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2010 FSAWWA conference

Pre-Population and Calibration of EZ Guide 2

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Conserve Florida Water Clearinghouse

Topics to Cover

- Overview of Conserve Florida Water Clearinghouse
- Overview of EZ Guide 2.0
  - Goals and objectives
  - Data sources/ model structure/ approach
- Pre population: Create EZ Guide for any Florida utility/region
  - Overview of methodology
  - What is required from the utility?
  - Case study example
- Calibration: Refining the model
  - Overview of methodology
  - What is required from the utility?
  - Case study example

Goals of the Clearinghouse

- Be the premier source in Florida of water conservation information for public water supply, drawing upon information and expertise from throughout the utility sector, the water management districts, the state university system, and other sources
- Help Florida become a national leader in water use efficiency

Core Services of the Clearinghouse

1. Develop a water conservation model
    - Current version is an Excel based model called EZ Guide 2.0
2. Establish and develop a water conservation library
3. Establish and refine an integrated data Infrastructure
4. Provide technical assistance
5. Develop a research agenda/program
6. Provide outreach to users

Conserve Florida Water Clearinghouse

Promoting Conservation in Our Public Water Supplies

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- EZ GUIDE
- LIBRARY
- TECHNICAL ASSISTANCE
- CLEARINGHOUSE PUBLICATIONS
- OUTREACH
- LINKS

DO YOU KNOW EVERYTHING YOU NEED TO KNOW ABOUT WATER CONSERVATION?

SUBSCRIBE TO OUR MAILING LIST →

Or get our bi-weekly emails by sending an email to:
lists@conservefloridawater.org

Join our mailing list and get the latest information about Water Management Districts, water shortages, rules and regulations, related events, and more.

recent news

» Teams from Southern Methodist University and the University of Florida Win the 2010 WEF Student Design Competition

Get Information Here to Help You Conserve Water

Mission: The mission of the Conserve Florida Water Clearinghouse is to develop collaborative relationships with related programs, and to collect, analyze, and make available reliable information and technical assistance to public water supply utilities and water managers for use in developing effective and efficient water conservation programs.

upcoming events

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Conserve Florida Water Clearinghouse

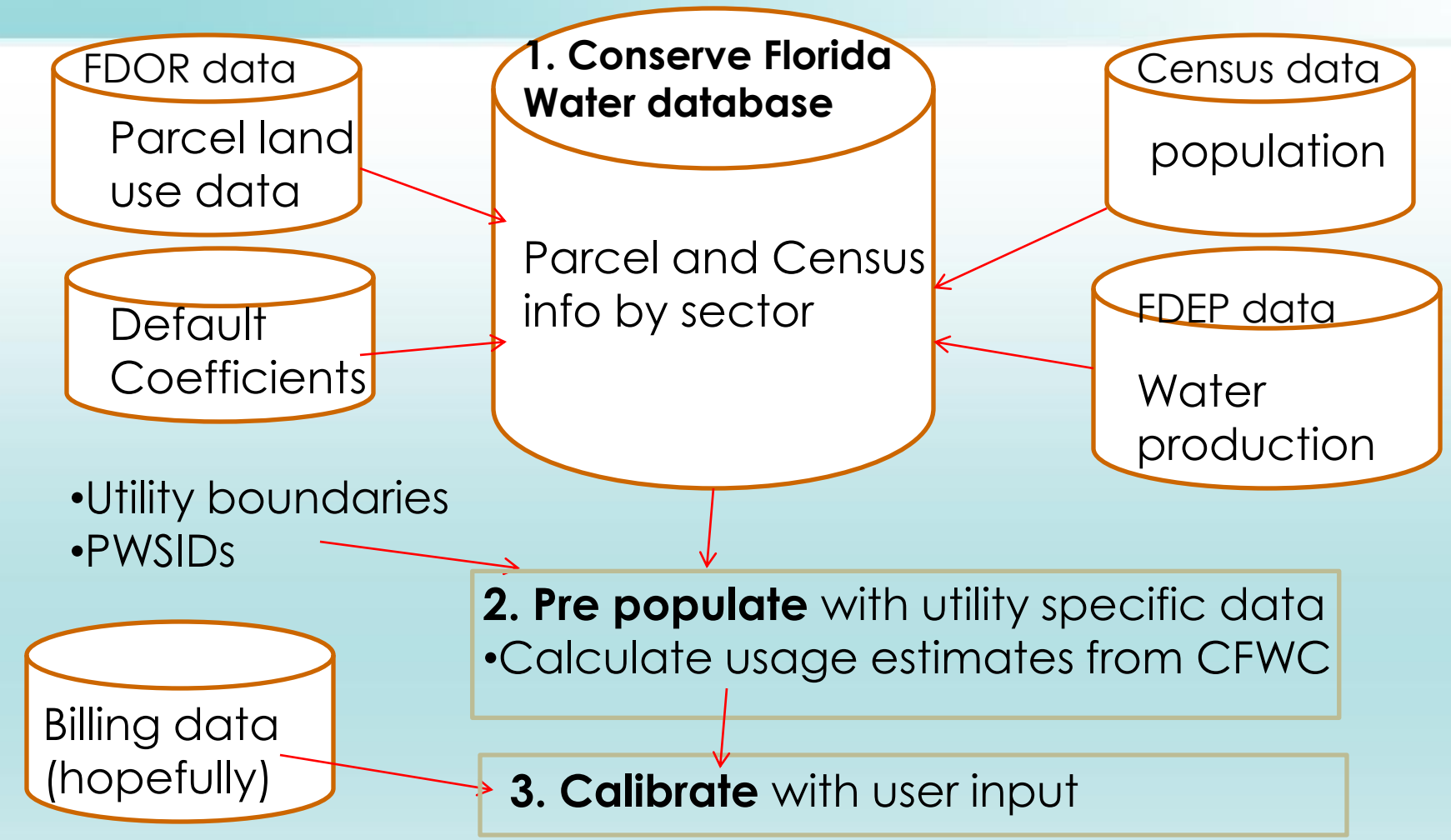
What is EZ Guide 2.0?

- EZ Guide 2.0 is an Excel based water conservation tool consisting of several analysis modules
- Profile: Basic utility information, water production
- Water Audit: Water losses, unaccounted-for water
- Utility Water Budget:
  - Water use by sector
  - End-use analysis, water use by fixture
- BMP Selection
- BMP Tracking
- Measures
- Reports

Introduction

- Purposes of EZ Guide
  - Illustrate utility system characteristics
  - Identify water conservation practices that maximize water savings and cost effectiveness
  - Assist in tailoring a conservation program to high water use sectors/customers
  - Provide a uniform framework to allow consistent conservation program comparisons between utilities

EZ Guide 2.0 Workflow



Conserve Florida Water Clearinghouse Data Services

Centralized resource for water production data:

- Water production numbers from FDEP's Monthly Operation Reports (MOR)
  - Monthly treated supply 1999-present

- Water production capacity and number of connections from the Basic Facility Reports (BFR) published by FDEP
  - number of accounts
  - population served

Conserve Florida Water Clearinghouse Databases

Centralized resource for population, and land use information:

- Population data from the U.S. Census
  - Average household size per block
- Parcel level land use data from Florida Department of Revenue (FDOR)
  - DOR use code
  - Parcel area (from GIS geometry)
  - Number of residential units
  - Effective area
  - Effective year built

Basic Facility Report Query Interface - BFR Query results are limited to 500 rows; MOR is limited to 400,000 rows

County Name: –Select County– City: Zip Code:

Mailing Name: PWSID: 3484119 Type: –Select Type–

Get BFR Data

BFR Total Records: 1; Preview MOR records: 25; Total MOR Records: 636; Estimated File Size (MB): 0.06

Basic Facility Reports (BFR) - Click on column header to sort the column

	Status Date	District	County Number	County Name	PWSID	Type	Surface Source	Ground Source	Mailing Name	Address1
☑	10-18-2009	3	58	ORANGE	3484119	COMMUNITY	NA	Y	OCUD/SOUTHERN WATER SY	HUNTERS CREEK

Get MOR Data Based on Row(s) Selected

Preview: Detail - Monthly Operation Reports (MOR); To Preview corresponding MOR data click on one or more rows in BFR grid

PWSID	System Name	Plant Name	Plant Number	Design Capacity	Status	Max Treated	Average Treated	Date Reported
3484119	OCUD/SOUTH REGIONAL WATER	CYPRESS WALK (3.139MGD)	1	24901000	ACTIVE	1959000	1077000	01-01-1999
3484119	OCUD/SOUTH REGIONAL WATER	VISTANA (4.464MGD)	2		ACTIVE	3490000	2413000	01-01-1999
3484119	OCUD/SOUTH REGIONAL WATER	ORANGEWOOD (10.8 MGD)	3		ACTIVE	3979000	2421000	01-01-1999
3484119	OCUD/SOUTH REGIONAL WATER	HUNTERS CREEK (5.498MGD)	4		ACTIVE	3207000	2088000	01-01-1999
3484119	OCUD/SOUTH REGIONAL WATER	CYPRESS WALK (3.139MGD)	1	24901000	ACTIVE	1256000	1068000	02-01-1999
3484119	OCUD/SOUTH REGIONAL WATER	VISTANA (4.464MGD)	2		ACTIVE	4630000	2761000	02-01-1999

Save MOR Data to File

Pre population

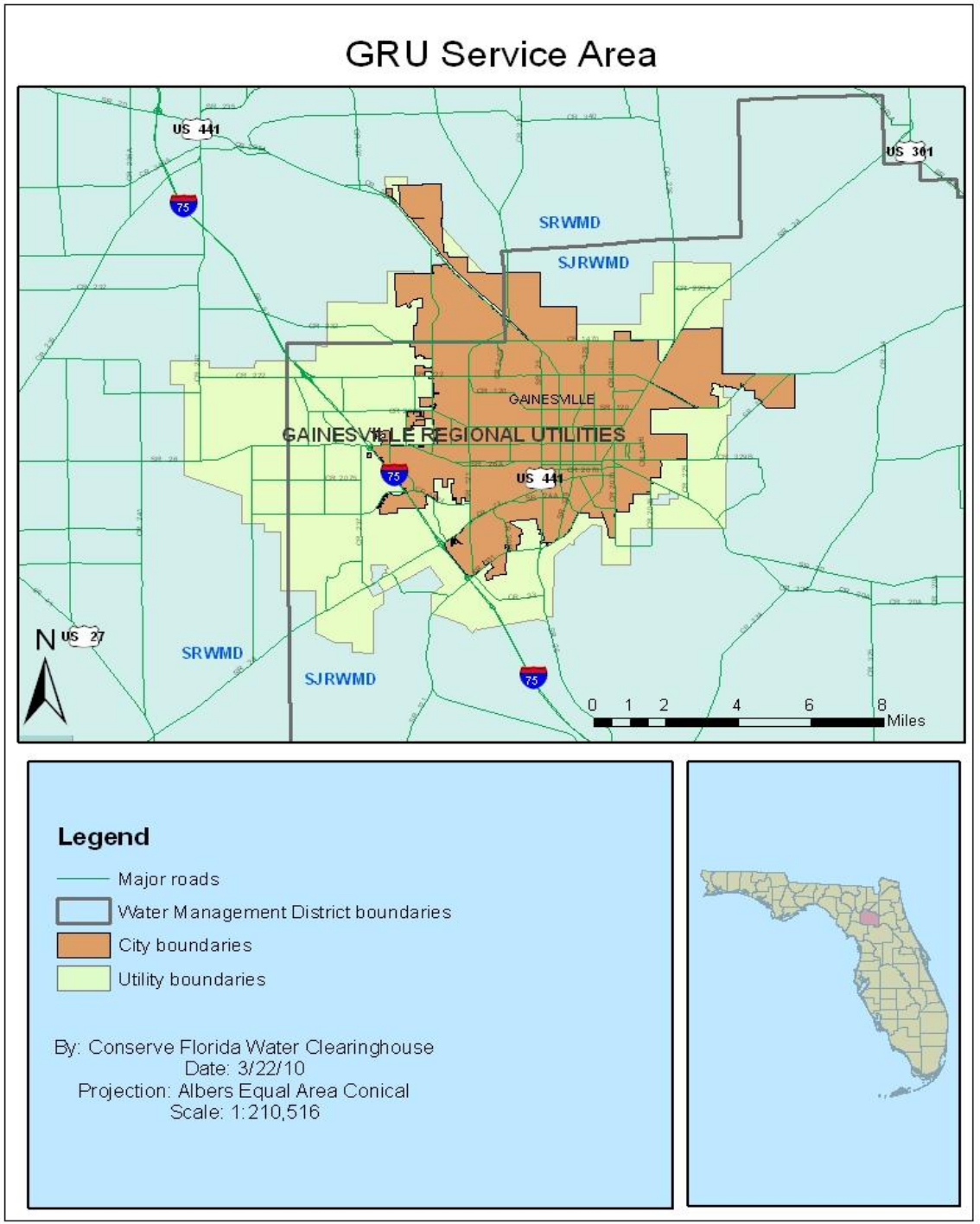
- CFWC database has land use data for all Florida parcels
  - **Need utility boundary to select parcels in service area**
- CFWC database has water production data for all treatment plants in Florida
  - **Need PWSID(s) to select which plants are served by the utility**
- This information is given to CFWC upon EZ Guide request
- EZ Guide is run, initial sectoral water usage estimates determined
- Pre population time not dependent on utility size

DOR/ Census Data

- The combination of DOR and Census parcel data allows for parcel level water usage estimates
- DOR parcel data available for every parcel in Florida.
- Census data available for every block within Florida
  - CFWC has merged these two datasets together (all parcels assigned to respective blocks)
- DOR does not provide parcel-utility link
- DOR does provide the City and zip code for each parcel, although these boundaries are not necessarily contiguous with utility boundaries
- Therefore utility boundaries needed to select DOR parcels a utility serves

Example Service Area Boundary

- All parcels within the boundary are selected for analysis
- Boundaries come from either:
  - Utilities directly
  - WMDs



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Water Production Data

- Monthly Operational Report Flow data/ Basic Facility Report
  - Available for every utility in Florida
  - Provides monthly treated water produced, number of service connections, number of plants, etc.
  - PWSID is the unique identifier for a utility in this database
  - Utility names can be used, although similar names exist.
    - IF PWSIDs of utilities of interest not known, some collaboration may be needed if MOR record not obvious based on name alone
    - Usually only an issue if utility has multiple PWSIDs

Initial water use estimates

- After pre population, EZ Guide is run to generate water use estimates by sector (from FDOR/Census data)
- These estimates are compared to FDEP data for accuracy
- **Calibration:** systematic procedure used to adjust initial estimates to match measured flow data

Sector	% of Total Water Use	Breakdown of Gross gpcd	Breakdown of Gal/Htd. Sq. Ft.
Single Family	58.0%	91	3.21
Single Family Indoor	36.9%	58	2.04
Single Family Outdoor	21.1%	33	1.17
Multi-Family	3.0%	5	2.61
Commercial	12.9%	20	5.46
Industrial	0.1%	0	4.88
Institutional	11.0%	17	4.40
Unaccounted For	15.0%	24	0.62
TOTAL	100.0%	157	4.15

	FDEP Data	CFWC Estimate	% Differen
Total Number of Accounts	4,747	4,468	-5.9%
Population Served	15,500	10,114	-34.8%
Total Water Use (MGY)	655.30	581.66	-11.2%

Calibration of number of accounts and population

- Check service area boundaries
  - Up to date?
  - Accurate?
  - Any "holes"
- Adjust number of CII accounts from local records
  - SFR, MFR methodology being developed
- FDEP population may not be accurate, not vital to match with estimate
  - Adjust average persons per house

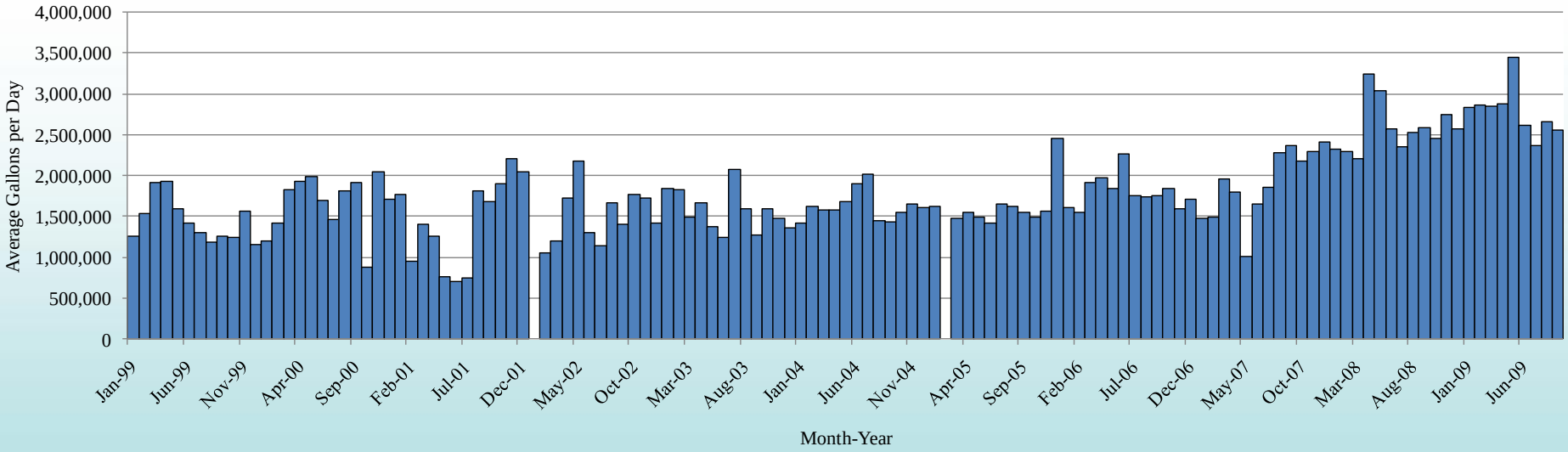
Calibrate Water Usage

- Start by ensuring FDEP flow data is accurate, then calibrate:
- Pick representative analysis year based on FDEP flow analysis
- Many calibration parameters
  - Fixture service lives, water loss %, irrigation application rates, percent of customers on/off irrigation system, % with sprinklers
- Rely on local data, if possible
- Billing data greatly enhances calibration

Case Study EZ Guide Calibration

- Approximately 30 EZ Guides requested, pre-populated, and sent to user
  - Includes small/large utilities and planning regions
  - In some cases, detailed calibration with CFWC was done
- A SFWMD utility will be used as an example of detailed calibration procedures
  - PWSID and utility boundary provided to CFWC by utility
    - Several modifications to boundary through collaboration
  - Collaboration between utility, SFWMD, and CFWC to calibrate model

FDEP Flow Analysis



After pre-population, CFWC noticed 2007-2009 treated supply much higher than previous years.

Initially choose 2006 as analysis year.

FDEP Flow Analysis

Before

FDEP Basic Facility Report	
Analysis Year	2006
Design Capacity (gal./day)	5,130,000
Number of Plants	2
Number of Service Connections	4,747
Population Served	15,500
Population Sold to	300

Reported Year	Million Gallons per Month
Treated water imported	0.000
Treated water exported	0.000

After

FDEP Basic Facility Report	
Analysis Year	2008
Design Capacity (gal./day)	5,130,000
Number of Plants	2
Number of Service Connections	4,747
Population Served	12,427
Population Sold to	300

Reported Year	Million Gallons per Month
Treated water imported	0.000
Treated water exported	0.825

Calibration: Utility exported water beginning in 2007

2008 chosen as analysis year

Water Budget Calibration

Watering Restrictions (Days/Week)	2

Irrigable Area Application Rates	
With Sprinkler, in./month	Without Sprinkler, in./month
2.00	1.25

	Pre-1983	1983-1994	Post-1994	Overall
Total number of SFR accounts	618	594	2,653	3,865
% of accounts automatic sprinklers	9%	23%	61%	47%
Number of SFR accounts with automatic sprinklers	56	137	1,618	1,811
% of SFR accounts with sprinklers that irrigate from the potable system	50%	50%	50%	50%
Number of SFR accounts not having automatic sprinklers	562	457	1,035	2,054
% of SFR accounts not having automatic sprinklers that irrigate regularly from the potable system	25%	25%	25%	25%

Watering Restrictions (Days/Week)	2

Irrigable Area Application Rates	
With Sprinkler, in./month	Without Sprinkler, in./month
3.00	1.25

	Pre-1983	1983-1994	Post-1994	Overall
Total number of SFR accounts	618	594	2,653	3,865
% of accounts automatic sprinklers	90%	90%	95%	93%
Number of SFR accounts with automatic sprinklers	556	535	2,520	3,611
% of SFR accounts with sprinklers that irrigate from the potable system	75%	75%	75%	75%
Number of SFR accounts not having automatic sprinklers	62	59	133	254
% of SFR accounts not having automatic sprinklers that irrigate regularly from the potable system	25%	25%	25%	25%

- Water loss changed to 9.9% from utility records
- CII accounts adjusted from utility records
- Initial irrigation estimates were low
- Application rate:
  - From 2 to 3"/mo (w/ sprinkler)
- Increase in % on system and % with sprinkler

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Water Budget Calibration Summary

Before

	FDEP Data	CFWC Estimate	% Differen
Total Number of Accounts	4,747	4,468	-5.9%
Population Served	15,500	10,114	-34.8%
Total Water Use (MGY)	655.30	581.66	-11.2%

After

	FDEP Data	CFWC Estimate	% Differen
Total Number of Accounts	4,747	4,556	-4.0%
Population Served	12,427	10,114	-18.6%
Total Water Use (MGY)	932.94	930.62	-0.2%

- Iterative calibration process:
  - make changes from local data, check error, make changes on other parameters, ….
  - Check number of accounts first
    - Check service area boundaries
    - Calibrate estimates
  - Check water usage error
    - Ensure FDEP data is correct/ adjust if necessary
    - Water audit
    - Calibrate estimates (billing data helpful)

BMP Optimization

- Once calibrated, optimization conducted to determine best mix of BMPs for demand reduction
- Current gpcd after calibration for case study: 252
  - Utility had estimated 250 based on their records
- Wanted to model 22 gpcd reduction (to get to 230 gpcd)
- Model output:
  - Retrofit a blend of 24,750 toilets, clothes washers, faucets, and showerheads for $4 million
- Outdoor retrofits thought to be an option for further reduction

Summary and Conclusions

- CFWC provides several services for a wide variety of applications
- EZ Guide 2.0 can be pre populated for any utility in Florida
  - PWSID(s) and utility boundaries required
- Calibration requires user to verify estimates, make adjustments with local data if possible
  - Collaboration with CFWC
- EZ Guide 2.0 has a wide variety of applications
  - Historical production analysis, system audit, water use by sector, conservation potential, etc.
  - Conservation planning, regional water supply planning, etc.