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Information for Water Demand Analysis: Barriers and Best Practices

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Presentation Overview

Background

Project Objectives

Research Approach

Interview Results

Common Opportunities/Barriers

Recommendations/Conclusions

Project Background

WRF Project #4527

Evaluation of Customer Information and Data Processing Needs

Primary driver for study

Lack of consistent, standardized data to support planning and evaluation efforts

Primary focus of study

Identification of interim “best practices” for moving toward standards

Tailored Collaboration Study

Tampa Bay Water

Southern Nevada Water Authority

San Diego County Water Authority

Regional Municipality of York

Canadian National Water Efficiency Network

Use of Good Data Results in Better Decision Making

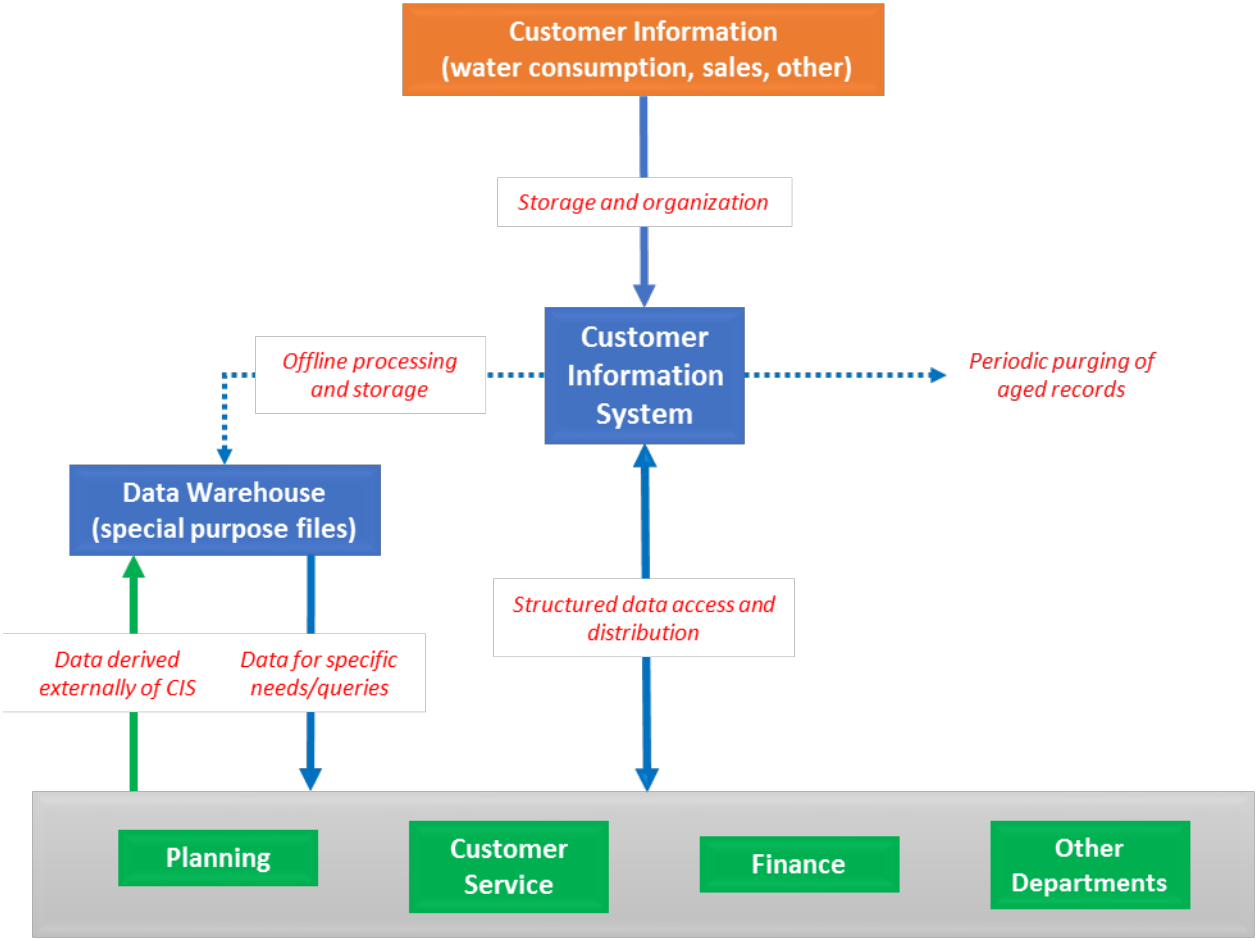
Project Objectives

To define the needs and establish priorities, if any, for improving the amount and quality of information used for water demand analysis, planning and management.

Project Approach

- Study used surveys to gather input / perspectives
  - Utilities (23 retail / 6 wholesale - telephone/written)
  - Government agencies (10 - written)
  - Consulting firms (7 - written)
- Questionnaire developed in collaboration w/WUWG
  - General use of customer water use data
  - Accessibility and quality of data
  - Classification of customers
  - Use and linkage of external data sources
  - Challenges and opportunities for improvement

Study focused on water billing data & related customer information used in evaluating & forecasting water use.



Source: Kiefer, J.C. and L.R. Krentz. 2016. *Evaluation of Customer Information and Data Processing Needs for Water Demand Analysis, Planning, and Management*. Denver: Water Research Foundation.

Generalized Model of Utility Management Processes

Customer Information Systems (CIS)

Primary Design Considerations

- Revenue collection is main driver
  - Information to process and send water bills
    - Billed consumption
    - Rate classes
    - Billing address
- Planning and evaluation seldom mentioned as a factor for influencing CIS design

Reported general uses of water use data

Planning

Long-term and short-term demand forecasting
Master water planning
Water resource planning
Conservation planning
Drought planning (curtailment potential)
Capital improvement planning
Financial planning

Evaluation and Monitoring

Forecast monitoring
Estimating non-revenue water
Evaluating efficiency programs
Water supply assessments
Conducting annual water distribution audits (M36)
Evaluation of price elasticity
Profiling water use
Regulatory reporting/compliance

Other

Distribution system sizing
Leak detection
Implementing meter change out programs
Proper meter sizing
Support of asset mgmt. / work order systems

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Utility Interviews

General Use, Access & Quality of Data

- Utilities generally satisfied w/amount and quality of data
- Most interested in classifying beyond categories currently in CIS…but most do not.
- Linkage to external sources
  - Majority indicated meters are geocoded either directly in CIS or in external GIS

Reported general uses of water use data

Planning

Statewide planning
Water efficiency planning
Reservoir reallocation
Regional water supply studies
Regional resources studies

Evaluation and Monitoring

Periodic withdrawal/water use surveys
Measurement/modeling consumption trends
Water demand forecasting
Water needs assessment
Metric development
Basin surveys

Other

Permitting water supply withdrawals
Evaluation of supply alternatives
Utility reporting guidance
Repositories for public use
Policy development

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Government Interviews

General Use, Access & Quality of Data

- Government agencies collect data through periodic collection/survey's.
- Reliance on providers in terms of disaggregation / classification…lack of authority to require more
- Agencies generally expressed satisfaction with quality of data…meet current needs
    - Some issues w/consistency / uniformity and disaggregation of by source / sector

Reported general uses of water use data

Planning

Water rate studies
Water demand forecasting
Water demand management plans
Water supply studies and master plans
Water shortage preparedness and planning

Evaluation and Monitoring

Residential per capita use
Efficiency benchmarks
Ranks and percentile analysis
Analysis of customer water use characteristics
Targeting of efficiency program participants
Commercial, Industrial, Institutional water audits
Water loss auditing / non-revenue water analysis
Water supply evaluation and needs assessments
Distribution system hydraulic modeling

Other

Applied research for understanding variability and trends in water use

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Consultant Interviews

General Use, Access & Quality of Data

- Level of disaggregation varies considerably
- Need for more refined, consistent customer classification (MF/NR)
- Linkage to external data not frequently made available by clients
- Survey group suggests geocoded data seldom made available…contrary to typical utility response
- Time collecting and processing data to support analysis:10-50%

Customer Classification

6 utilities w/MF classification

- Typically grouped with master-metered commercial accounts

13 utilities w/NR designations beyond General/NR

- Generally limited to 1-2 commercial, industrial or institutional classes - none w/all three CII sectors

10 retail utilities use external sources to further classify users

- Typically property/land use classes
- Wholesale utilities maintaining customer level data, classify according to local property use codes

Rate Classes
Single-Family
Multifamily
General/Nonresidential • Commercial • Industrial • Institutional • Government (Public/Muni)
Other • Irrigation • Agricultural

Linkage to External Data Sources

External data available from a variety of sources

- Tax Assessor / Census

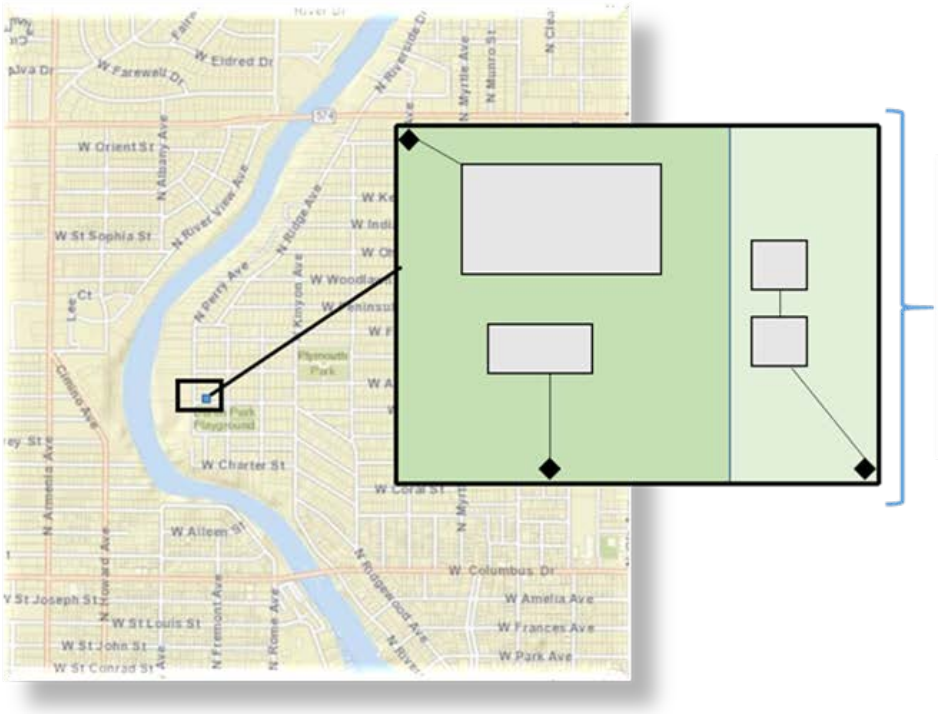
Potentially uses include

- classifying customers
- developing water use metrics
- characterizing water use patterns over time/geographic areas

Requires geocoding

- mapping address to the geographic coordinates of a parcel

Unique Water Using “Locations”



- ❑ 1 water use **location** associated with:
  - ❑ 1 business or function associated with:
    - ❑ 4 buildings
    - ❑ 2 tax parcels
    - ❑ 3 water meters

Associates metered water use records to the physical boundaries where water use occurs.

Source: Kiefer, J.C. and L.R. Krentz. 2016. *Evaluation of Customer Information and Data Processing Needs for Water Demand Analysis, Planning, and Management*. Denver: Water Research Foundation.

Common Opportunities for Improvement

Areas for Improvement Identified by Predominantly Retail Utilities		
Theme	**Area for Improvement**	**# Retail Utilities Identifying Improvement (n=23)**
Measures of Occupancy or Scale	Occupancy at residential properties	7
	Number of units served at multifamily properties	7
	Measures of occupancy or scale for CII facilities (employment, rooms, beds, etc.)	5
	Area measures (e.g., irrigated acres, lot size, square footage of buildings)	5
Customer Classification	Development of multifamily class or sub-classes	3
	Development of CII classes and sub-classes	8
Other Classifiable	More frequent time measurement	4
	Socioeconomic and demographic information	4
	Information on large users/process use	2
	Geographic capabilities and matching	4
	Year of construction	2
	Better/additional contact information	2

Source: Kiefer, J.C. and L.R. Krentz. 2016. *Evaluation of Customer Information and Data Processing Needs for Water Demand Analysis, Planning, and Management*. Denver: Water Research Foundation.c

Common Challenges

Barriers for Making Identified Improvements

Agency or departmental priorities and incentives

Availability of resources and skills

Ability to estimate and demonstrate value

Importance of Water Demand Research

Residential End Uses Study Update (4309)

Methodology for Evaluating Water Use in CII Sectors (4375)

Water Use in the Multifamily Housing Sector (4554)

Changes in Water Use under Climate Change Scenarios (4263)

Water Demand Forecasting in Uncertain Times: Isolating the Effects of the Great Recession (4458)

Common Obstacles

Classification

Linkage to explanatory data

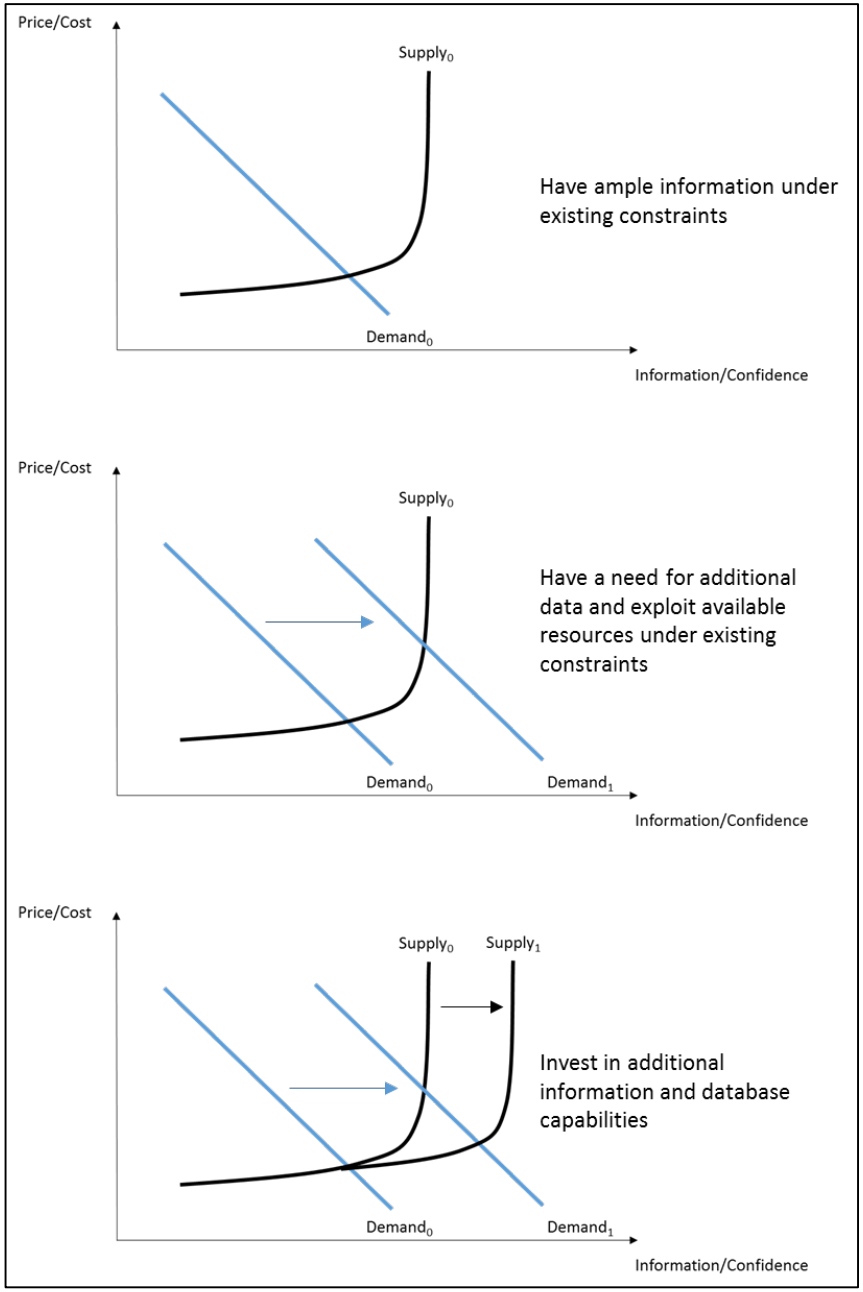
Amount of historical data available

Consistency across places

Segments of the Water Utility Community

With respect to information needs for planning:

1. Those without pressing needs for additional information
2. Those that work within constraints of data available within their organization and data management systems
3. Those who have already invested in or are actively seeking additional data and processing capabilities



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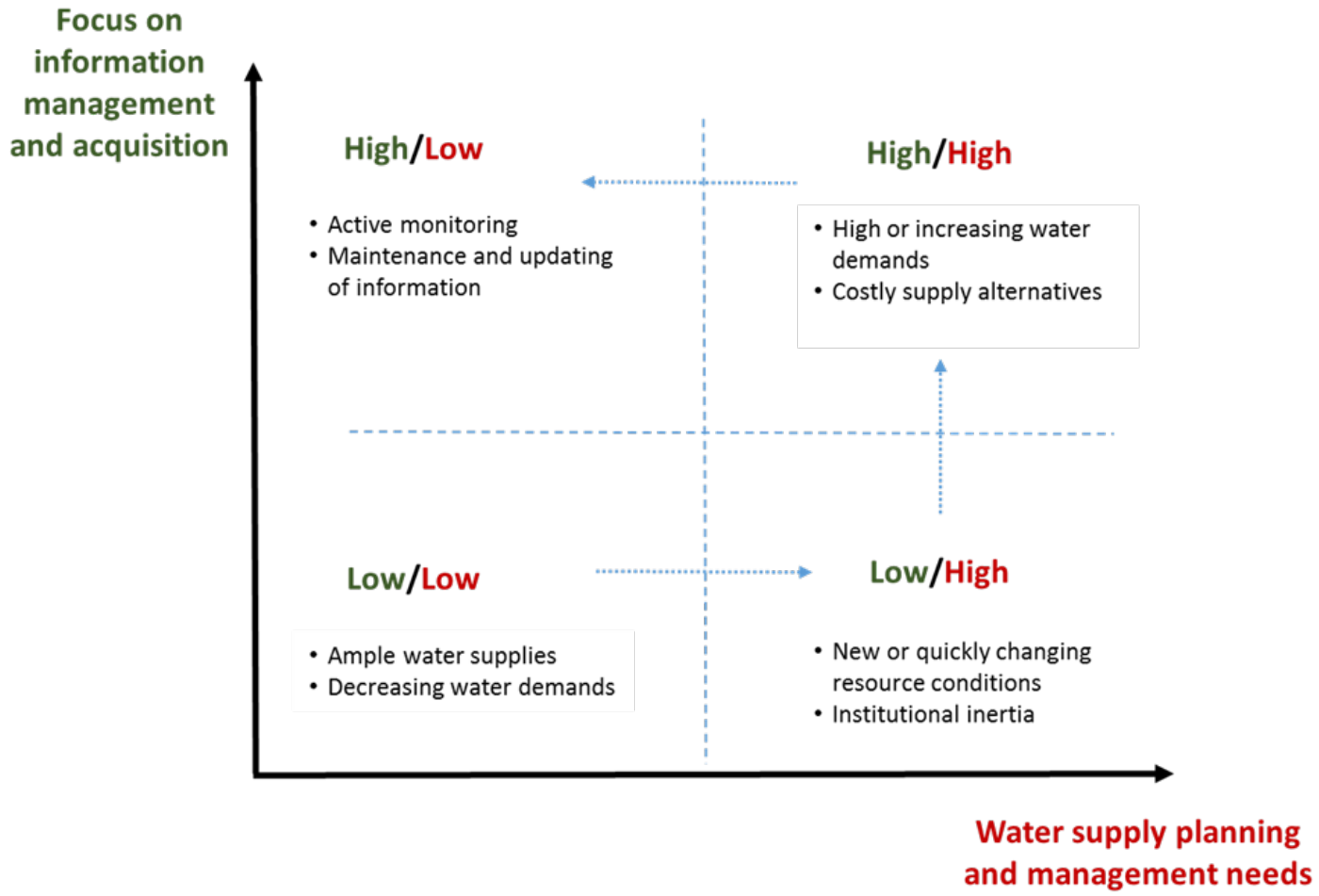
Evolution of Planning Needs and Information Management



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Recommendation #1

Standardization of water customer classes and adoption of uniform class definitions.

- List of 17 primary categories as an initial basis for future refinements
- Supports more refined evaluation of trends and water use modeling
- Provides better level of detail for deriving water use metrics
- Permit more meaningful comparisons across utilities

Initial Recommended Customer Classification Scheme

No.	Principal Category	Example Potential Subcategories
1	Single-family Residential	Single-family homes
2	Multifamily Residential	Duplex
		Triplex
		Apartments buildings
		Mobile home parks
3	Dominant End Use	Commercial/industrial laundries
		Laundromats
		Car washes
		City parks and recreation areas
		Public pools and water parks
		Golf courses
		Landscape irrigation—only
4	Lodging	Hotels and motels without irrigation & cooling
		Hotels and motels with irrigation & cooling
		Resort/large convention hotels
5	Office Buildings	Large office with cooling towers
		Office complexes with irrigation
		Small office without cooling towers and irrigation
6	Schools	Pre-schools and daycare
		Primary and secondary schools
		Universities/college campuses
7	Health Care	Hospitals and sanitariums
		Medical centers, doctor offices, and labs
8	Eating Places	Full service restaurants
		Fast food outlets
		Bakeries & cafeterias
9	Retail Stores	Shopping centers and malls
		Grocery stores and supermarkets
		Convenience stores
10	Warehouses	Warehousing cold storage
		Other warehouses
11	Auto Service	Auto service
12	Religious Buildings	Religious buildings
13	Retirement Homes	Long-term nursing homes
		Retirement homes
14	Manufacturing	Heavy industry plants
		Light industry plants
		Food and beverage processing plants
		Other manufacturing establishments
15	Largest CII Customers	Top quantity customers
16	Other Commercial	Personal services (beauty shops, health spas, fitness)
		Miscellaneous commercial
17	Other Institutional	Correctional facilities
		Group live-in shelters
		Miscellaneous institutional

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Benefits of Sub-classification

Sub-classification permits establishment of more homogeneous groups for analysis/metric development

- Multifamily, vary in similarity w/single-family customers
  - Multiple dwelling units, master-metering, unique water end uses, common property
- Nonresidential, unique business or facility functions
  - Sub-classification can improve ability to evaluate water use patterns

Differentiating MF customers helps refine estimates of water use for all other sectors

Recommendation #2

Geographically referencing water customers and unique locations.

- Creates bridge between water use and property ownership or management data
- Permits aggregation to various geographic levels, where supplemental data may exist
- Associates metered water use records to the physical boundaries where water use occurs

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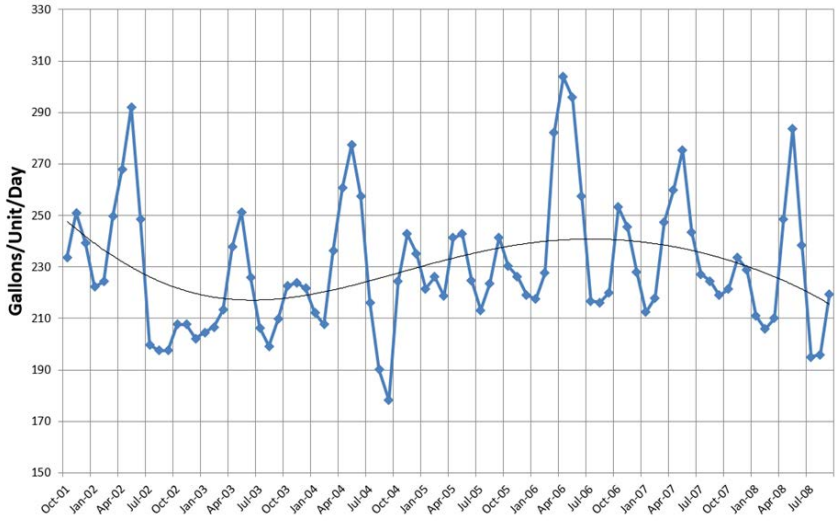
Recommendation #3

Creating and expanding the means for preserving historical water use and billing information

- Preserve minimum of 10 years metered water consumption history
- At any given time, the last decade of water usage trends can be examined
- Basis for examining past trends, developing alternative water use metrics and benchmarks, and modeling consumer behavior



Benefits of Standardized Data

Utility Benefits

- Improved, more robust knowledge base and metrics influencing
  - Water demand forecasts
  - Efficiency program development
  - Rate structures and pricing
  - Benchmarking
- Water utilities on the “front line” of this effort
- External benefits may exceed internal benefits

Benefits of Standardized Data

External Benefits

- Enhance quality of national, basin, regional assessments
  - Evaluating trends in residential use
  - Evaluating trends in CII
  - Estimating climate change impacts
  - Estimating economic impacts
  - Estimating trends in efficiency
- More refined Public and Domestic water withdrawal estimates for USGS surveys
- Basis for disaggregation for EPA's Portfolio Manager
- Alternative metrics for Planning and Regulatory agencies

Recommendations/Conclusions

Water Demand Data Committee

- Idea is to ensure that information benefits can be adequately captured across perspectives
  - Federal, state, regional water management agencies
  - Water utilities
  - Researchers
  - Consultants
- Finalize requirements of a standardized customer classification scheme and class definitions
- Establish a desirable set of water use metrics and the information needed to calculate them

Recommendations/Conclusions

Water Demand Data Committee (continued)

- Propose, design, and conduct focus groups and additional empirical research to elaborate on/develop solutions for common challenges
- Serve as proponent for:
  - Articulating the benefits of water use data standardization
  - Establishing a common vernacular on the topics of customer classification, water use metrics, and water data management

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Questions?

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