EPA's Risk & Resiliency Assessments and Emergency Response Plans

Kelsey Waidhas
Metropolitan North Georgia Water Planning District

August 2019

ATLANTA REGIONAL COMMISSION
regional impact + local relevance

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Utility Sizing

- >100,000 people: large
- 50,000 – 99,999: medium
- 3,300 – 49,999: small

*wholesale purchasers certify based on population served

**wholesale & retail sellers certify based on combined total served population

DOCUMENT	LARGE	MEDIUM	SMALL
Risk & Resilience Assessment	March 31, 2020	December 31, 2020	June 30, 2021
Emergency Response Plan	September 20, 2020	June 30, 2021	December 30, 2021
Risk & Resilience Assessment #2	March 31, 2025	December 31, 2025	June 30, 3026
Emergency Response Plan #2	September 20, 2025	June 30, 2026	December 30, 2026

Risk & Resiliency Assessment

- Risk from malevolent acts & natural hazards
- Resilience of source water, conveyance, barrier, collection/intake, treatment, storage, distribution, automated, electronic infrastructure
- Other O&M: How do you monitor? How do you budget/fund? How do you store & use chemicals? How do you evaluate needs?

Emergency Response Plan

- 6 months after the Risk & Resiliency Assessment:
- Use assessment conclusions for emergency response strategies, plans, procedures, etc.
  - Hazard detection/monitoring
  - Impact minimization/mitigation

Resources

American Water Works Association

1. J100: Risk & Resilience Management of Water & Wastewater Systems
2. Cybersecurity Guidance & Tool
3. M19: Emergency Planning for Water & Wastewater Utilities
4. G440: Emergency Preparedness Practices
5. Utility Risk & Resilience Certificate Program

Resources

EPA

1. Vulnerability Self-Assessment Tool (VSAT)
2. Baseline Info on Malevolent Acts for Community Water Systems
3. Emergency Response Plan Template & Instructions
4. Creating Resilient Water Utilities

Other Resources

- Metro Water District
  - Utility Climate Resiliency Study
- GEFA
  - Water System Interconnection, Redundancy and Reliability Act Emergency Supply Plan
- National Association of Counties + Multi-State Information Sharing and Analysis Center
  - Membership + Cybersecurity Program

Submitting

- EPA'S ELECTRONIC PORTAL
  – Email/mail if necessary

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Training

- Region 4: Friday, November 15, 9am-5pm
- Sam Nunn Atlanta Federal Center

  61 Forsyth St SW

  Atlanta, GA 30303
- Free for both in-person & webinar attendance

Announcements

Allie Orrego

Metropolitan North Georgia Water Planning District

August 21, 2019

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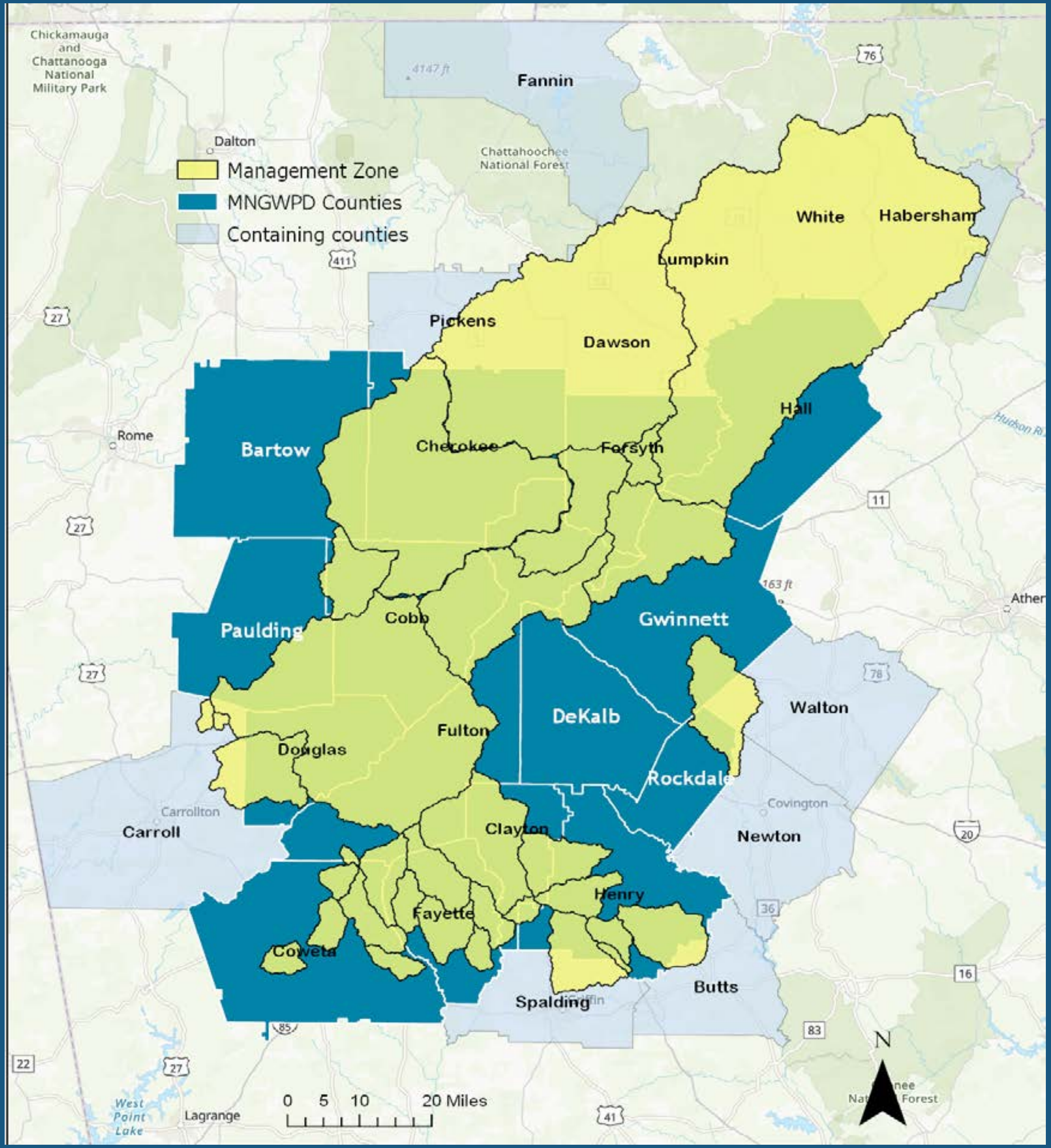
Source Water Assessment Plan (SWAP) Update

- Update by January 1st, 2020
- Preliminary results-individual meetings:

September 16th-27th



Shellby Miller

smiller@atlantaregional.org

Considering AMI? Are you using AMI? Overwhelmed with data?

Join AMI Users group!

Bi-monthly conference calls

September 4th @1pm

– Discuss:
- Challenges
- Lessons learned
- questions to ask data
- Methods to analyze data

– Benefits:
- Knowledge base – community
- Improve customer experience
- Create confidence in methods
- Save time

Allie Orrego

E| aorrego@atlantaregional.org

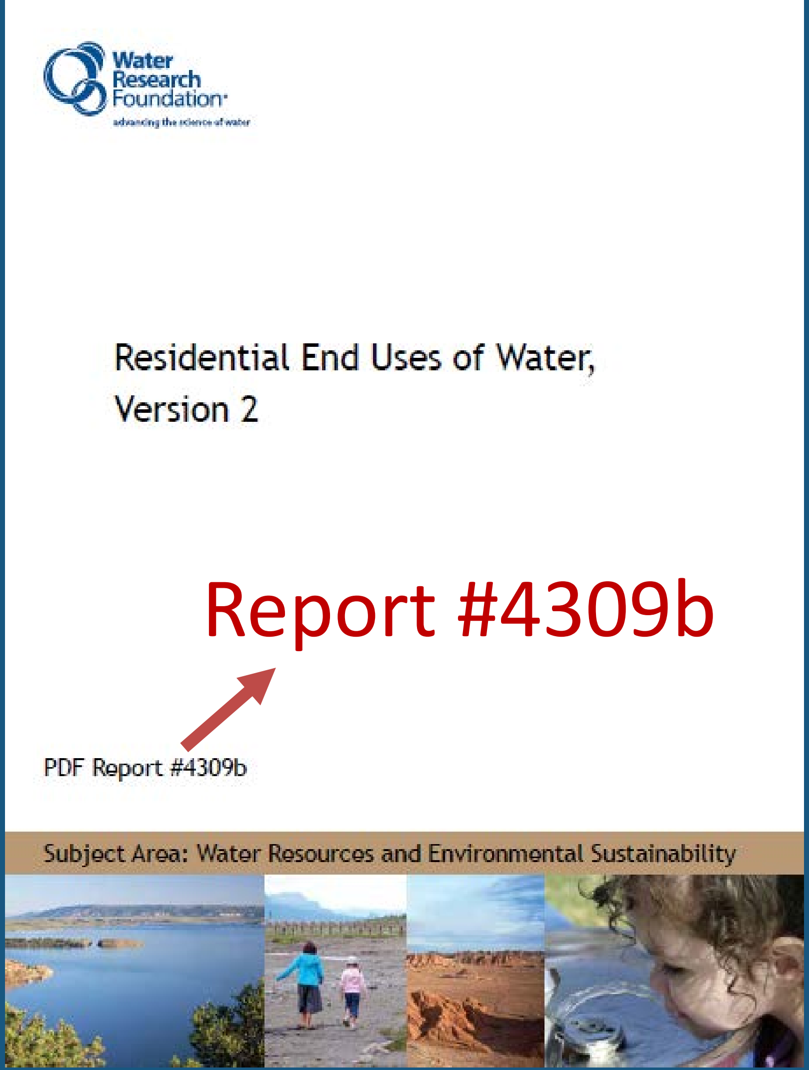
P| (470) 378 1558

Residential Indoor Water Use: Comparing System Averages to New / Renovated Homes

Andrew D. Morris
Water Policy Officer
Metropolitan North Georgia Water Planning District

August 21, 2019
WS/WC TCC

WRF's 2016 Study on Residential End Uses of Water



Why is this study significant?

- Shows trends by following up on a similar 1999 study
- Used billing data from 23 utilities and 23,749 single-family homes (some from Cobb and Clayton)
- 95% confidence level that the samples were representative
- Sent 13,749 surveys sent, 4,643 returned
- Installed high-resolution flow data loggers at 763 homes across participating utilities

Indoor Water Use Average – 1999, 2016, High-Efficiency

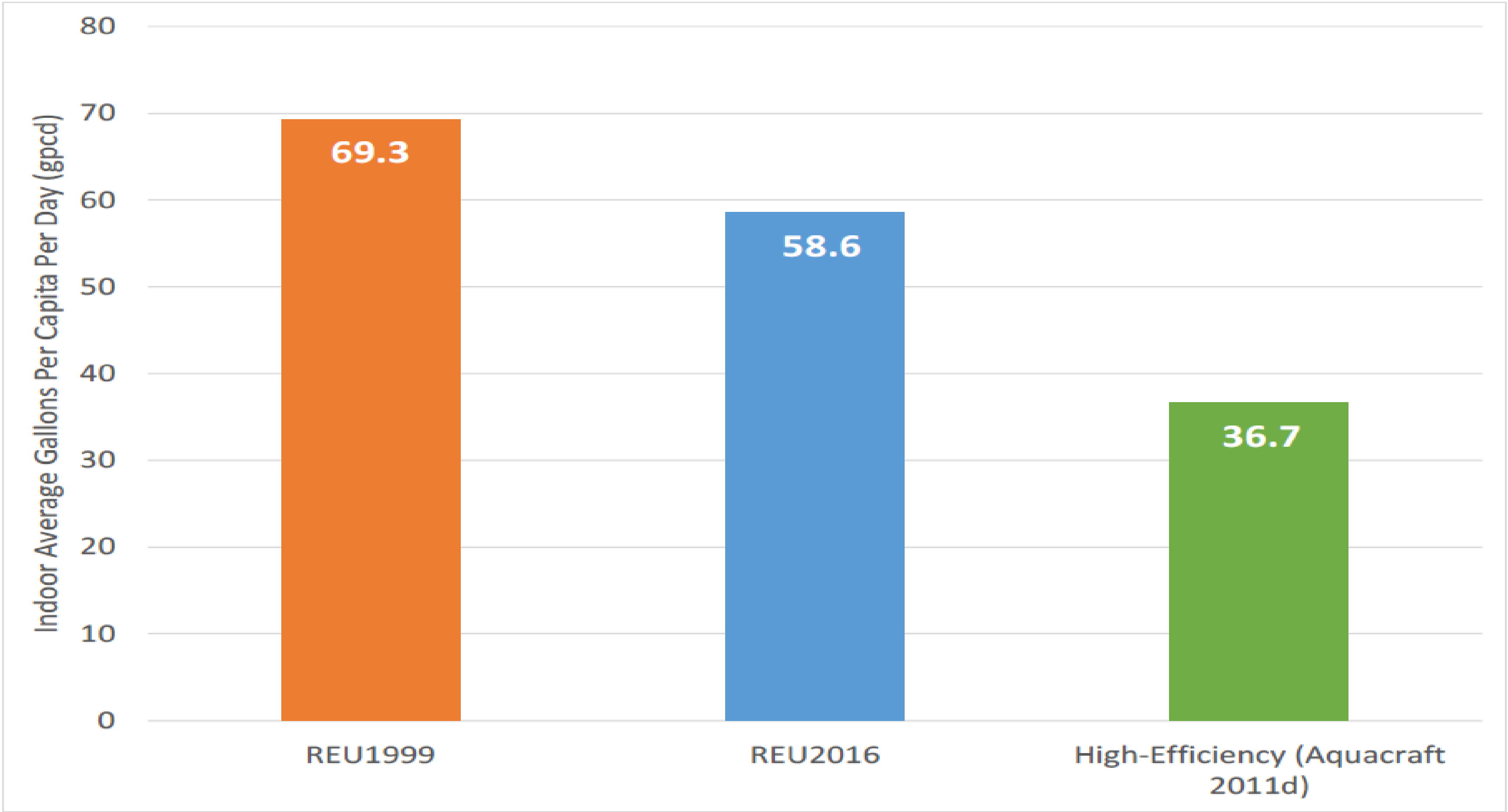


Figure ES.6 Indoor average gallons per capita per day, REU1999, REU2016, High Efficiency Studies

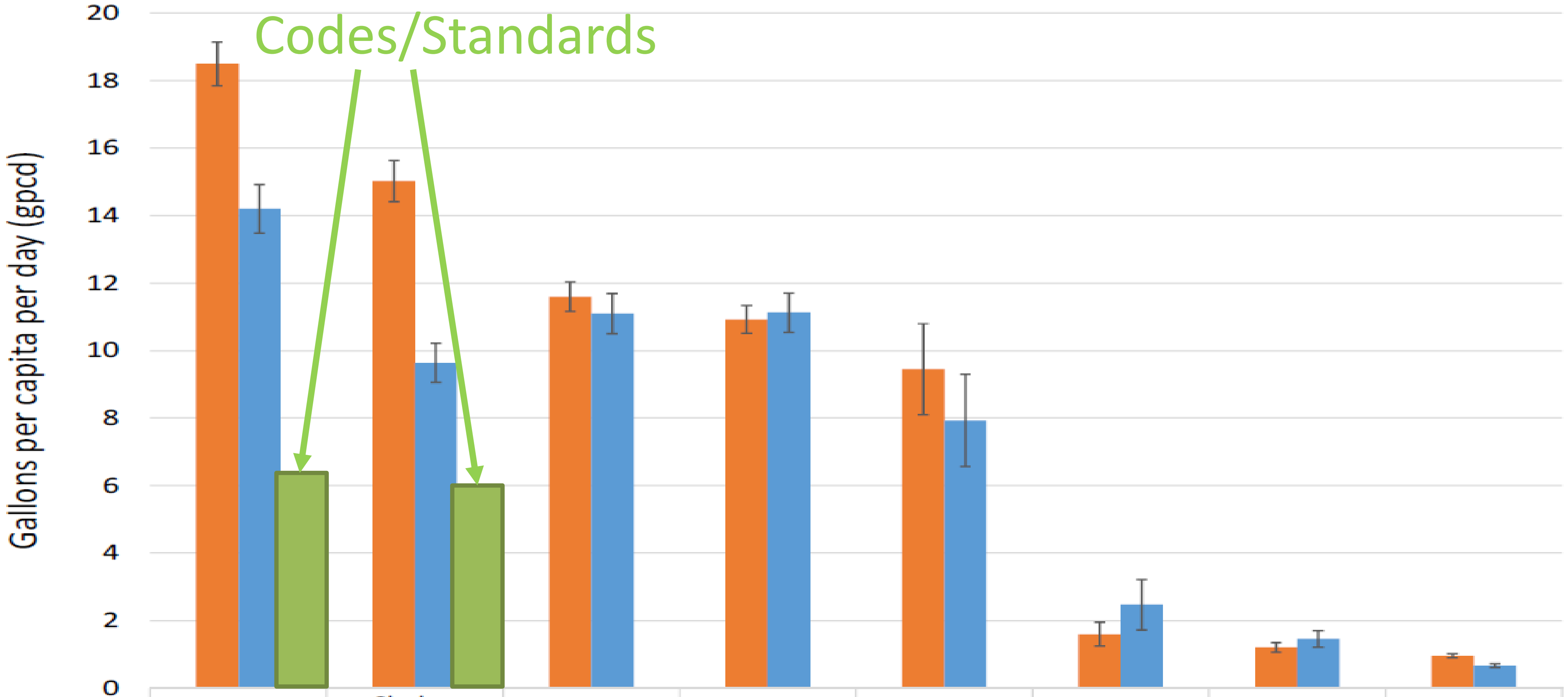
Baseline Water Use - 2017 District Plan

Single Family GPCD Weighted Average = **53**

Multifamily GPCD Weighted Average = **46**

See Table 4-4 for your county's average

1999 Avg; 2016 Avg; & Codes/Standards



	Toilet	Clothes washer	Shower	Faucet	Leak	Other	Bath	Dishwasher
REU1999	18.5	15.0	11.6	10.9	9.5	1.6	1.2	1.0
REU2016	14.2	9.6	11.1	11.1	7.9	2.5	1.5	0.7

Figure ES.3 Indoor per capita water use - REU1999 and REU2016

Codes/Standards and Market Trends

Fixture	Codes / Standards	Market Trends
Toilet	1.28 gpf	1.1 gpf, 1.0 gpf, 0.8 gpf
Showerhead	2.5 gpm	2.0 gpm, 1.8 gpm, 1.5 gpm
Clothes Washer	20 gallons per load	14 gallons per load
Kitchen Faucet	2.0 gpm	1.8 gpm, 1.5 gpm
Lavatory Faucet	1.5 gpm	1.2 gpm
Leak Detection	None	Utility leak notices; behind the meter tech

Estimating Indoor Use in New/Renovated Residential

-Indoor usage frequency and duration relatively stable across utilities (e.g. 5 toilet flushes per person per day; average shower is ~460 to 480 seconds)

-Indoor usage frequency and duration relatively stable in WRF REU 1999, REU 2016, and other studies

-WRF data is limited to single-family homes, but no reason to expect multifamily usage frequency and duration to vary significantly

-Dominant driver of total water use is plumbing fixture and appliance efficiency from home to home

WaterSense New Homes Tools for Estimating Water Use

So what is the gpcd indoor water use for new/renovated single and multifamily residences?

Step 1 – We are seeking utility partners who want to examine water use in new / substantially renovated single-family and multi-family developments in their service areas

Step 2 – District staff will use WRF and WaterSense data to estimate indoor water use in gpcd at the chosen developments

Step 3 – District and utility staff will use billing data and customer surveys to determine actual indoor water use in gpcd at the chosen developments

Step 4 – District and utility staff will document and present findings on actual indoor water in chosen developments and potential planning and design implications

Questions and Discussion

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@NorthGAWater

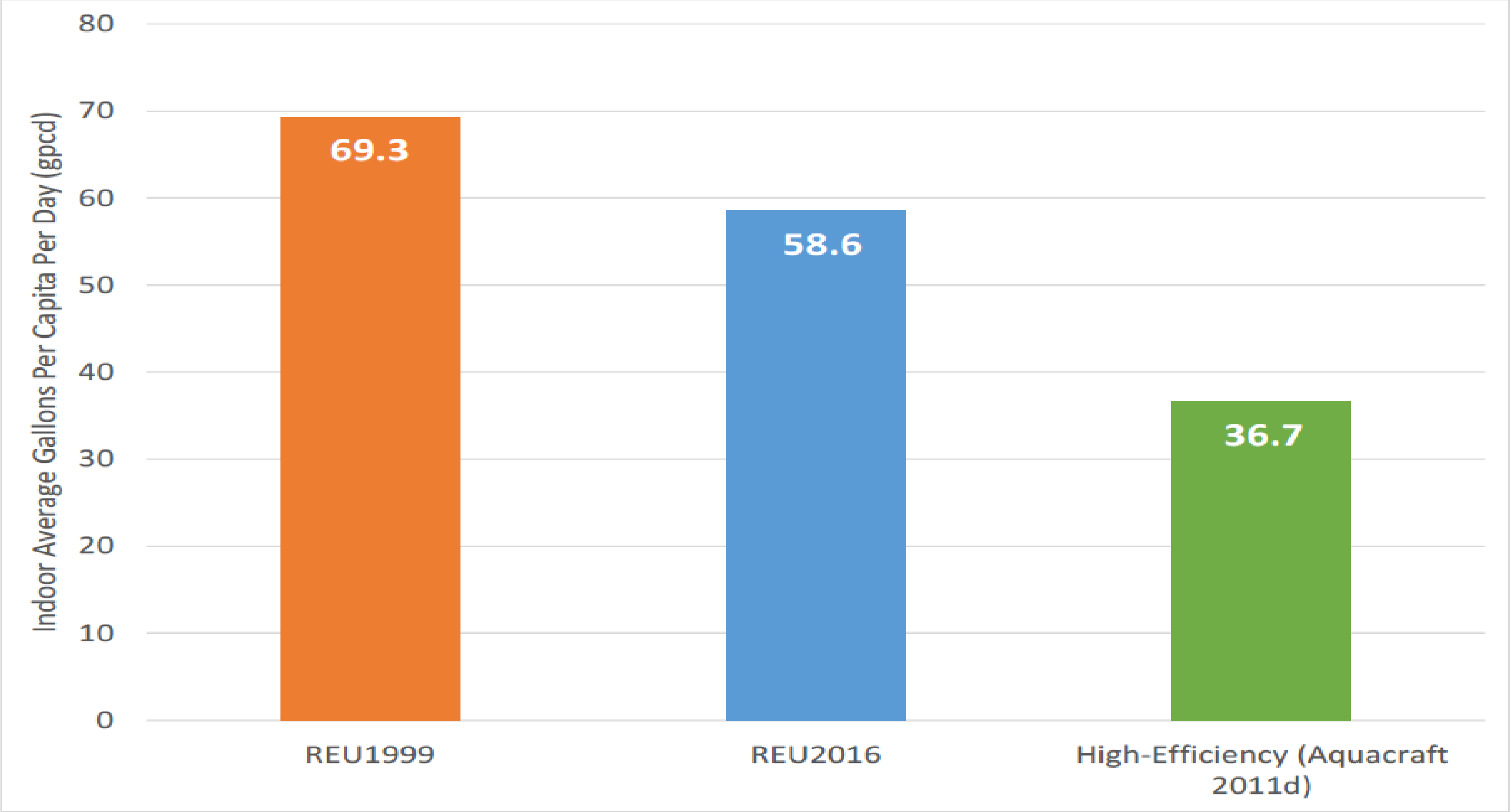
Andrew D. Morris
Water Policy Officer
amorris@northgeorgiawater.com
470.378.1549

Indoor Water Trends and Wastewater Infrastructure Implications

Danny Johnson
Manager
Metropolitan North Georgia Water Planning District

August 21, 2019
WW TCC

Indoor Water Use Average – 1999, 2016, High-Efficiency



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So what impacts do these trends have on wastewater infrastructure ?

- Plant capacity
- Plant process control
- Sewer capacity
- Sewer flushing velocity
- Corrosion
- Pump station impacts
- Energy costs
- Others?

Theoretical Change in Concentration

	District Plan Year			
	2003 (1999)	**2009 (2006)**	**2017 (2011-2014)**	**High Efficiency Home**
Indoor gpcd	70	69	53	36.7
I&I (2003 held constant)	14	14	14	14
Estimated gpc Wastewater Generation	84	83	67	50.7
Theoretical Change in Concentration of Equivalent Pollutant Load	**1**	**1.0**	**1.3**	**1.7**

RESEARCH STUDIES

Effects of water conservation on sanitary sewers and wastewater treatment plants

DeZellar, Maier
1980

1975-1977 Northern California Drought

Surveyed the effect of conservation on wastewater quantity and quality during the 1975-1977 drought

Included 14 wastewater treatment plants of varying sizes (0.033 to 90.6 MGD)

General Findings

- Flow
  - 13 of the 14 plants experienced decreased flows between 15% and 61%
    - Three largest – 15% to 17%
    - Three smallest– 33% to 61%
- BOD
  - Concentrations generally increased between 25% and 40%
  - Three largest – 12% to 31%
  - Three smallest– 6% to 61%

General Findings

- Garbage disposals
  - Some saw per capita BOD and TSS reductions due to declining use of garbage disposals, which were not allowed by some communities' conservation plans
- Solids settling
  - Possible reduction in per capita loading at the treatment plant due to reduced velocity settling in pipelines
- Nitrogen, sulfer, and phosphate
  - Effects not precisely defined

General Findings

- Wastewater treatment processes modeled
  - Predict effluent benefits from longer residence time
  - Lower total operational costs due to hydraulic loading reductions but higher costs to treat 1,000 gal
- Additional costs related to increased odor control needs should be anticipated
- Other effects on unit processes discussed
- Recommendations included for future designs of collection systems and treatment trains

A mathematical model to plan for long-term effects of water conservation choices on dry weather wastewater flows and concentrations

Lauren M. Cook, Constantine Samara, Jeanne M. VanBriesen
Carnegie Mellon University
2018

Purpose of model

"The model could be used by wastewater utilities to understand how interacting influences (e.g. rate of conservation, growth or decline of population, system infiltration) could result in a benefit (deferring plant expansion) or challenge (risk of low flow conditions) to the wastewater system as a result of conservation practices."

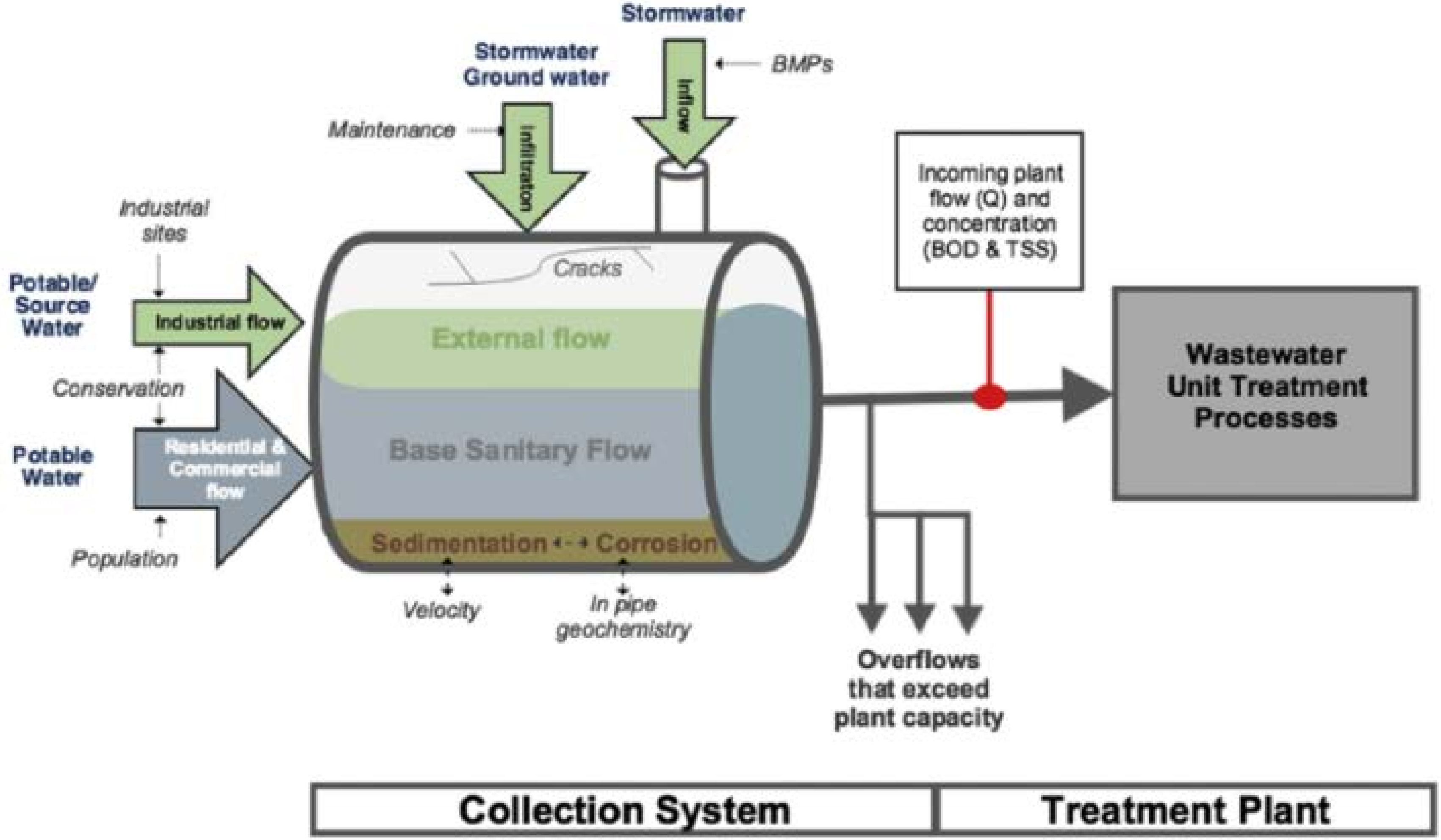

Fig. 1. Conceptual approach to modeling urban wastewater flows. External flows consist of industrial flow, infiltration, and inflow. Base sanitary flow consists of residential and commercial flow.

L.M. Cook et al. / Journal of Environmental Management 206 (2018) 684–697 693

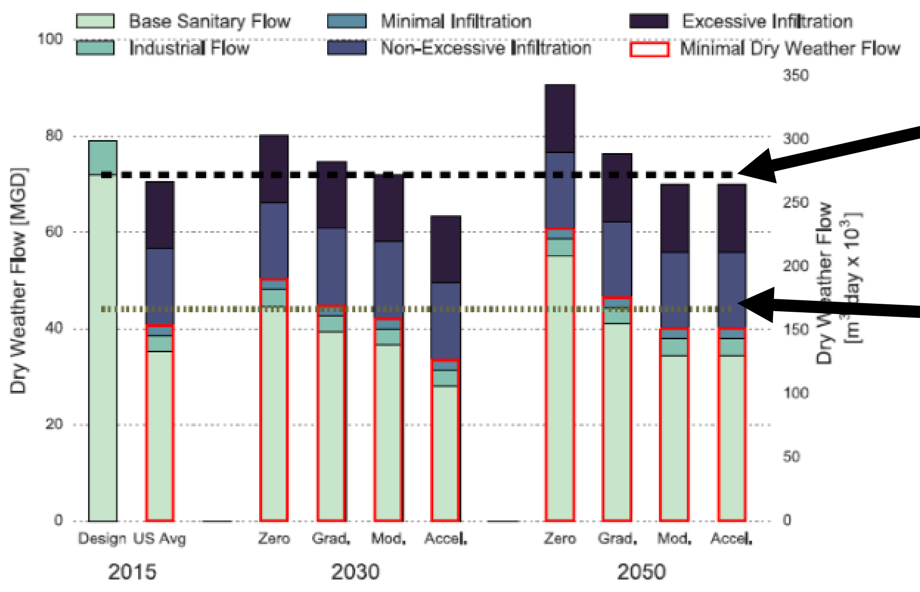

Fig. 3. Dry weather flow for design and initial conditions (first group of bars) and for two time points: 2030 (second group of bars) and 2050 (third group). Projections shown for each conservation scenario. Threshold for plant expansion is represented as a black, dashed line. Risk level 2 (20% decrease) is shown as a brown, dotted line. (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)

Upper Bound – Need for Expansion

Lower Bound – Critical Sedimentation/Corrosion Flows

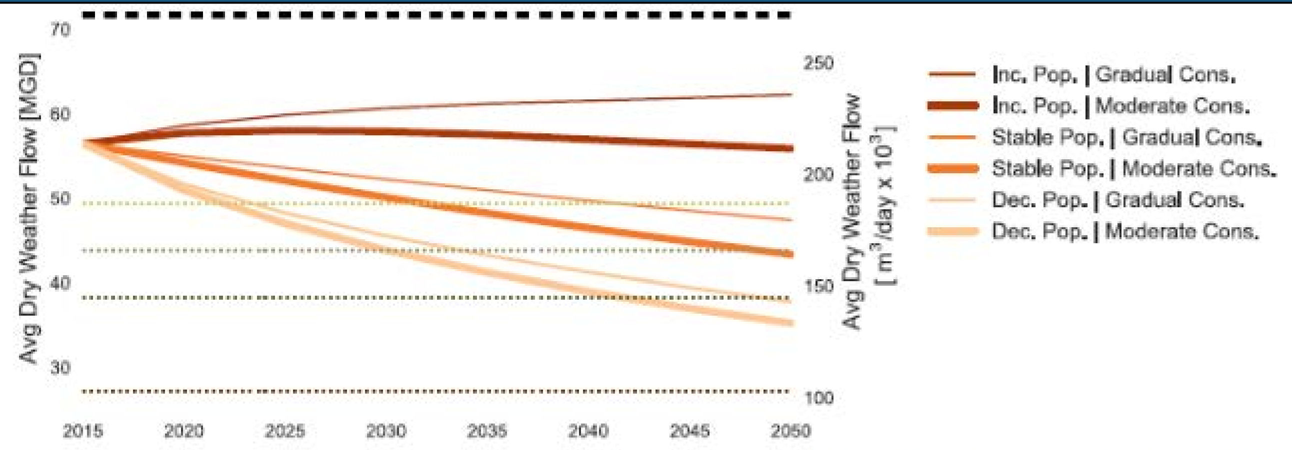

Fig. 4. Total dry weather flow over time under non-excessive infiltration with gradual conservation (thin lines) and moderate conservation (thick lines) for increasing population (top lines), stable population (middle lines), and decreasing population (bottom lines). Threshold for expansion represented as black, dashed line. Risk levels 1 to 4 shown as dotted, horizontal lines from top to bottom, respectively.

General Findings

- Reported the floor for indoor conservation in the US is 36.7 gpd per capita. However, this is likely not the floor based on market trends in efficiency in the United States. This is slightly higher than the 2011 level for indoor use in the Netherlands which is 34 gpcd.
- “The long-term effects of water conservation on wastewater collection and treatment systems are unknown.”
- Changes in concentration do occur as a result of conservation practices.

General Findings

- Systems with high levels of infiltration (~30% or more of total dry weather flow) will benefit the most from conservation practices since declines in per capita flow could delay the need for plant expansion or decrease the need for repairs due to I&I.
- Systems with low levels of infiltration (less than 5% of dry weather flow) are most at risk of negative effects from implementing conservation practices. These system may be at risk to setting or corrosion issues if the velocity falls below the level needed for self cleaning.
- Declines in per capita use lead to an increase in average dry weather pollutant concentrations; however increases are expected to be within the design tolerances of the wastewater plant (Metcalf & Eddy et al., 2003) as long as infiltration is not drastically increased or decreased.
- In example case, BOD5 and TSS influent concentrations never exceeded 600 and 700 mg/L and never fell below 200 mg/L.

General Findings

- Only systems with very large industrial flows (30% or more) should be concerned with declines in these flows due to conservation.
- Utilities should be less concerned about long-term changes in concentration as a result of conservation practices, and more concerned with impacts resulting from declines in flow [loss of flushing velocity].

Impact of water source management practices in residential areas on sewer networks - A review

Marleni, Sharma, Gray, Burn
Victoria University Melbourne
2012

General Findings

- Authors reviewed literature related to:
  - Water Demand Management
  - Greywater Recycling
  - Rainwater Harvesting
  - Sewer Mining

- Suggests that most of the source management practices will complicate odor, blockages, and corrosion in sewer systems, but rainwater harvesting might provide benefits to the system.

Takeaways

- Long term
  - Newly designed systems should consider sizing and loading implications from current plumbing code
  - Larger/older systems → Slow change → Easier to implement process and design changes over time
  - Smaller/newer systems → Review design assumptions and plan for operational changes
- Short term
  - Short term conservation strategies (e.g. required reductions) more likely to be disruptive

Potential for Further Study in the District

Comparison study of two or more sewersheds (new and old) to assess: flows, solids settling, water quality, corrosion indicators

Review of 2007-2008 drought response (10% reduction requirement, November 2007) and effect on influent and effluent data

Consider partnering with the Water Research Foundation or Alliance for Water Efficiency

Utility Partner(s) Needed

Other study needs?

Questions?

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Danny Johnson, PE
Manager
djohnson@northgeorgiawater.com
470.378.1552

Biosolids Task Force Update

- GAWP Residuals Committee
- Data collection effort
  - EPA ECHO data
  - GOES application
  - What data are you submitting through digital reporting?
- Connecting with regulators and agricultural community
- NPDES form update – email address being added
  - May help with future surveys

- Other?