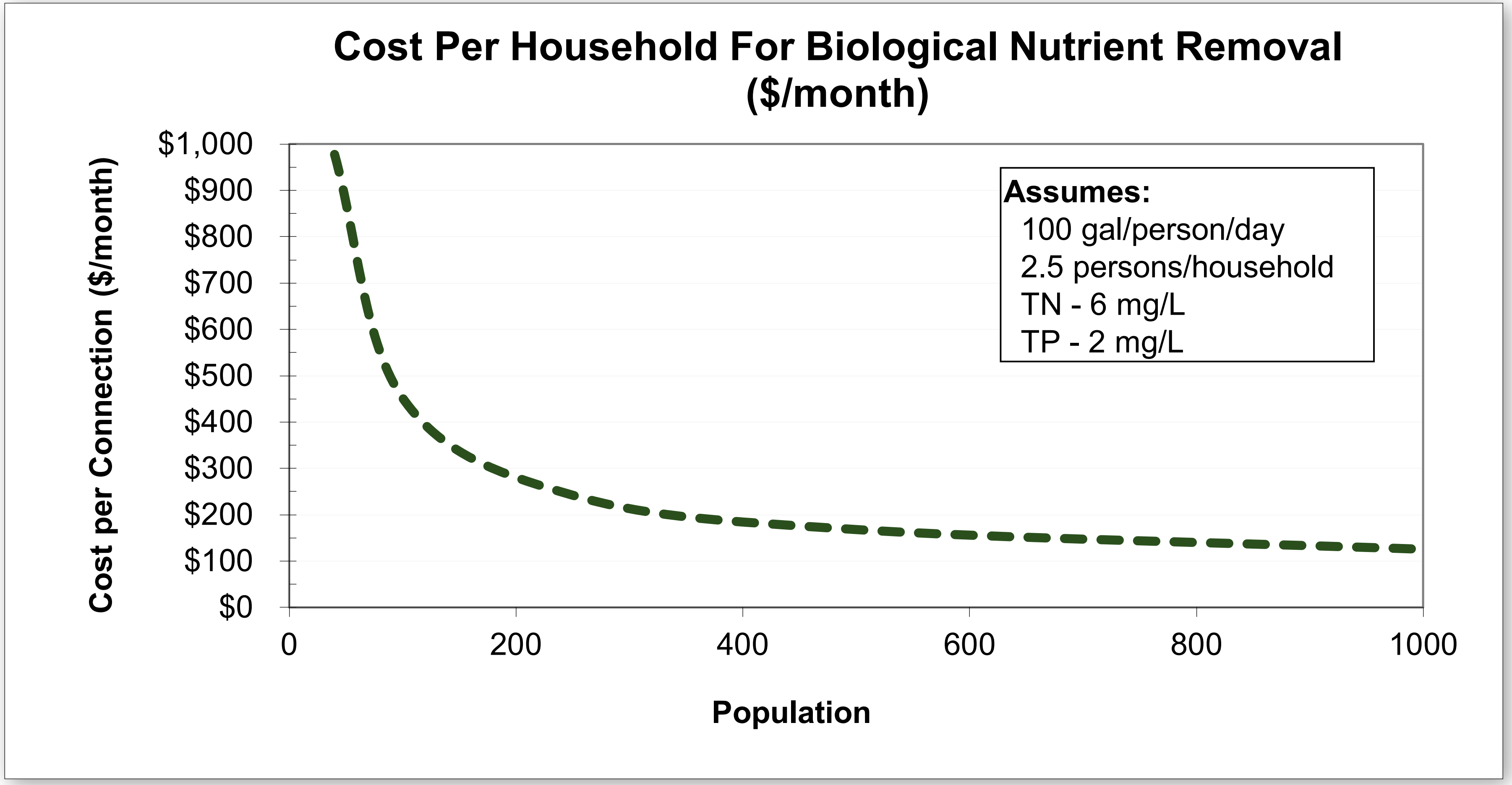
# Costs and Small Communities




TN only. TP cost from UT Study:

| | $/Mo | | |
|---|---|---|---|
| TP (mg/L) | Low | High | Avg |
| 1.0 | 0 | 4.45 | 1.37 |
| 0.1 | 0 | 47.66 | 14.27 |

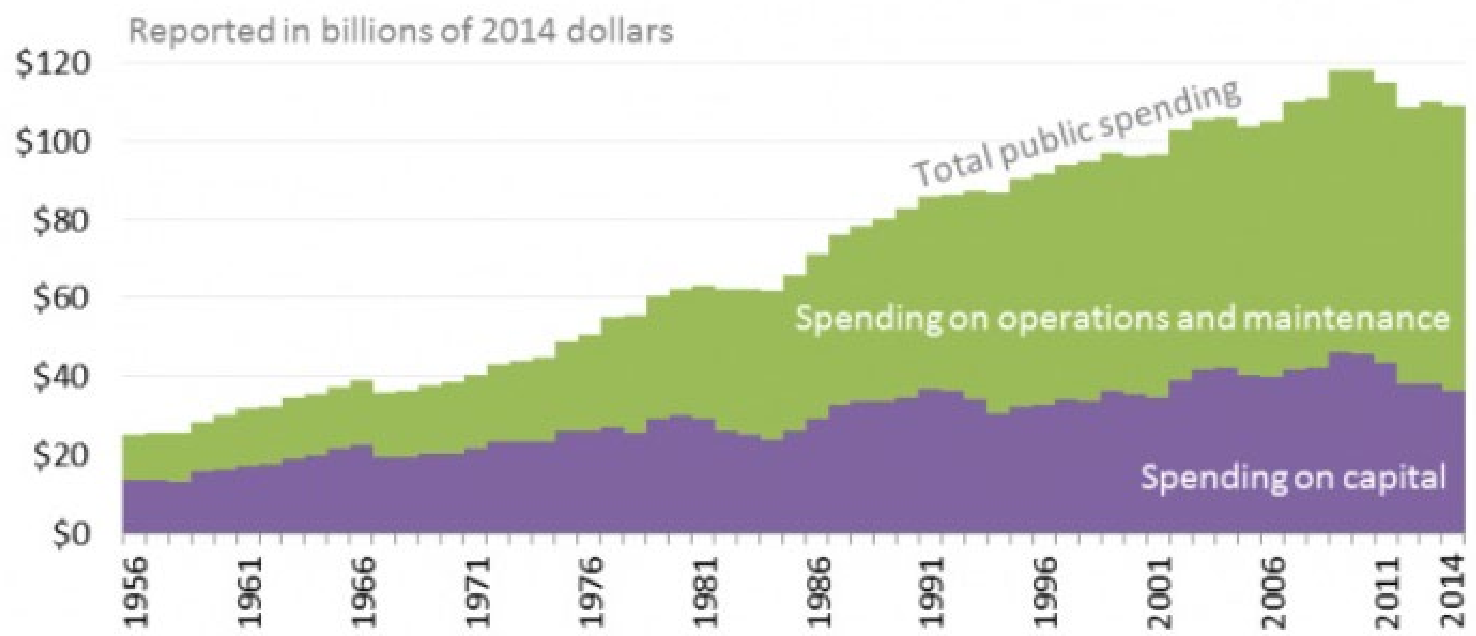
# Costs and Small Communities




FWPCA (inflation adjusted)

# CBO Data – Capital vs O&M

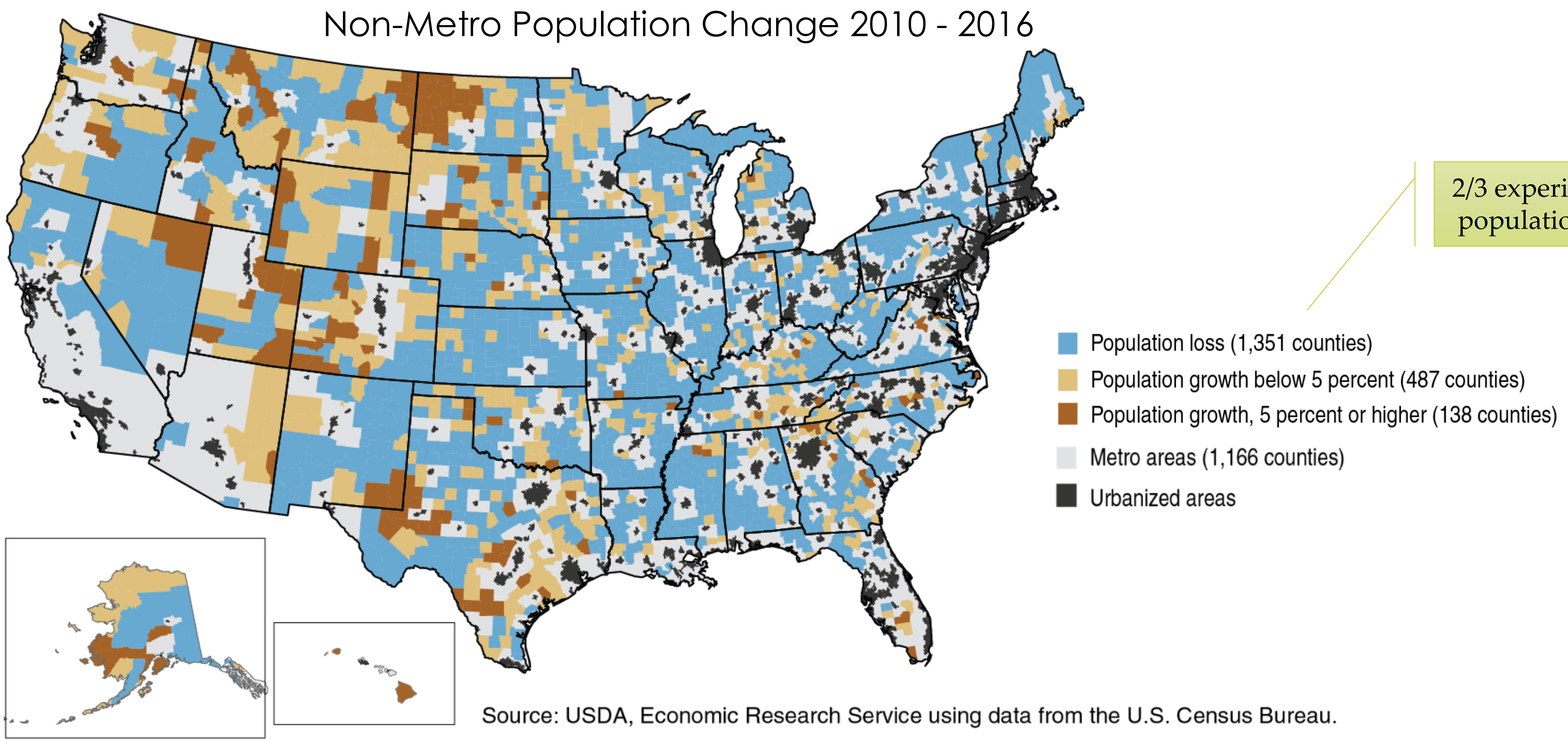
**Federal, state and local government spending on water and wastewater utilities, 1956 - 2014**




Graphed by the Environmental Finance Center at the University of North Carolina, Chapel Hill.
Source: Congressional Budget Office supplemental data for the *Public Spending on Transportation and Water Infrastructure, 1956 to 2014* report (March 2015). Displays public spending on supply systems for distributing potable water as well as wastewater and sewage treatment systems and plants. Real spending is shown after adjusting nominal spending to their 2014 dollar equivalent using infrastructure-specific price indexes.

EFC – Chapel Hill

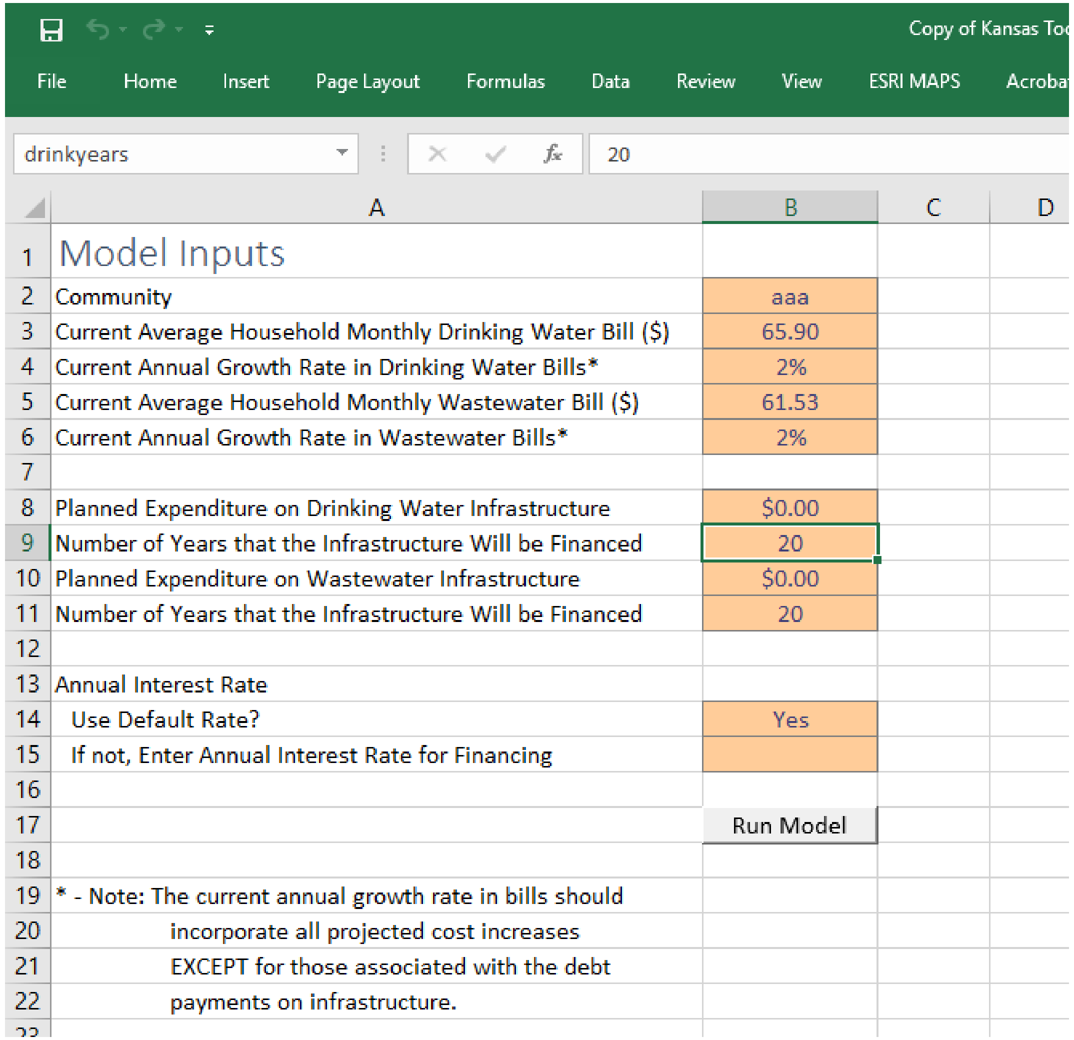
# Rural/Metro Demographics




2/3 experiencing population loss

Source: USDA, Economic Research Service using data from the U.S. Census Bureau.

# EFC Forecast Tool - Input



Copy of Kansas Too

File | Home | Insert | Page Layout | Formulas | Data | Review | View | ESRI MAPS | Acroba

drinkyears | 20

| | A | B | C | D |
|---|---|---|---|---|
| 1 | Model Inputs | | | |
| 2 | Community | aaa | | |
| 3 | Current Average Household Monthly Drinking Water Bill ($) | 65.90 | | |
| 4 | Current Annual Growth Rate in Drinking Water Bills* | 2% | | |
| 5 | Current Average Household Monthly Wastewater Bill ($) | 61.53 | | |
| 6 | Current Annual Growth Rate in Wastewater Bills* | 2% | | |
| 7 | | | | |
| 8 | Planned Expenditure on Drinking Water Infrastructure | $0.00 | | |
| 9 | Number of Years that the Infrastructure Will be Financed | 20 | | |
| 10 | Planned Expenditure on Wastewater Infrastructure | $0.00 | | |
| 11 | Number of Years that the Infrastructure Will be Financed | 20 | | |
| 12 | | | | |
| 13 | Annual Interest Rate | | | |
| 14 | Use Default Rate? | Yes | | |
| 15 | If not, Enter Annual Interest Rate for Financing | | | |
| 16 | | | | |
| 17 | | Run Model | | |
| 18 | | | | |
| 19 | * - Note: The current annual growth rate in bills should | | | |
| 20 | incorporate all projected cost increases | | | |
| 21 | EXCEPT for those associated with the debt | | | |
| 22 | payments on infrastructure. | | | |

# EFC Tool - Output

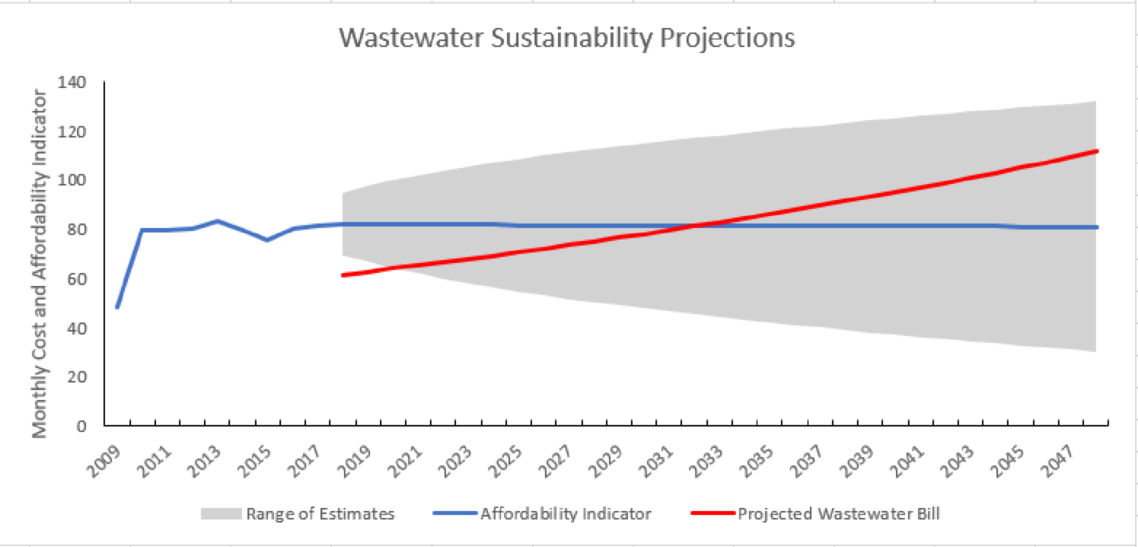
Copy of Kansas Tool ver 1.7_aaa.xlsm - Excel

## Model Outputs - Wastewater

| | |
|---|---|
| Community | aaa |
| Community Population (2016) | 2,887 |
| Increase in Average Monthly Wastewater Bill | $0.00 |
| Probability that Monthly Wastewater Bill Exceeds 2.0% of Median Household Income | 0.8366 |
| Sustainability Risk | High |
| Current MHI | $ 49,206 |
| Curent Wastewater Bill | $ 61.53 |
| Projected Average Wastewater Bill | $ 61.53 |

Drinking Water Outputs | New Model

**Note:** The graph shows the typical sustainable threshold for the community (blue line), forecast into the future, along with a range of estimates developed in a statistical model. It also shows the projected wastewater bills using the inputs you provided.




| Projections | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Median Household Income | 49,206 | 49,301 | 49,303 | 49,263 | 49,205 | 49,140 | 49,072 | 49,004 | 48,936 | 48,868 | 48,802 | 48,802 | 48,788 |
| Monthly Wastewater Bill | 61.53 | 62.76 | 64.02 | 65.30 | 66.60 | 67.93 | 69.29 | 70.68 | 72.09 | 73.53 | 75.00 | 76.50 | 78.03 |
| %MHI | 1.5% | 1.5% | 1.6% | 1.6% | 1.6% | 1.7% | 1.7% | 1.7% | 1.8% | 1.8% | 1.8% | 1.9% | 1.9% |

Instructions | Inputs | Drinking Water Outputs | Wastewater Outputs

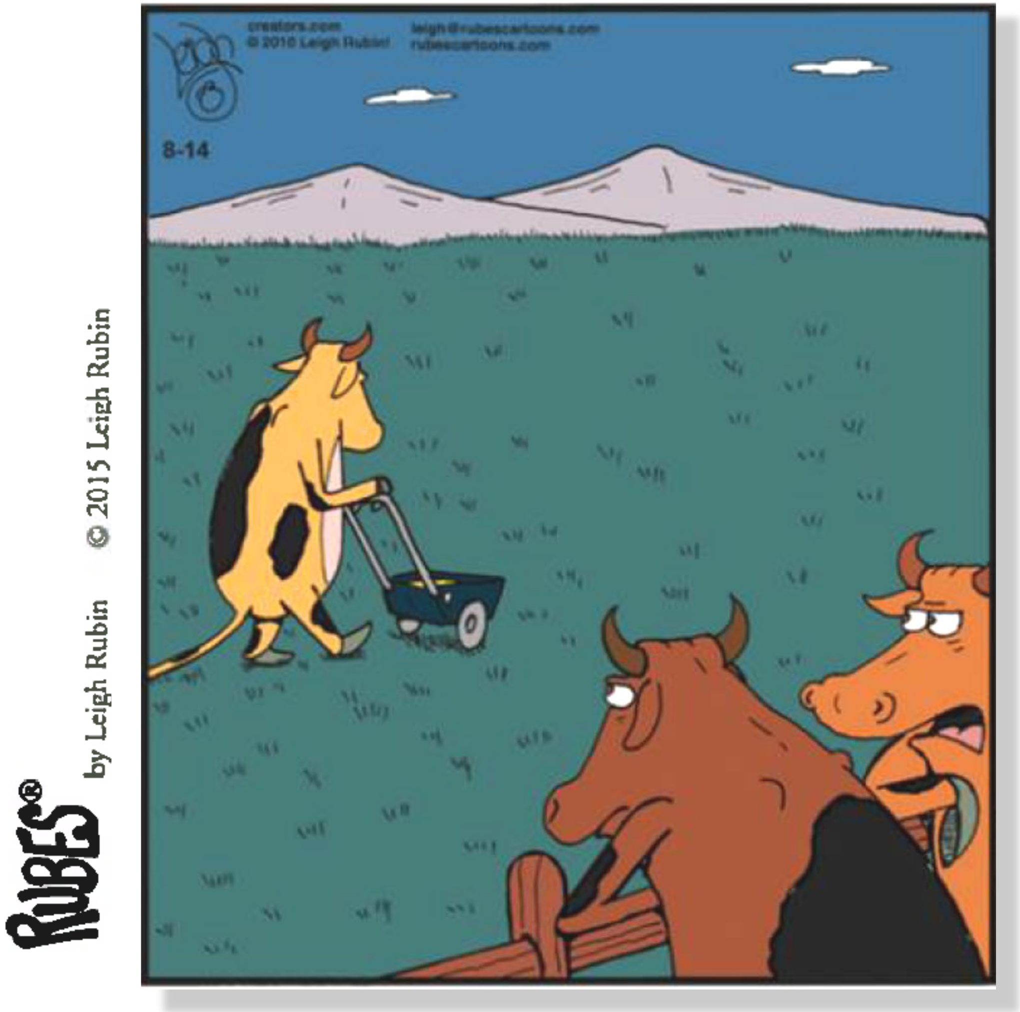
# Some Comments From C-Bus

- Idea of *de minis* dischargers
  - For instance, OH does not address nutrients for dischargers with <100,000 gpd design
- Issues vary across states and Regions
  - Need to make geographic/geopolitical allowances
- Quite a bit of support for a combo of Options 4 and 5
  - Technology-based approach for major POTWs; or
  - Tiered-technology for small POTWs with TBELs or WQBELs for majors
  - Longterm Nutrient Reduction Plans (LNRPs)
- Like the idea of tiered tech levels
- Concern about making any system spend money on meeting a tech-based limit if NNC were coming in the future

# Some Comments From C-Bus

- Concern that NNC were not in the foreseeable future, so need to do something else to spur reduction
- As much as it may present bad "optics" – variance may be needed
- Do not like narrative translators
- Not all small POTWs need relief
  - If they do not, should not be let off the hook
- Need to allow for site-specific implementation in sensitive watersheds
- Is there a possibility for a nationwide variance, or at least a framework?
- Probably need more discussion on when it is best or most appropriate to use UAA vs Site Specific Criteria vs Variance.
- Bottom line – small communities are an important issue.  Keep working!

# Modern Era Non-Point Nutrient Pollution




"It's positively disgraceful. Just look at the way he's fertilizing. Has he no respect for tradition?!"

# Implementing Nutrient Reduction at Small Towns

Kansas Approaches

November 7, 2018

# Kansas Wastewater Demographics

- 85% of Kansas Towns have population under 3000
- Most of those Towns rely on gravity-fed facultative lagoons for wastewater treatment
- Between 2010 – 2016, only 37 towns with populations between 300 and 3000 saw growth
- Nutrient Impairments (TP, $NH_3$, $NO_3$) closely associated with mechanical plants
- Nitrogen handled as concentrations (numeric criteria)
- Phosphorus handled as mass (narrative criteria)
- 130 mechanical plants in Kansas average 3 MGD; focus of nutrient TMDLs
- 322 lagoon systems with average design flow of 0.12 MGD; what to do?

# Phosphorus is handled through TMDLs

- Typical Small Town Handles Wastewater with Lagoons
  - 120 to 150 days of retention time
  - 3, 4 or 5 cells
  - Default is 2 mg/l TP (tech-based), but Mass is the limit
  - Population Determines Wastewater Volume (Little to No Industry)
  - Wasteload Allocation based on Design Flow X Default [TP]
  - Design Flows typically >> Actual discharge
    - Declining population
    - High ET, Low Precipitation during Summer Baseflow
    - Reuse gaining Momentum

  - Thus, Town remains within its WLA, without Capital Outlay for additional Treatment

# Ammonia is handled through MDVs

- Most Small Towns with Lagoons can Comply with NH3 Limits Based on 2013 Criteria
  - 120 to 150 days of retention time allows for adequate biological uptake of NH3 and NO3
  - Winters often problematic with compliance for some towns
  - Population declines also erode revenue stream
  - Little Financial Capability to invest or maintain BNR (Nitrify – Denitrify)
  - Multi – Discharger Variance in place for towns with population below 3000
  - Highest Attainable Criteria = Most likely cap on ammonia output = historic 99$^{th}$ percentile
  - Pollution Minimization Plans holds the line on rises in ammonia output
    - Musts – Restrictions: Cert. Op, Adequate Maintenance, No Industrial Wastewater
    - Consider Operational Conditions: Irrigation, Controlled Discharges, Routine Desludging
    - Encouraged Construction Improvements: Improved Piping, Additional Cells

# Small Town Nutrient Reduction

## Thank you/Questions

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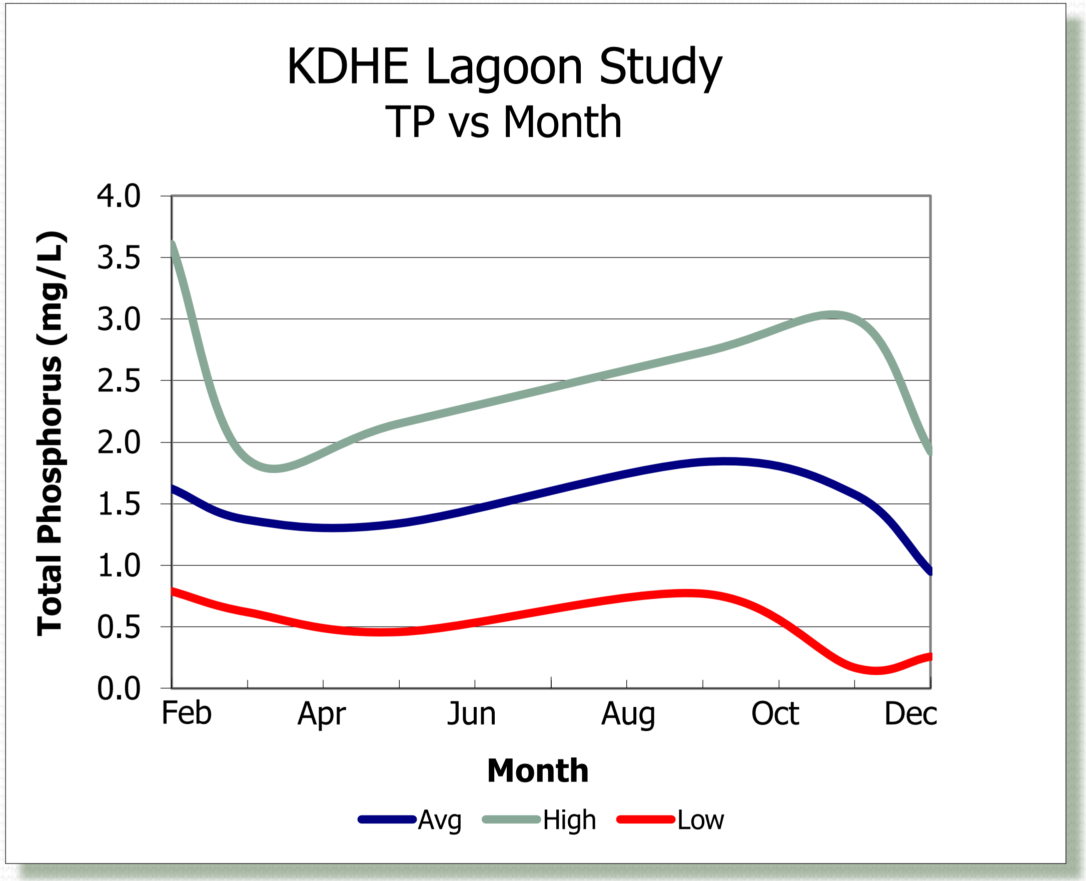
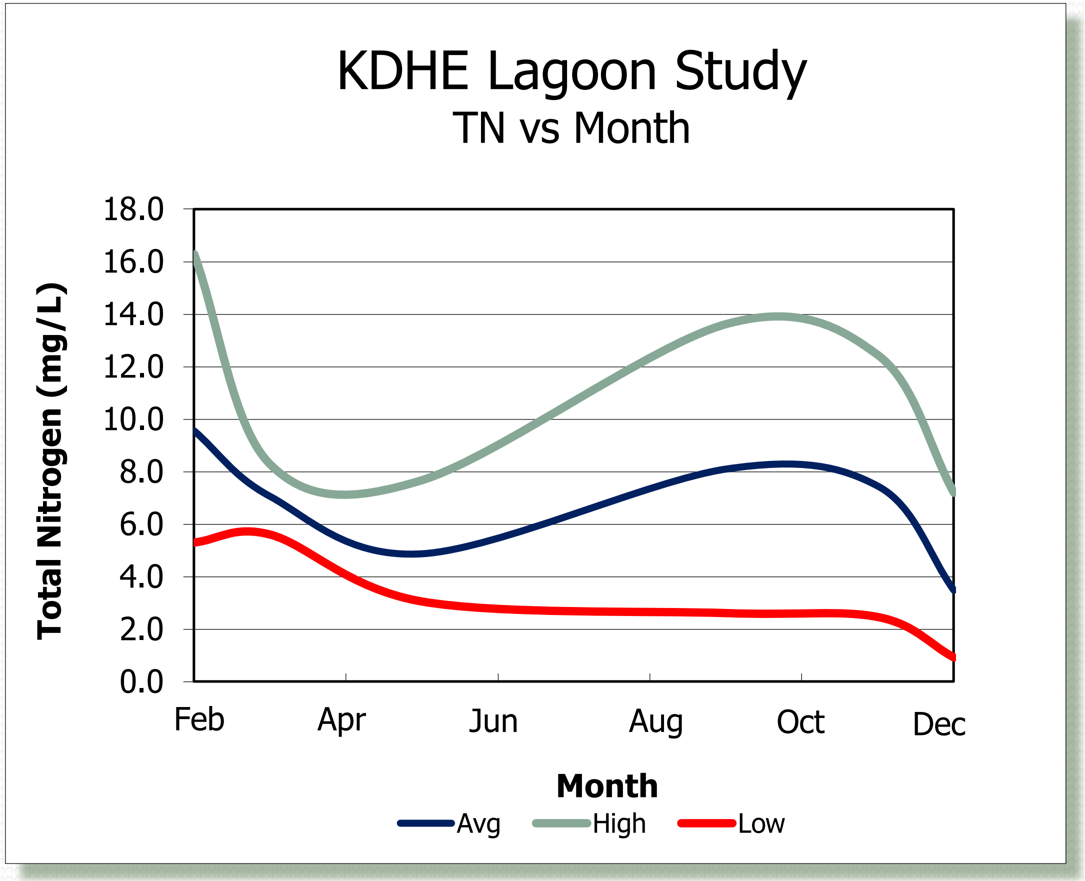
www.kdheks.gov/water/www.html

# We’ve Shown Our Ideas – Yours?

1. Are states using TMDLs in other ways to deal with nutrient permitting?
    - If so, differentiating between “Small” and “Large” POTWs?
2. What about industry?
    - How is industry nutrient permitting handled?
3. What about TMDLs with WLAs more stringent than treatment technology can achieve?
    - Particularly for small facilities?

# Lagoon Study Data - KDHE



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