



Technologies and Techniques to Increase Landscape Irrigation Efficiency and Conserve Water

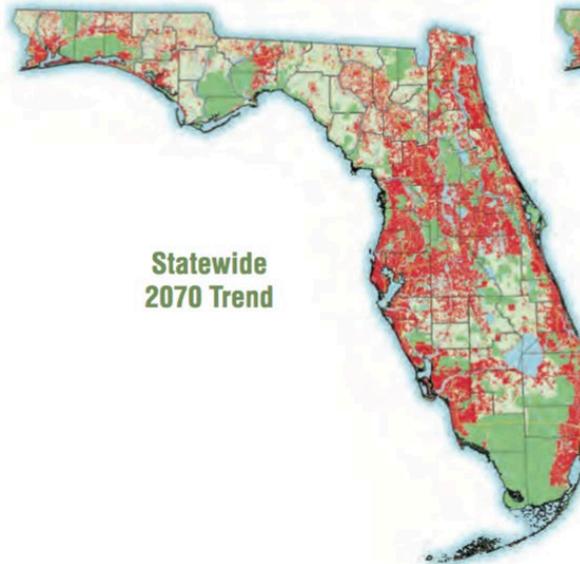
UF Water Institute Symposium
Feb. 25-26, Gainesville, FL

Michael D. Dukes, PhD., P.E., C.I.D.

Agricultural & Biological Engineering
University of Florida/IFAS

Florida in 2018

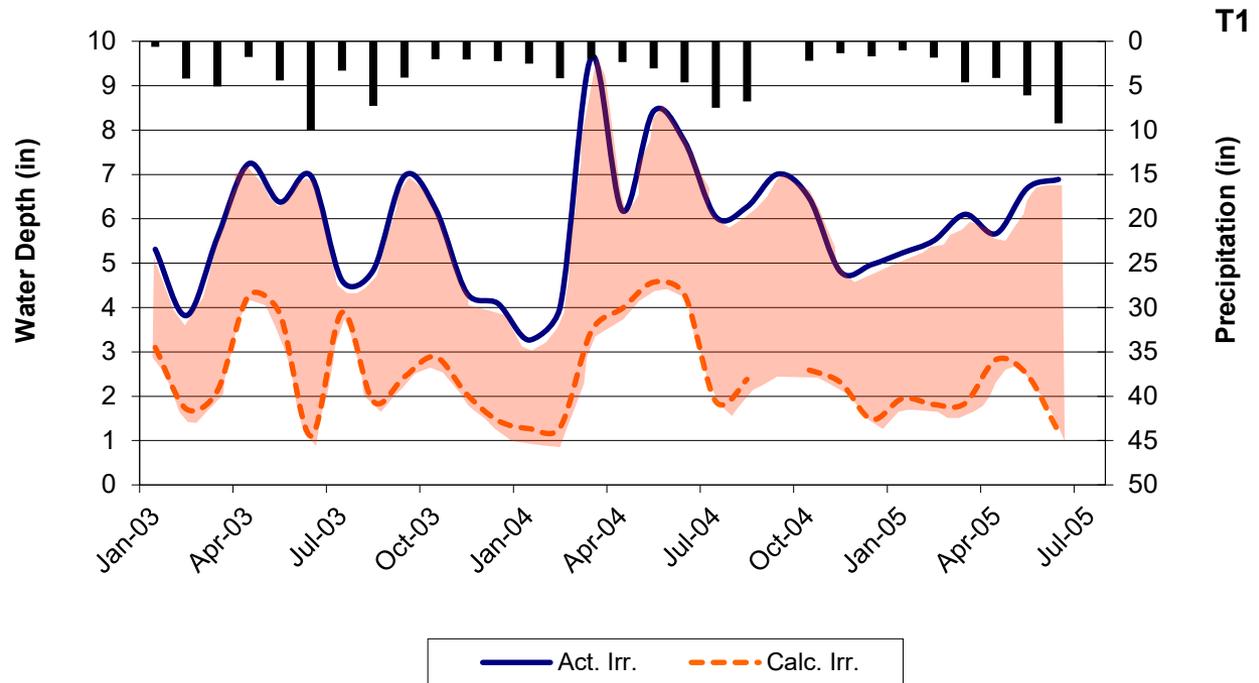
- 4th fastest growing state
- 20.61 million as of 2018



From Florida 2070: <http://1000friendsofflorida.org/florida2070/>

Central Florida - Typical Irrigator

- Irrigation:
 - Actual, 70 inches/yr
 - Max need, <30 inches/yr
- Rainfall, 50 inches/yr



Water 2070

- +15 million people
- Development related water demand +100%
- **“The single most effective strategy to reduce water demand in Florida is to significantly reduce the amount of water used for landscape irrigation.”**

<http://1000friendsofflorida.org/water2070/wp-content/uploads/2016/11/water2070summaryreportfinal.pdf>



Misaligned Sprinklers



Broken Sprinklers

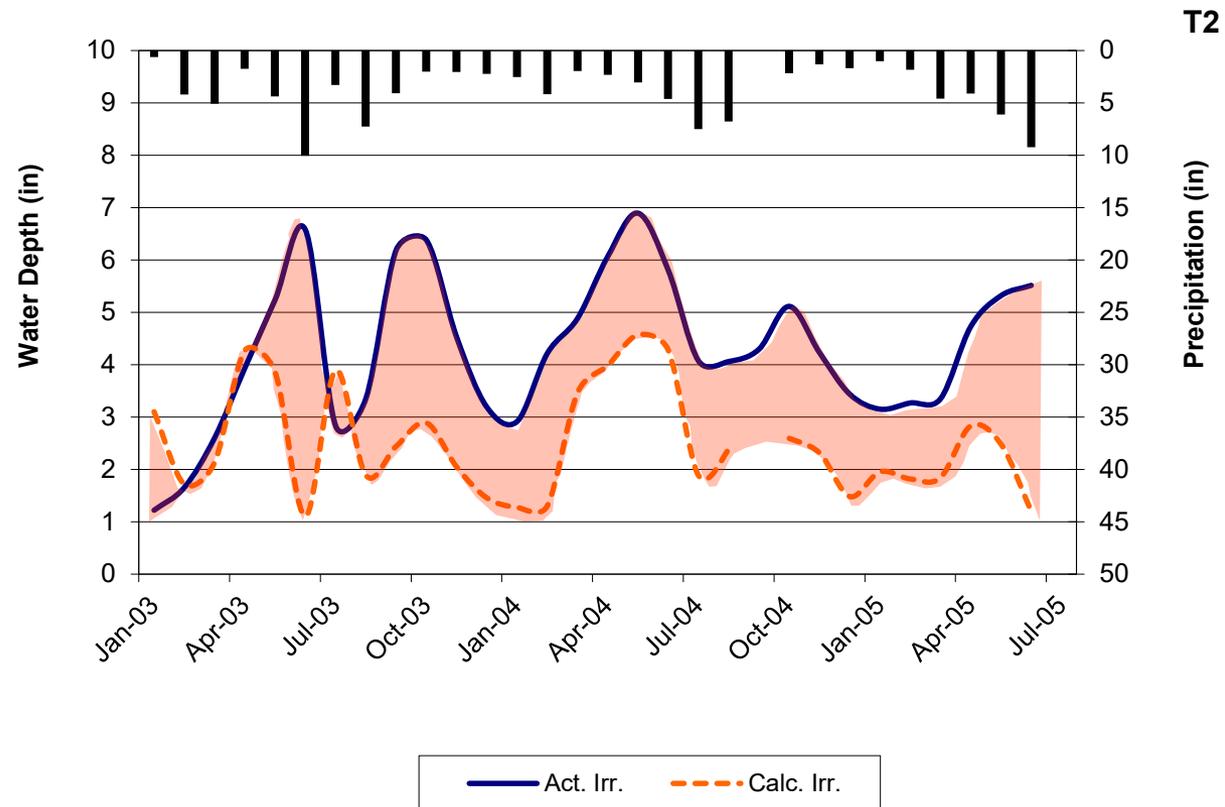


— Really?

SMART IRRIGATION CONTROLLERS

Central Florida - Monthly Time Clock Adjustment

- 30% savings by adjusting time clock monthly



Soil Moisture Sensor Controller



Initial Plot SMS Studies - Rainy

Treatment	TOTAL (in)	Savings compared to 2-WOS (%)
2-WOS	59.6	0
SMS Based		
Avg	16.5	72
1-d/w	16.5 <i>b</i>	72
2-d/w	18.8 <i>a</i>	68
7-d/w	14.3 <i>c</i>	76

WOS = without sensor

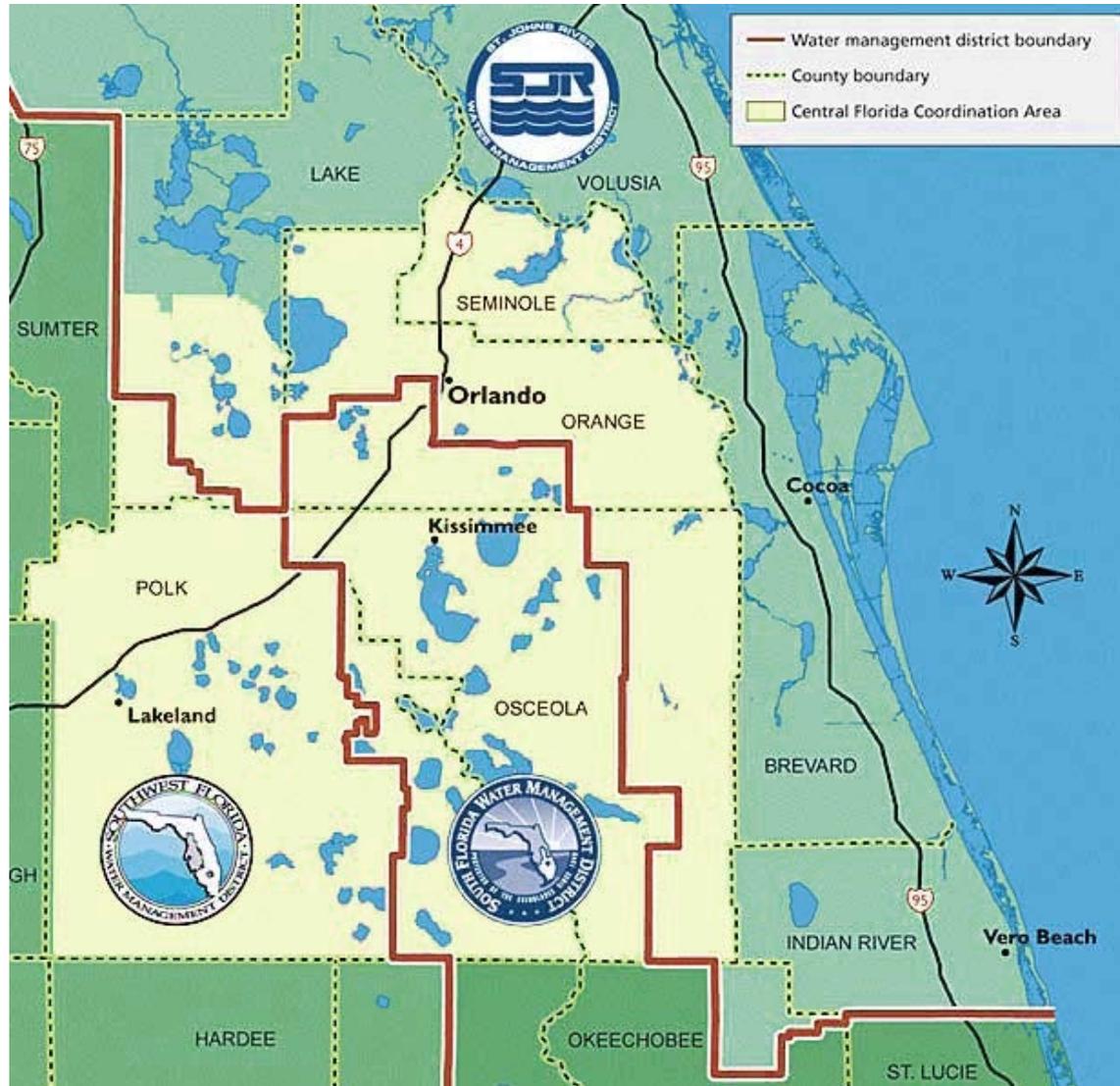
Avg = average

SMS = soil moisture sensor

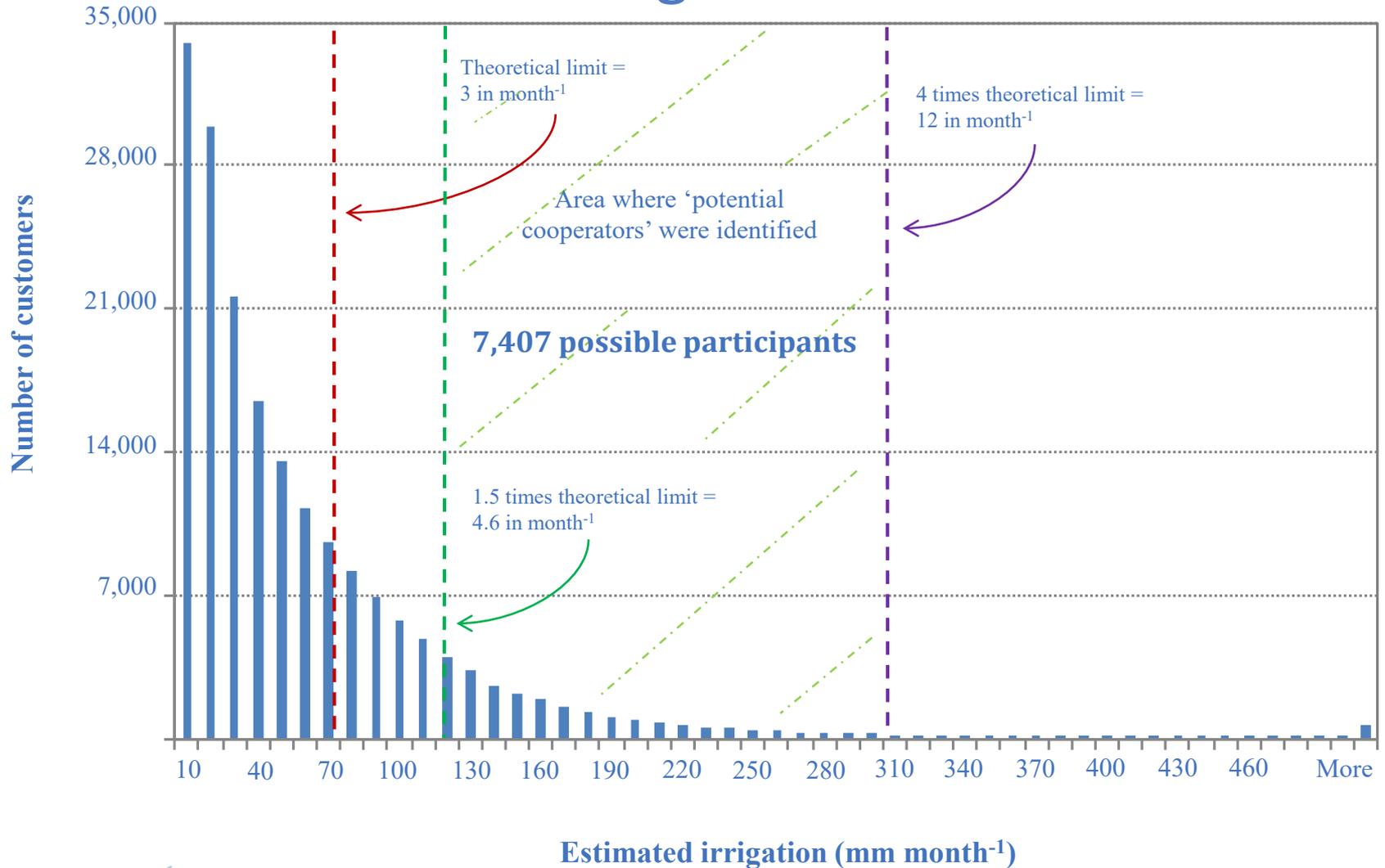
Turfgrass Quality



Orange County Utilities Smart Controller Project



Orange County Evaluation Selection of Excess Irrigators



OCU Technologies & Expt. Design

Treatment	ET	ET+OPT	SMS	SMS+OPT	Comparison
-----------	----	--------	-----	---------	------------

Rain Bird ESP-SMT

Rain Bird ESP-SMT

Baseline WaterTec S100

Baseline WaterTec S100

Technology



--

Locations Installed

7

9

7

9

9

Number Installed

28

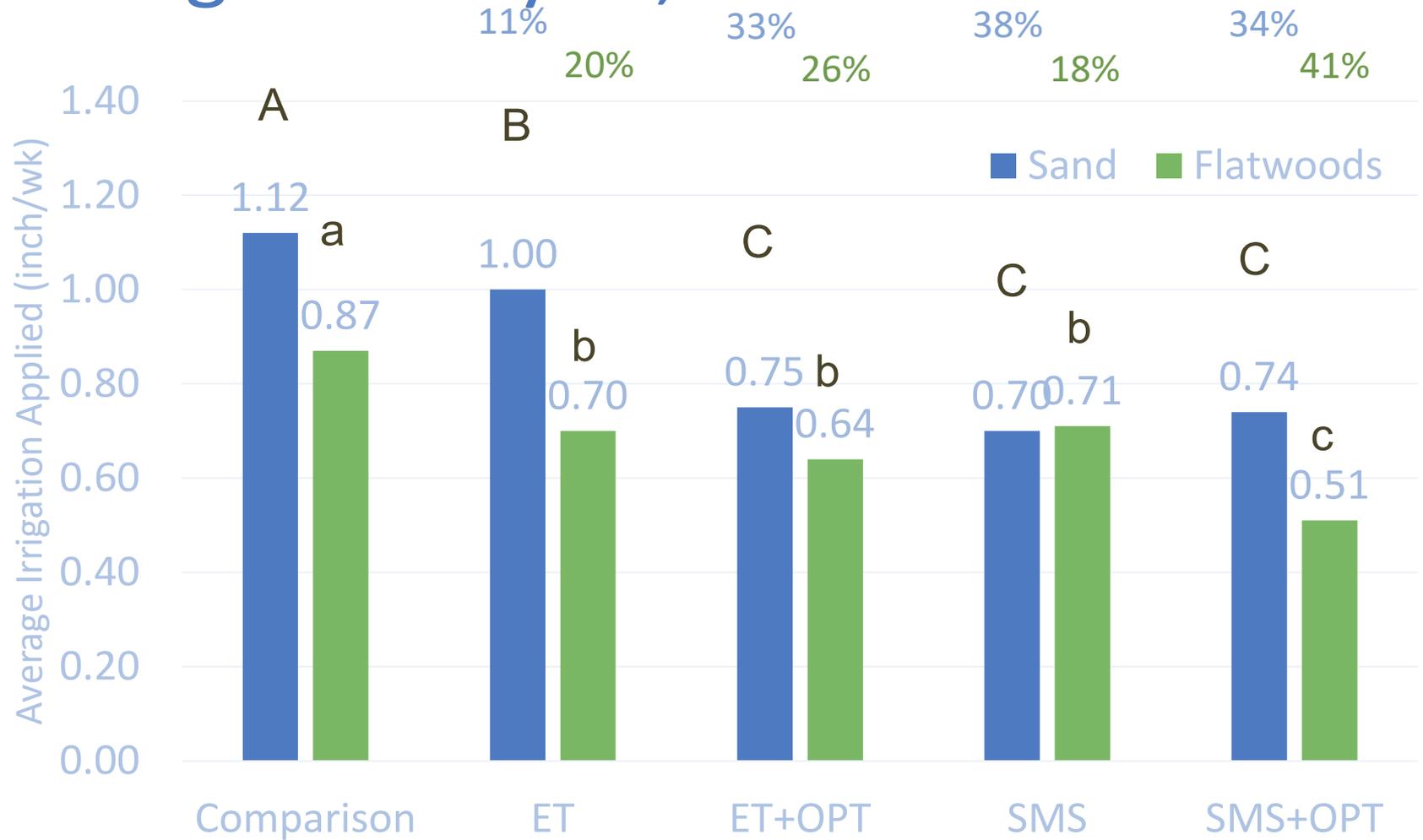
38

28

38

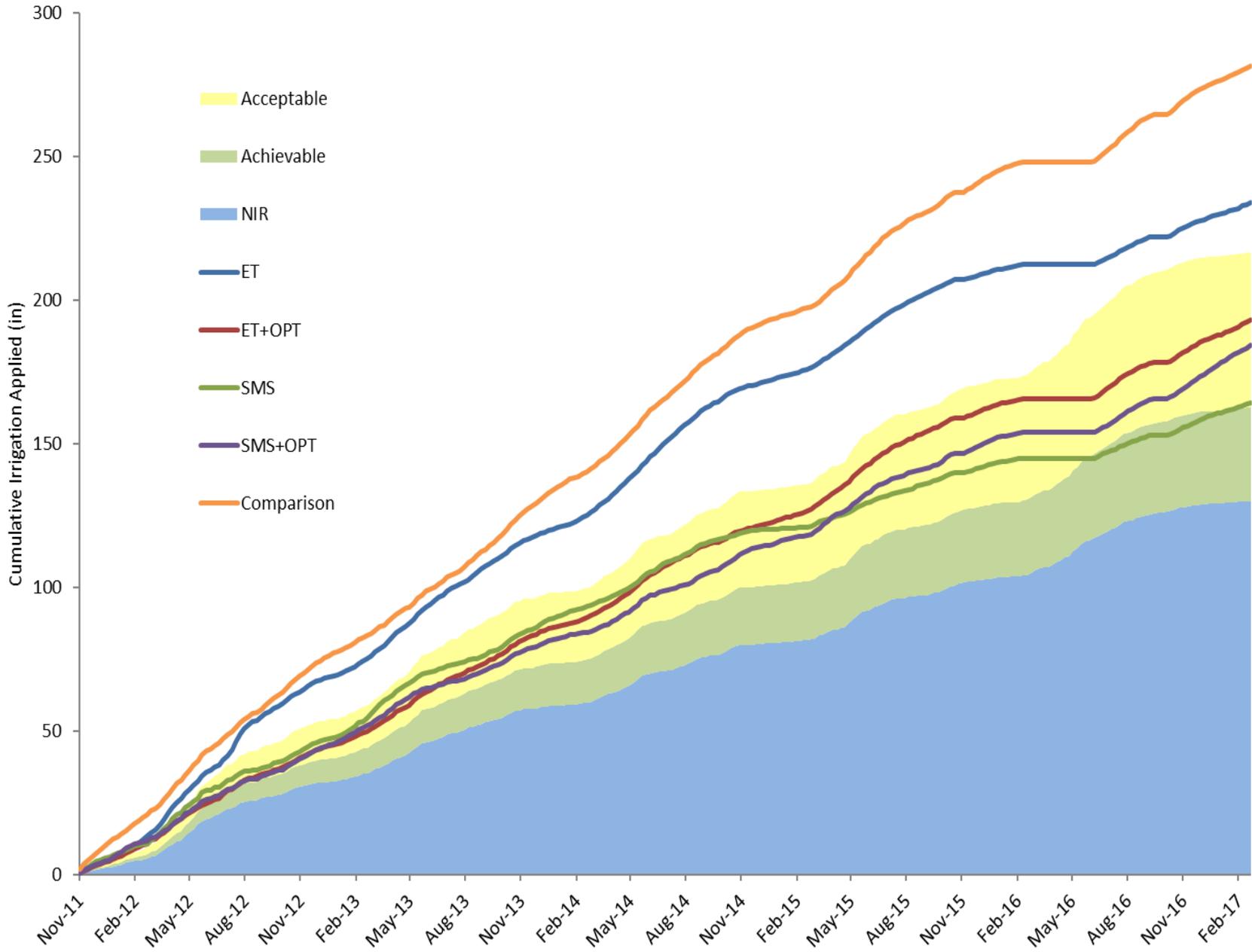
35

Orange County FL, Nov 2011-Feb 2017



Sand 6"

Irrigation efficiency (%)
46



56

67

71

79

Florida Friendly Landscaping

LANDSCAPE

DESIGN/MODIFICATION

Nine principles of a Florida Friendly Yard

**RIGHT PLANT,
RIGHT PLACE**



1

LANDSCAPING PRINCIPLES FOR
FLORIDA-FRIENDLY YARDS

**WATER
EFFICIENTLY**



2

LANDSCAPING PRINCIPLES FOR
FLORIDA-FRIENDLY YARDS

**FERTILIZE
APPROPRIATELY**



3

LANDSCAPING PRINCIPLES FOR
FLORIDA-FRIENDLY YARDS

MULCH



4

LANDSCAPING PRINCIPLES FOR
FLORIDA-FRIENDLY YARDS

**ATTRACT
WILDLIFE**



5

LANDSCAPING PRINCIPLES FOR
FLORIDA-FRIENDLY YARDS

**MANAGE
YARD PESTS
RESPONSIBLY**



6

LANDSCAPING PRINCIPLES FOR
FLORIDA-FRIENDLY YARDS

RECYCLE



7

LANDSCAPING PRINCIPLES FOR
FLORIDA-FRIENDLY YARDS

**REDUCE
STORMWATER
RUNOFF**



8

LANDSCAPING PRINCIPLES FOR
FLORIDA-FRIENDLY YARDS

**PROTECT THE
WATERFRONT**



9

LANDSCAPING PRINCIPLES FOR
FLORIDA-FRIENDLY YARDS

2. Water efficiently

- Use rain gauge to track rainfall
- Water only at signs of wilt
- Group plants with similar water needs
- Use rain barrels
- Reduce irrigation in summer and winter
- Connect and maintain automatic rain shutoff device for sprinkler system
- Use low-volume irrigation in plant beds
- Install soil moisture sensor



Research questions

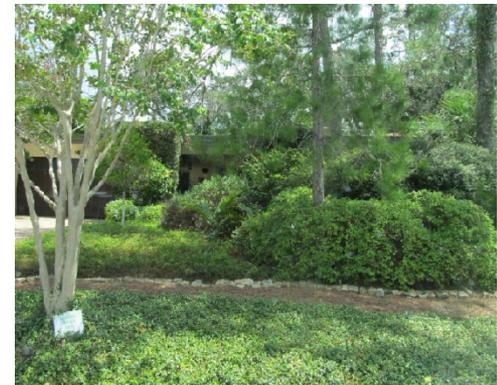
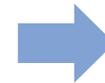
- What are the irrigation behaviors of customers in southwest Florida?



vs.

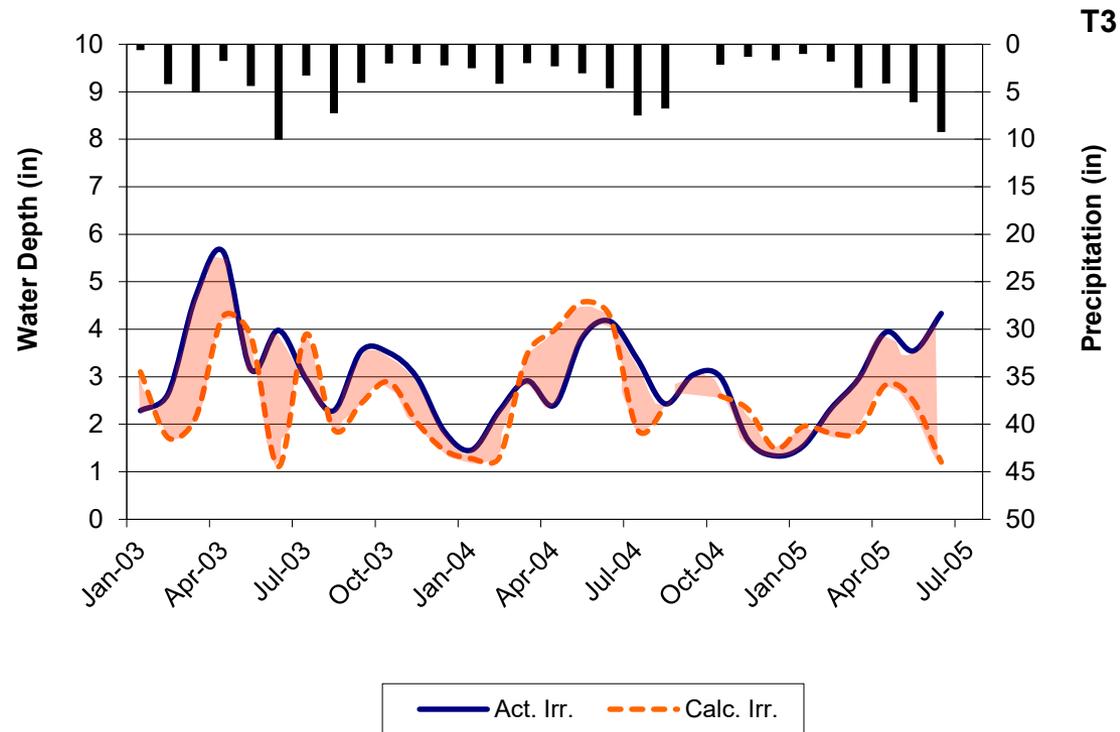


- How much irrigation could be saved using Florida-Friendly Landscapes?



Central Florida - Monthly Time Clock Adjustment + Extensive Microirrigation

- 50% savings by adjusting time clock monthly & adding >50% microirrigated area



Good Quality FFL...

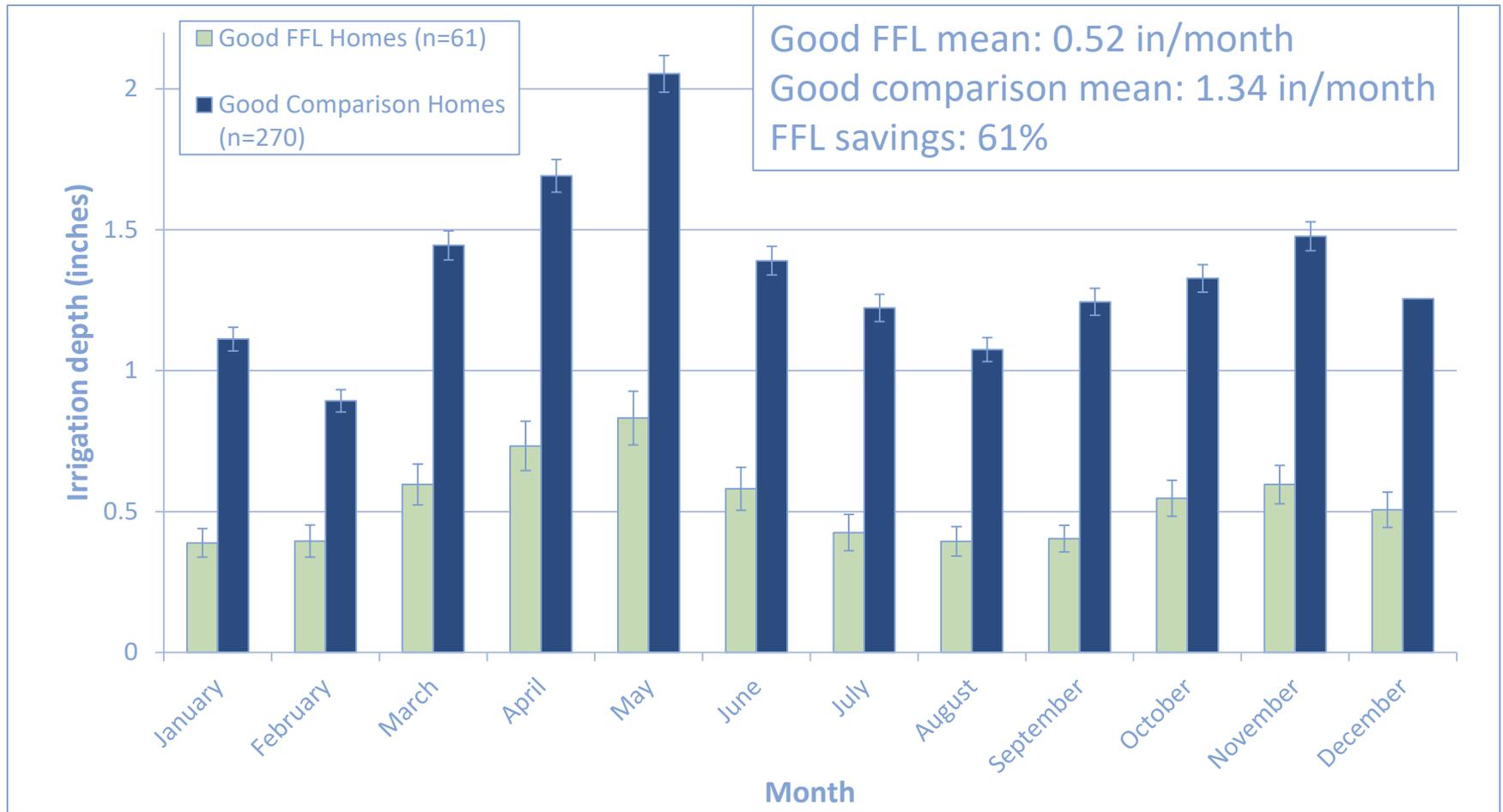




High quality
comparisons



“Good” Quality FFL vs. Neighbors



Acknowledgements: Water Research Foundation, Orange County Utilities, St. Johns River Water Management District, Southwest Florida Water Management District
Tampa Bay Water (Dave Bracciano), Shu Wang, Chuan Wang, Linda Young, Michael Gutierrez, Mackenzie Boyer, Bernardo Cardenas, Melissa Haley, Stacia Davis, Leah Meeks

