This presentation premiered at WaterSmart Innovations

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Importance of Irrigation Efficiency in Landscapes

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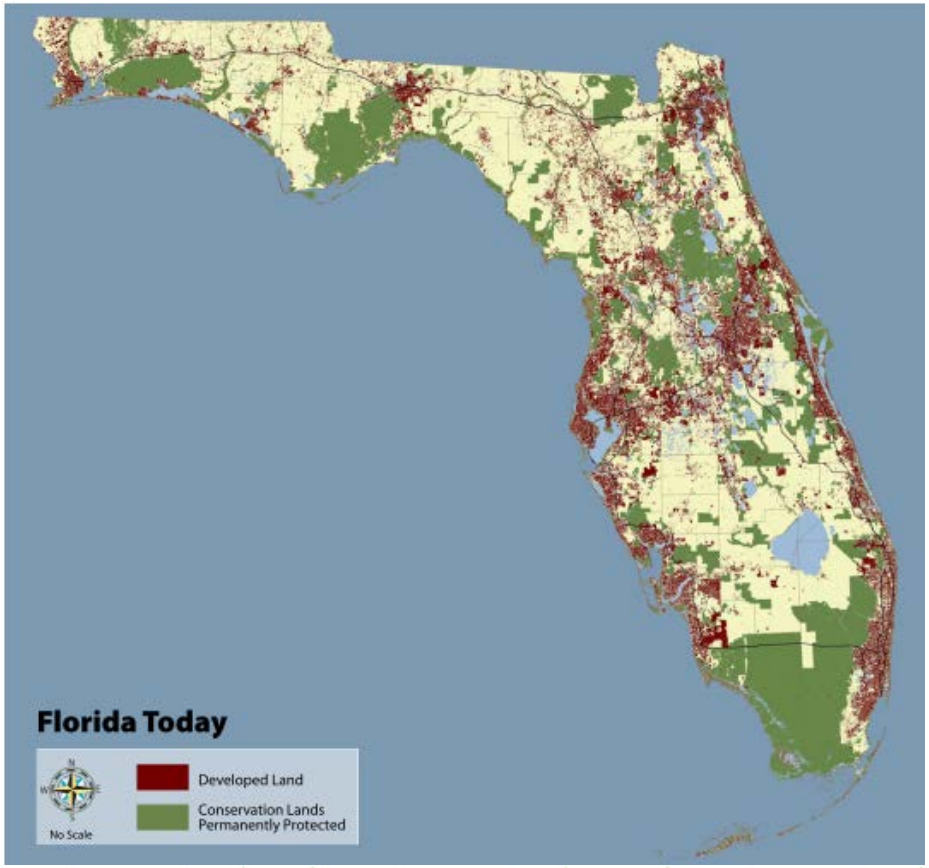
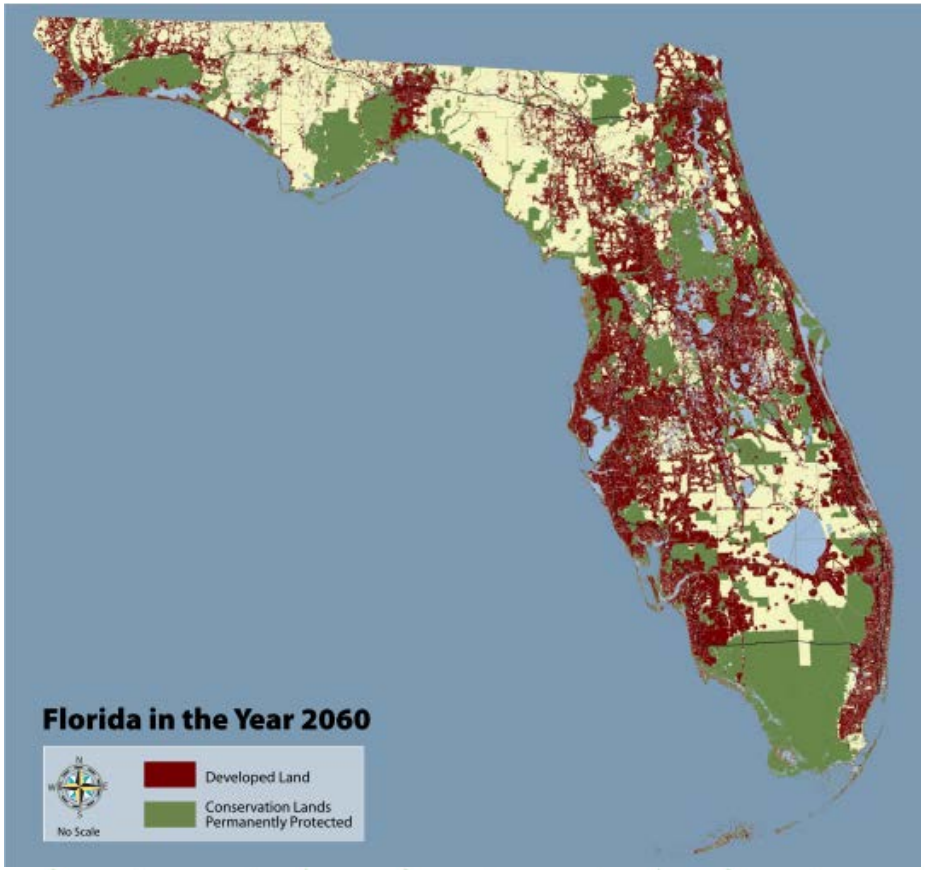
Michael D. Dukes, PhD., P.E., C.I.D.
Agricultural & Biological Engineering
University of Florida/IFAS

UF/IFAS Center for Landscape Conservation and Ecology

- Mission
  - To protect and conserve Florida's natural resources through research-based sustainable urban landscape practices.
- Vision
  - To be the leading source of science-based information on horticulture and the urban environment in Florida.

Development of Land in Florida





Maps from 1,000 Friends of Florida
http://www.1000friendsofflorida.org/planning/2060.asp

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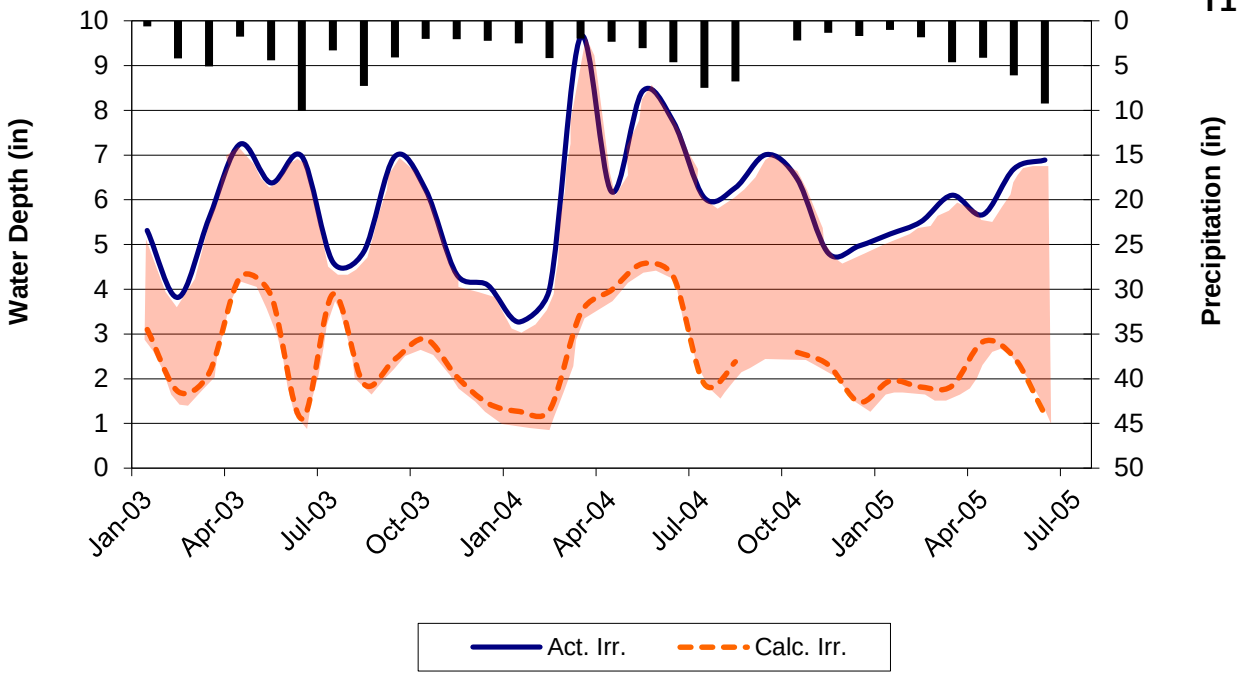
Water 2070

- +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

Central Florida – Typical Irrigator

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



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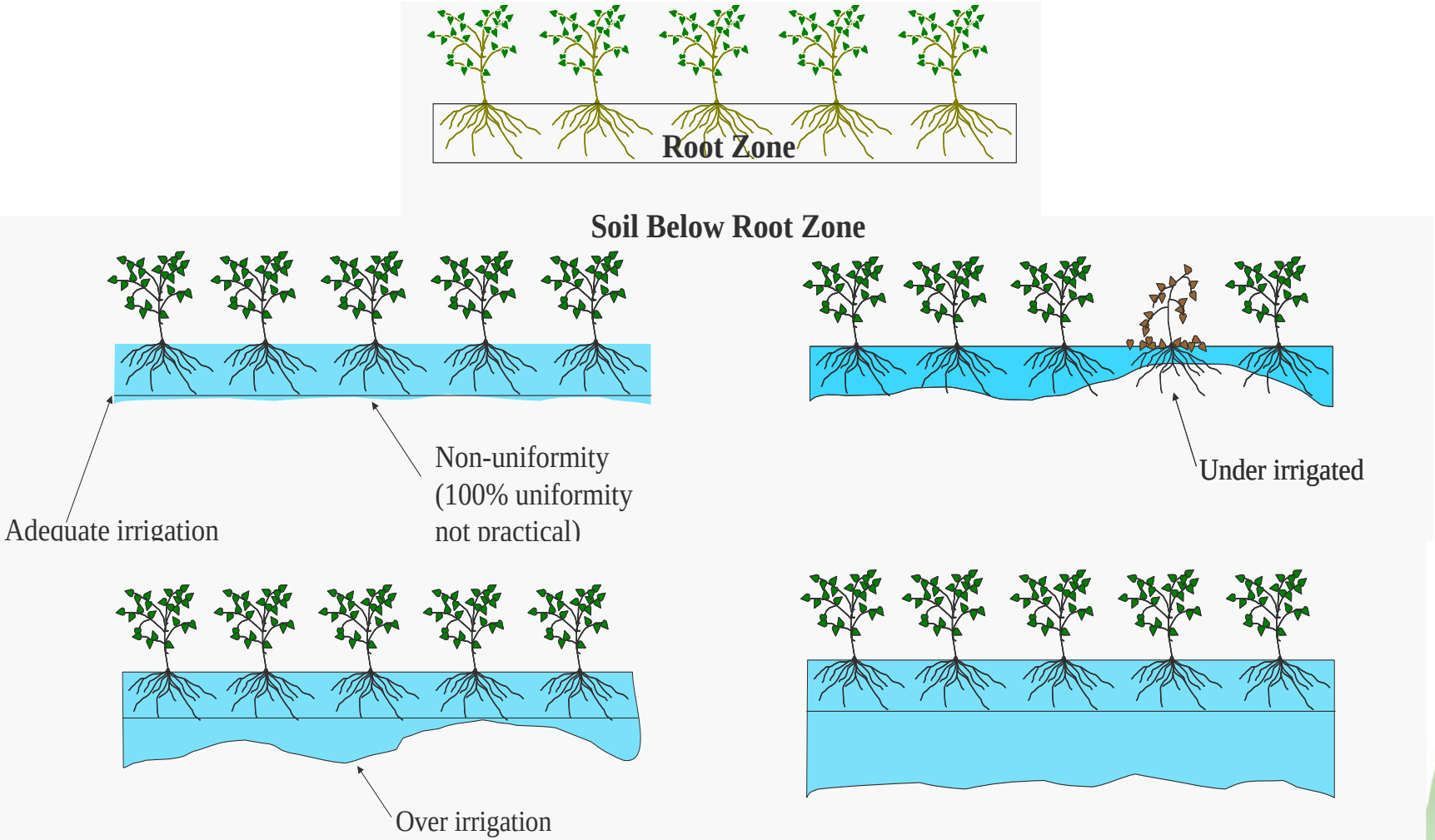
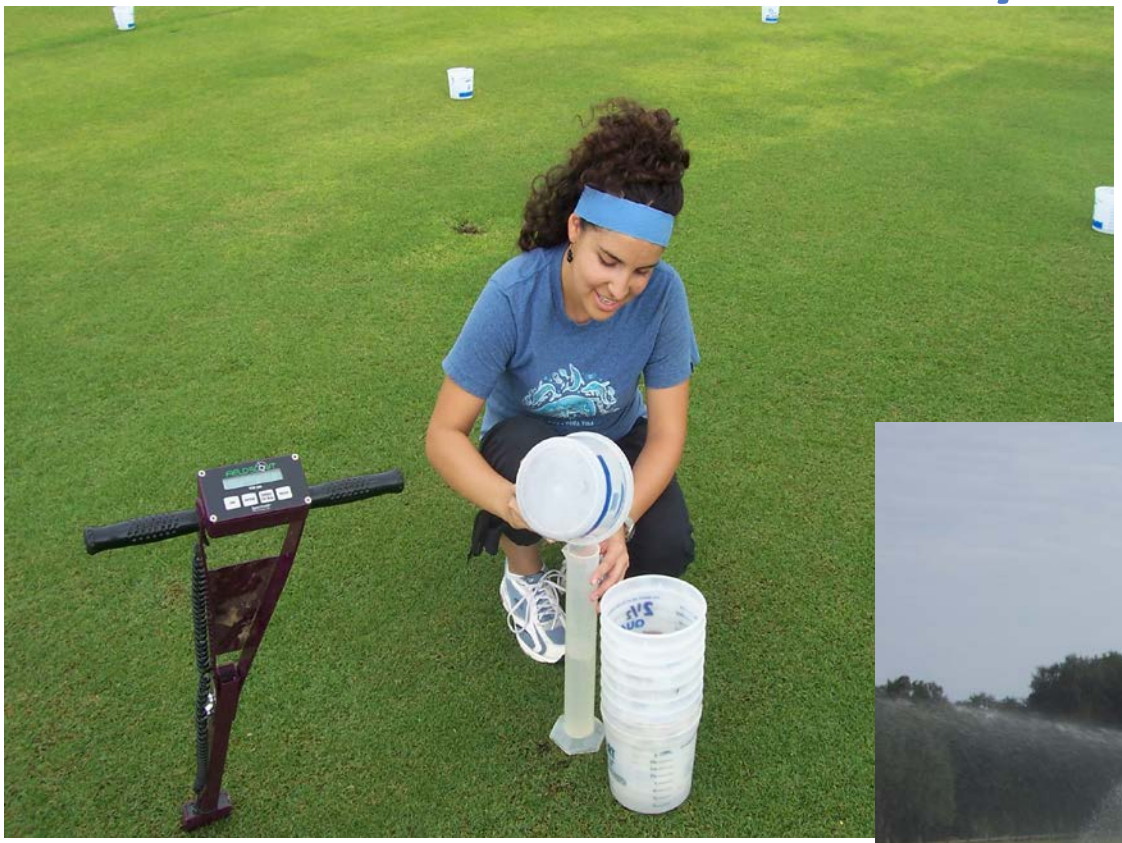
Irrigation Efficiency

- Ratio of amount of water pumped from source to amount of water needed to satisfy plant ET
  - While maintaining desired quality
- Ex., 50% efficient system requires 2 gal pumped for each 1 gal delivered

Irrigation Efficiency: Design/maint. + Management



Uniformity Testing



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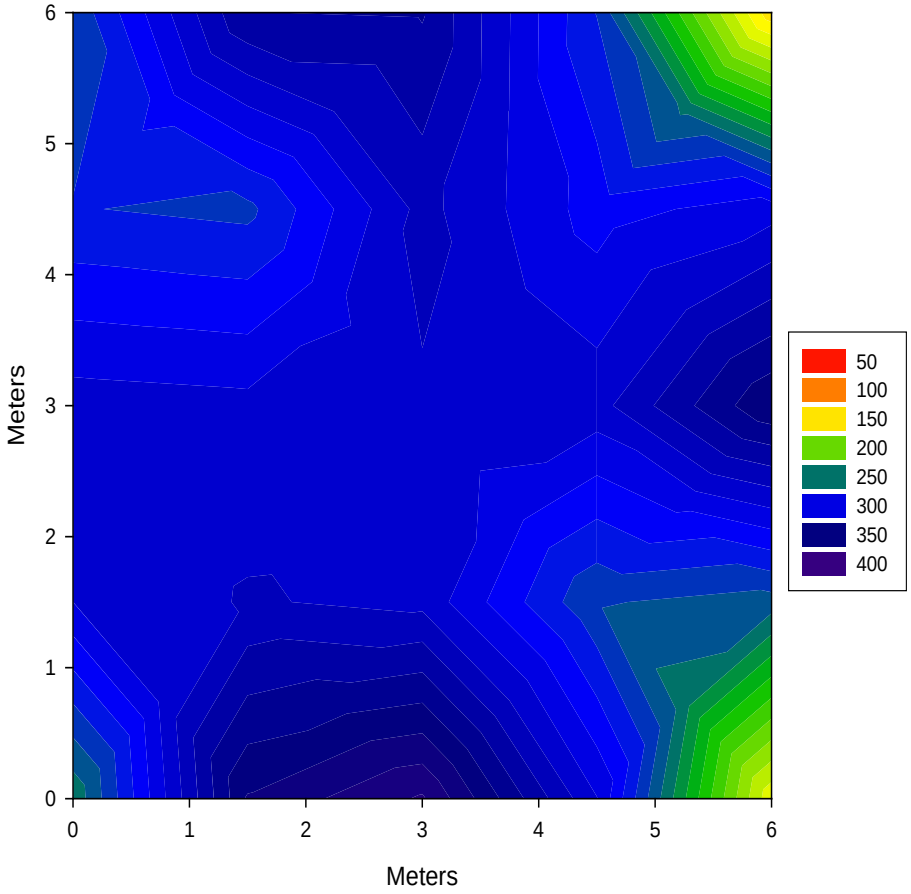
Good Uniformity



- Spray head with quarter circle nozzle at recommended pressure
- average DU_{lq} of 0.66

Improper Design & Installation: Inadequate Pressure

Photo credit: Dr. Bryan Unruh

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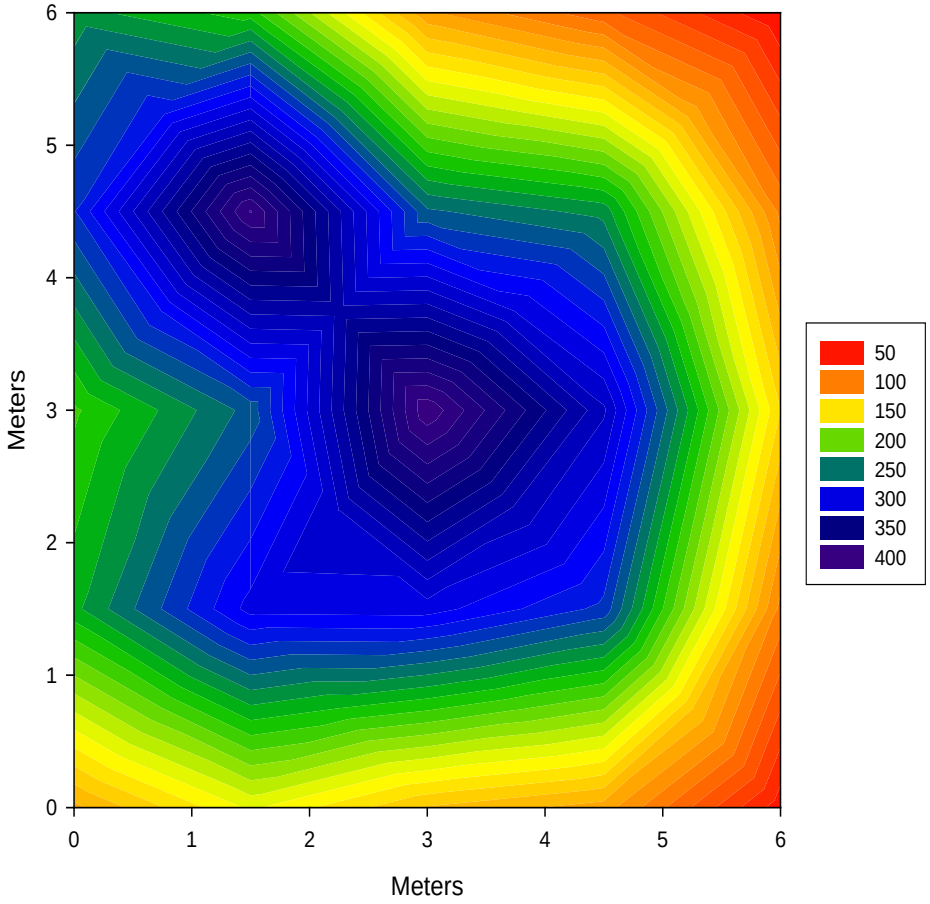
Poor Uniformity

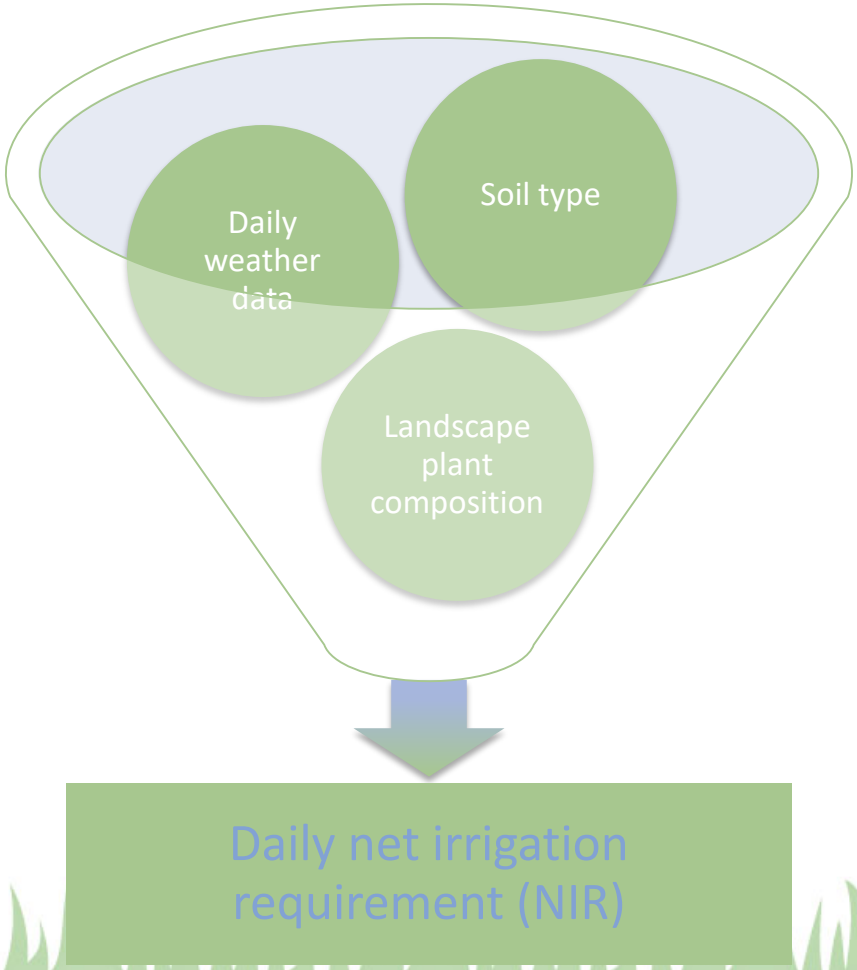


- Spray head at low pressure
- average DU_{lq} of 0.33

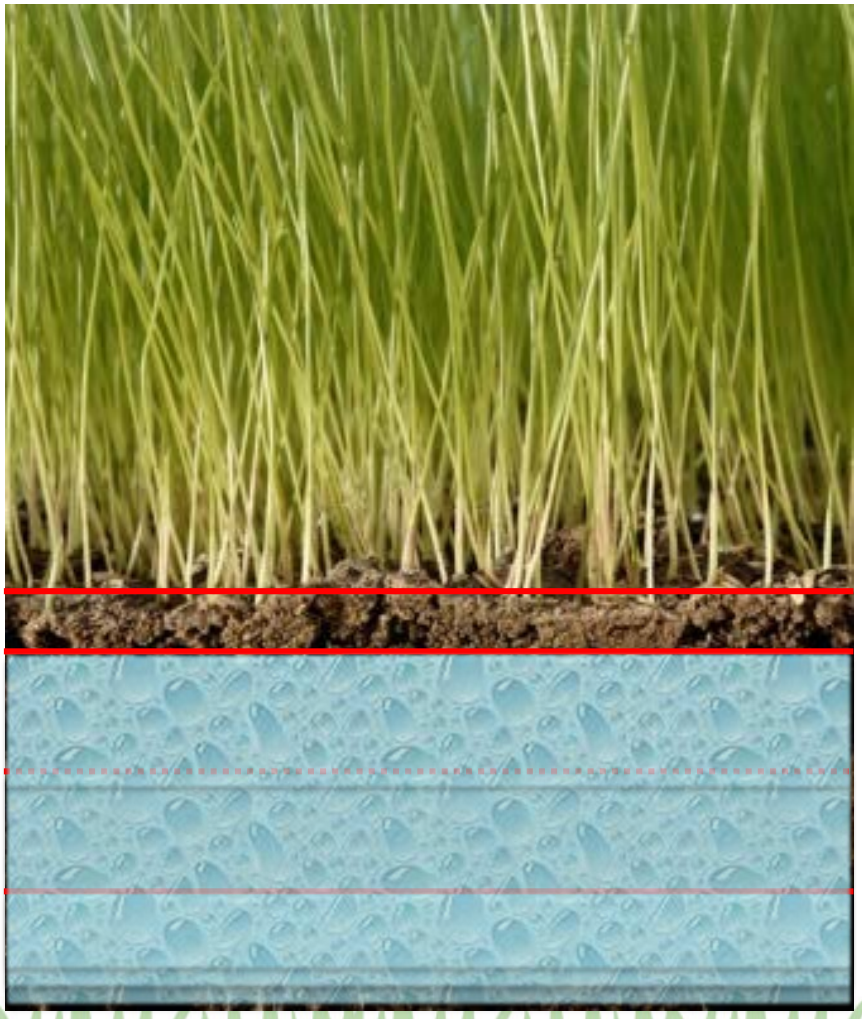

Misaligned Sprinklers

Broken Sprinklers

Irrigation Requirements



Daily Soil Water Balance



Saturation

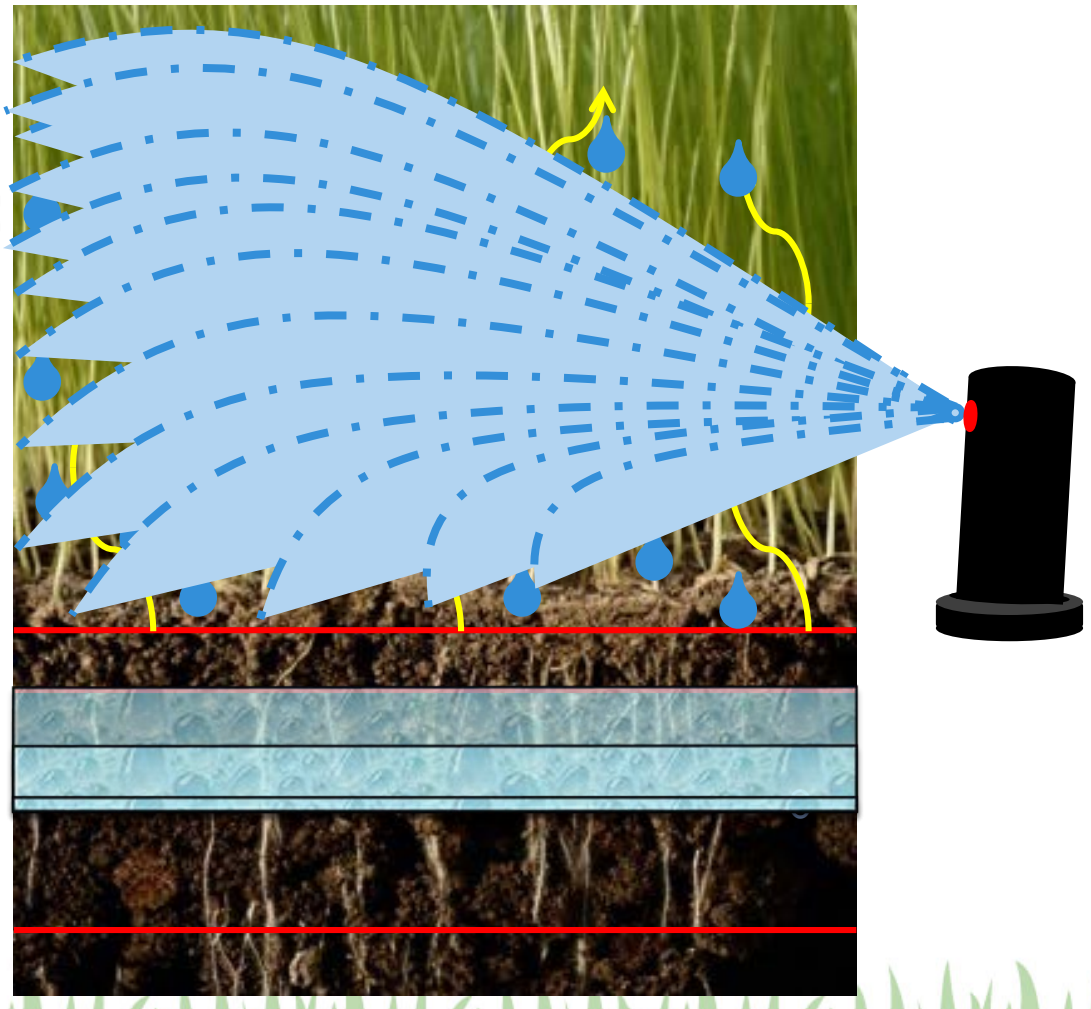
Field Capacity (FC)

Maximum Allowable Depletion (MAD)

Permanent Wilting Point (PWP)

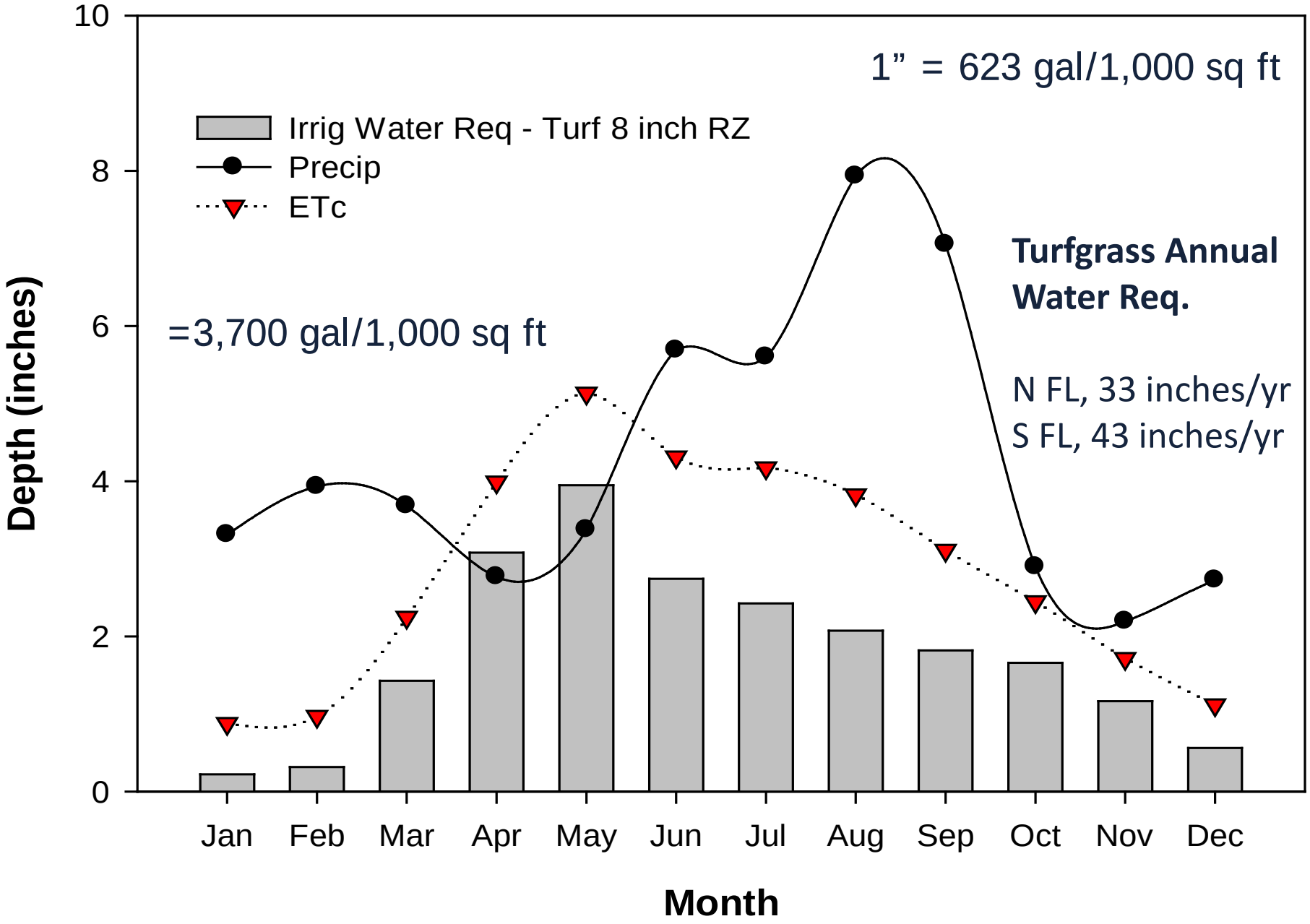
Davis, S.

Daily Soil Water Balance



Graph by Davis, S.

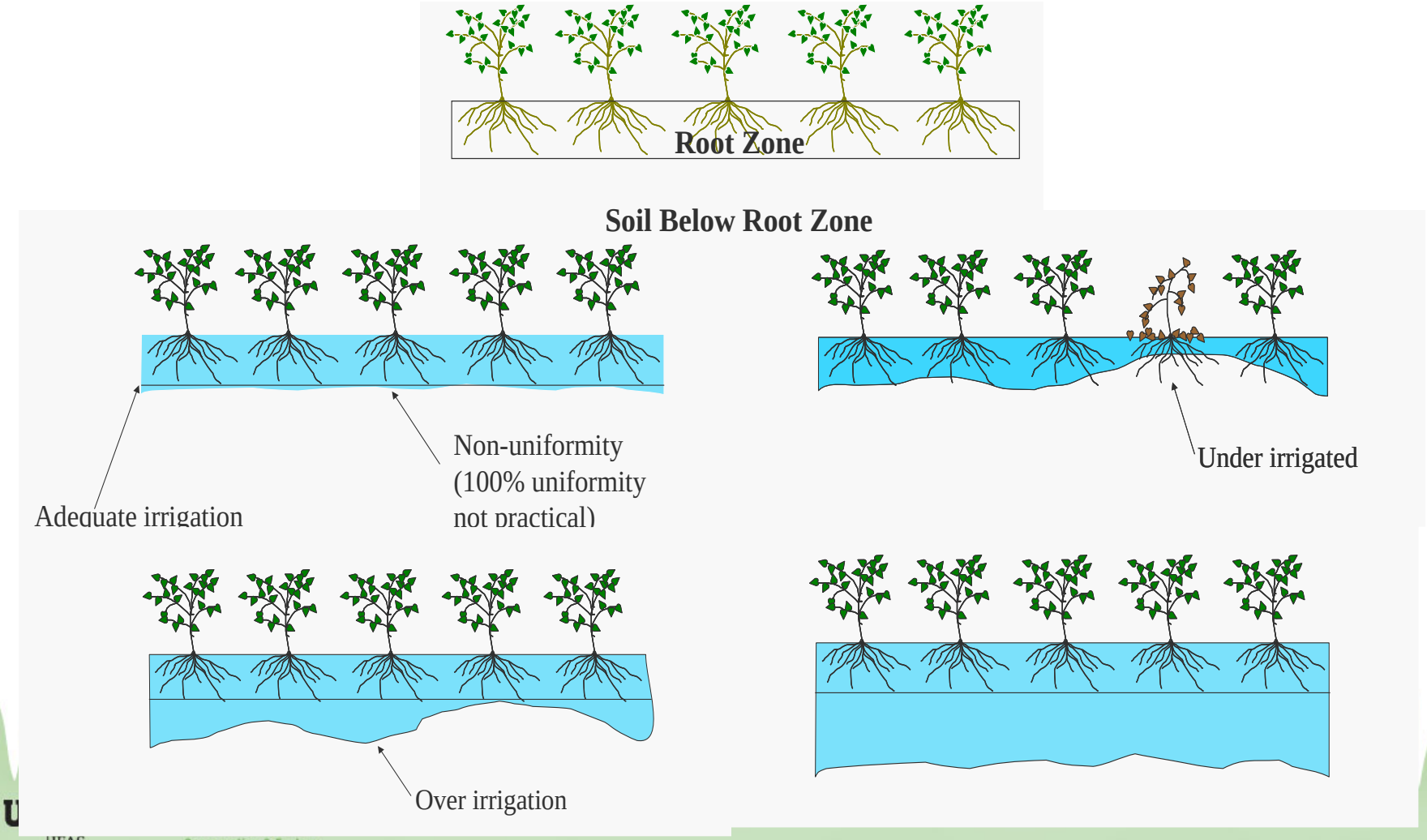
Irrigation Requirements



Irrigation Efficiency

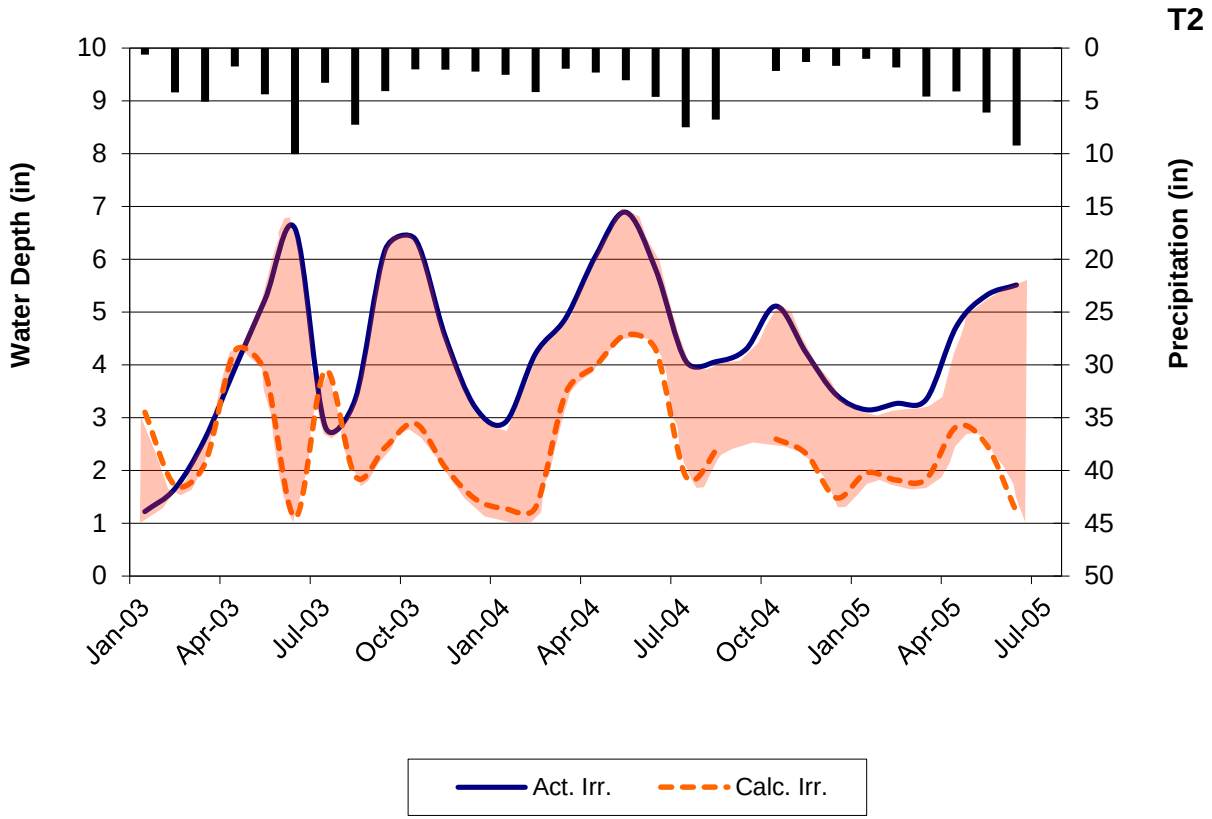
- Irrigation Efficiency = Net irrigation requirement / Irrigation applied
- Ex. 36 inches applied & Net irrigation requirement is 24 inches
  - 24 inches / 36 inches --> 67% efficient

Irrigation Efficiency: Design/maint. + Management



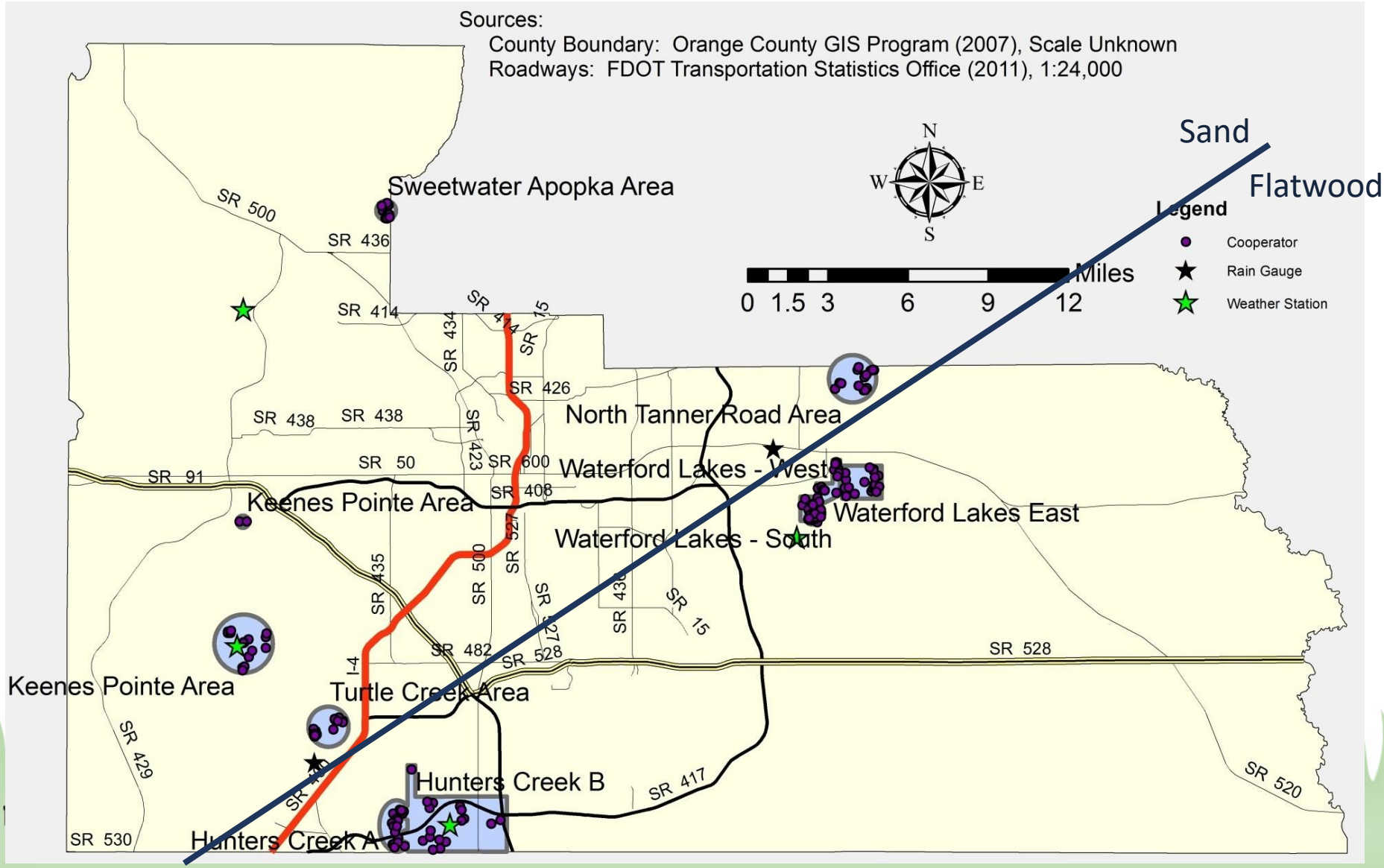
Central Florida – Monthly Time Clock Adjustment

- 30% savings by adjusting time clock monthly



SMART IRRIGATION CONTROLLERS

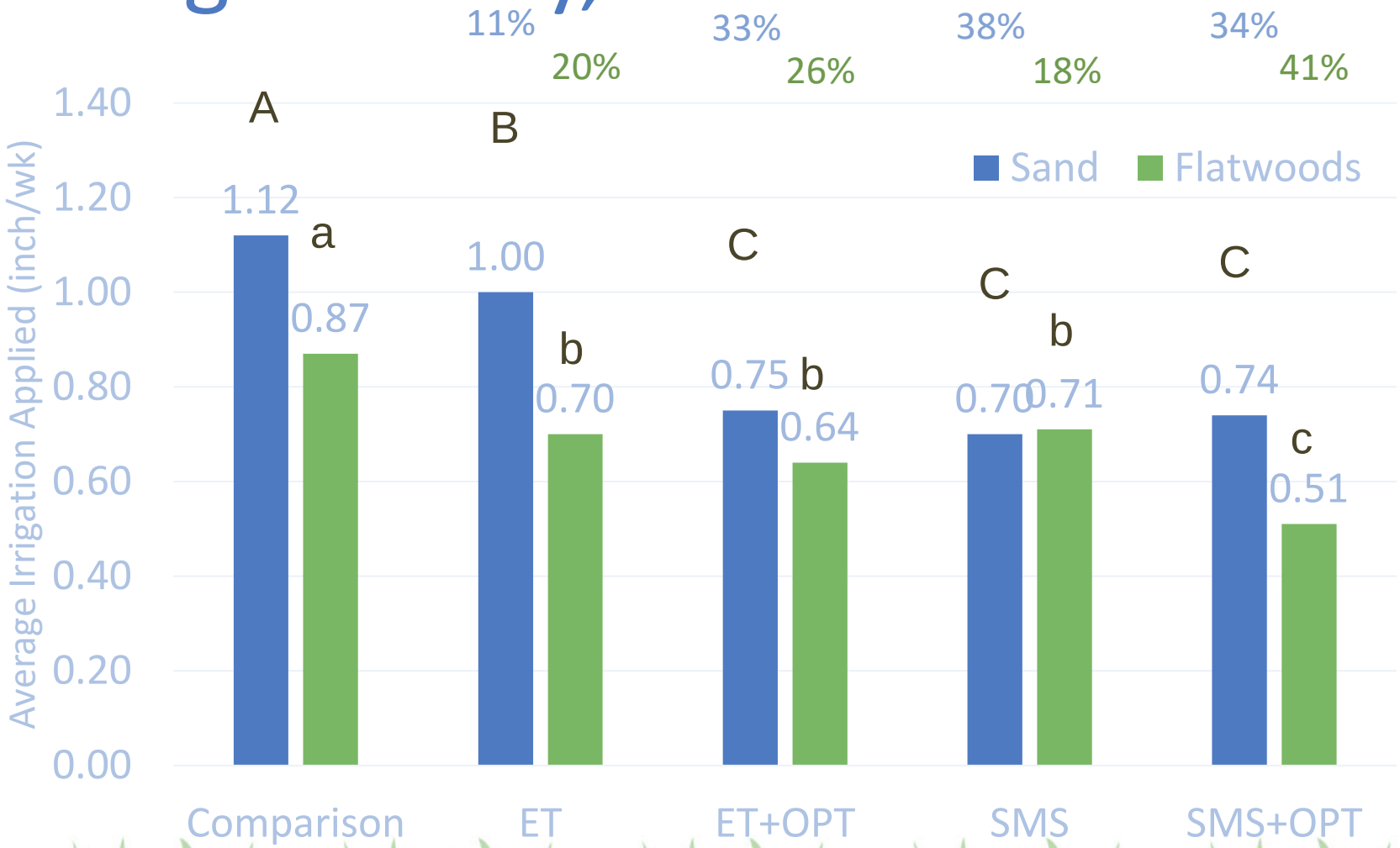
Summary of Participants



OCU Technologies & Expt. Design

Treatment	ET	ET+OPT	SMS	SMS+OPT	Comparison
Technology	Rain Bird ESP-SMT 	Rain Bird ESP-SMT	Baseline WaterTec S100 	Baseline WaterTec S100	--
Locations Installed	7	9	7	9	9
Number Installed	28	38	28	38	35

Orange County, Nov 2011-Feb 2017



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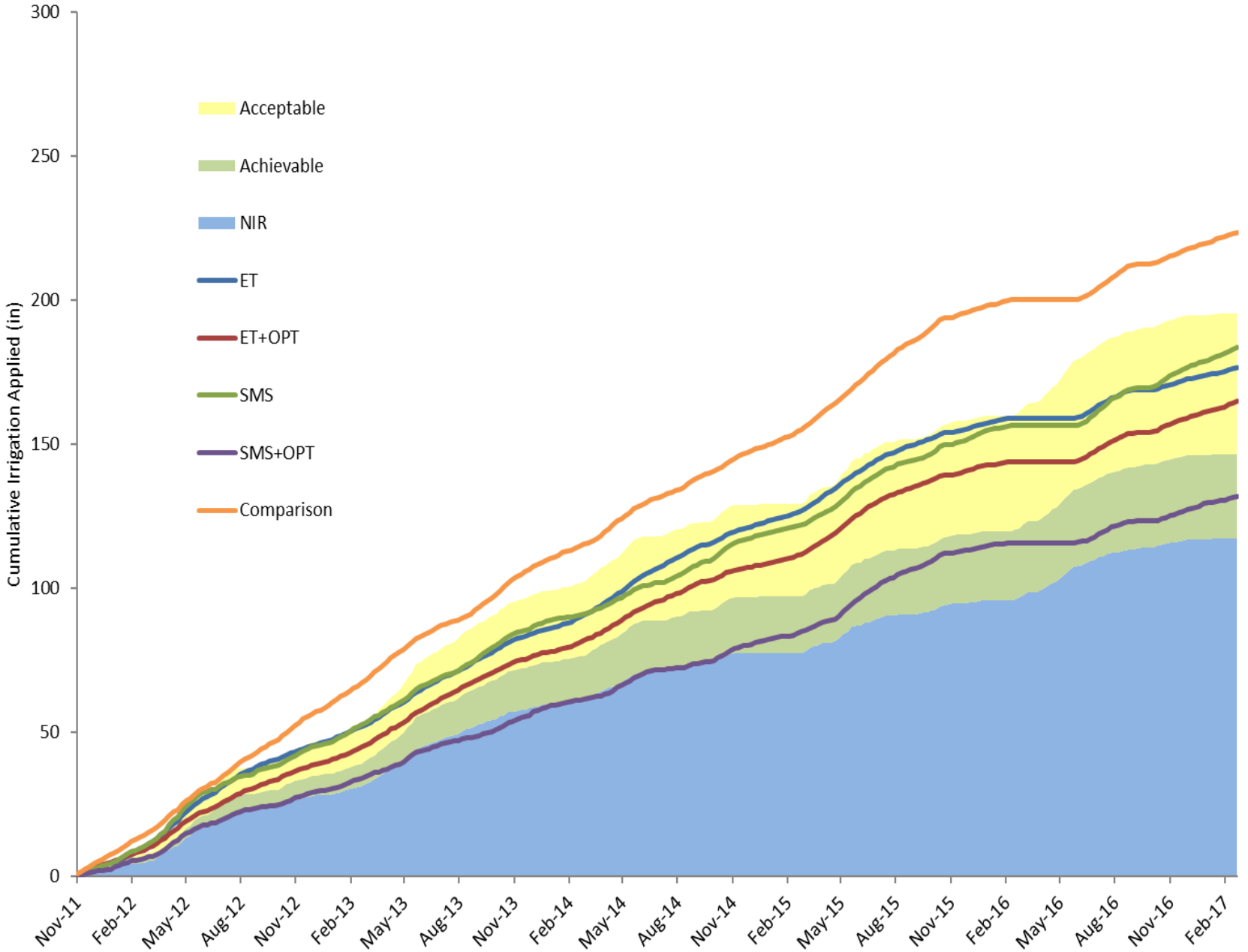
Flatwoods 6"



Irrigation efficiency (%)

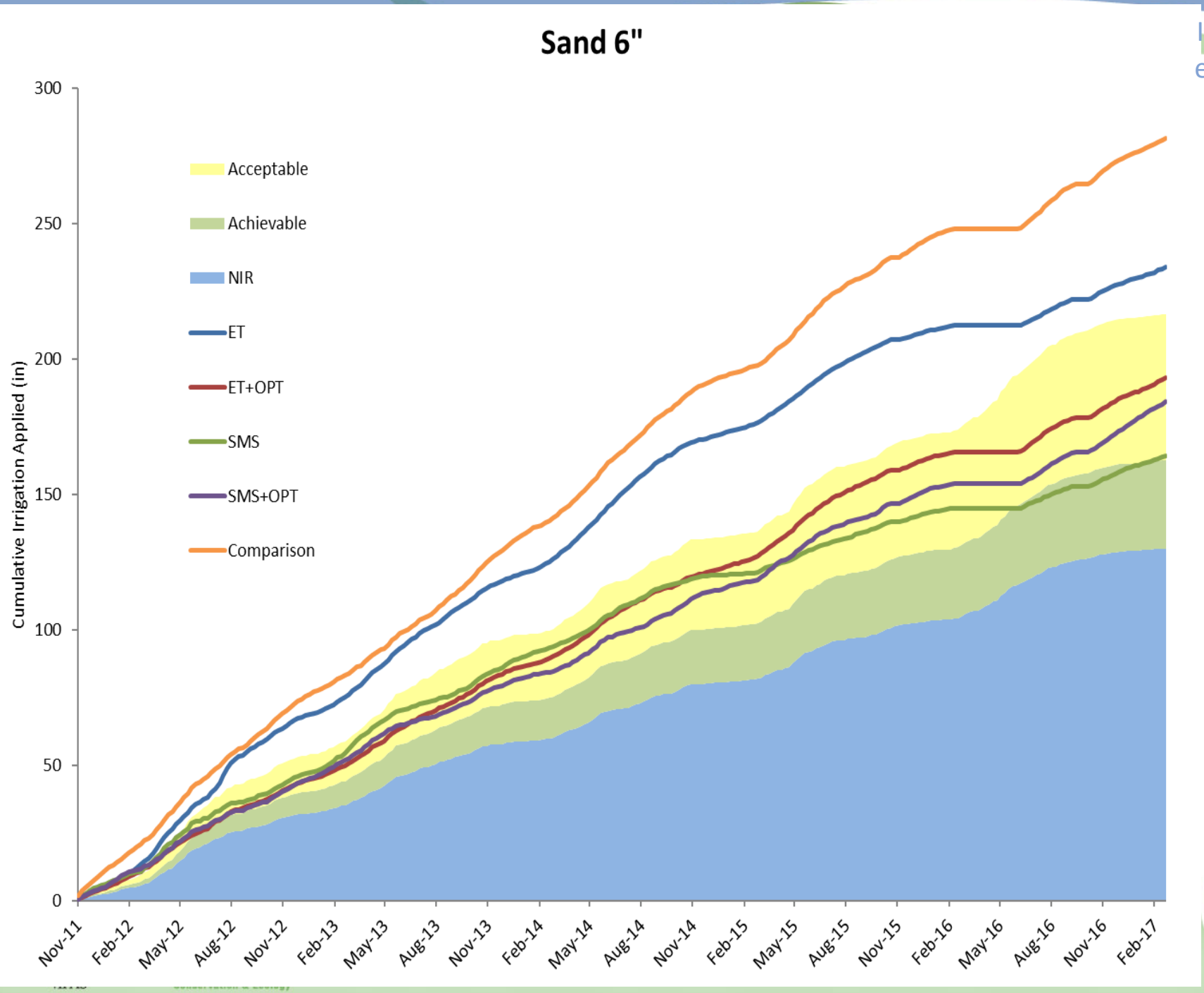
52

64

66

71

89

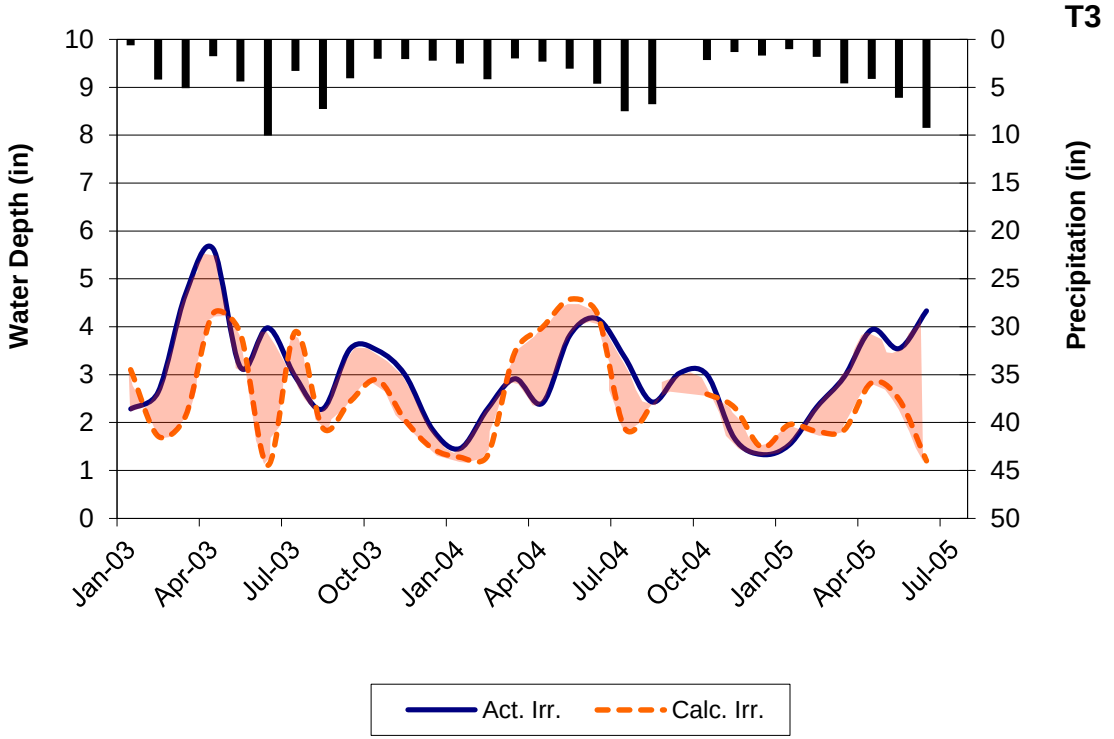

Sand 6"
Irrigation efficiency (%)
46
56
67
71
79
Cumulative Irrigation Applied (in)
300
250
200
150
100
50
0
Acceptable
Achievable
NIR
ET
ET+OPT
SMS
SMS+OPT
Comparison
Nov-11
Feb-12
May-12
Aug-12
Nov-12
Feb-13
May-13
Aug-13
Nov-13
Feb-14
May-14
Aug-14
Nov-14
Feb-15
May-15
Aug-15
Nov-15
Feb-16
May-16
Aug-16
Nov-16
Feb-17

Florida Friendly Landscaping

LANDSCAPE DESIGN/MODIFICATION

Central Florida – Monthly Time Clock Adjustment + Extensive Microirrigation

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



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Nine principles of a Florida Friendly Yard

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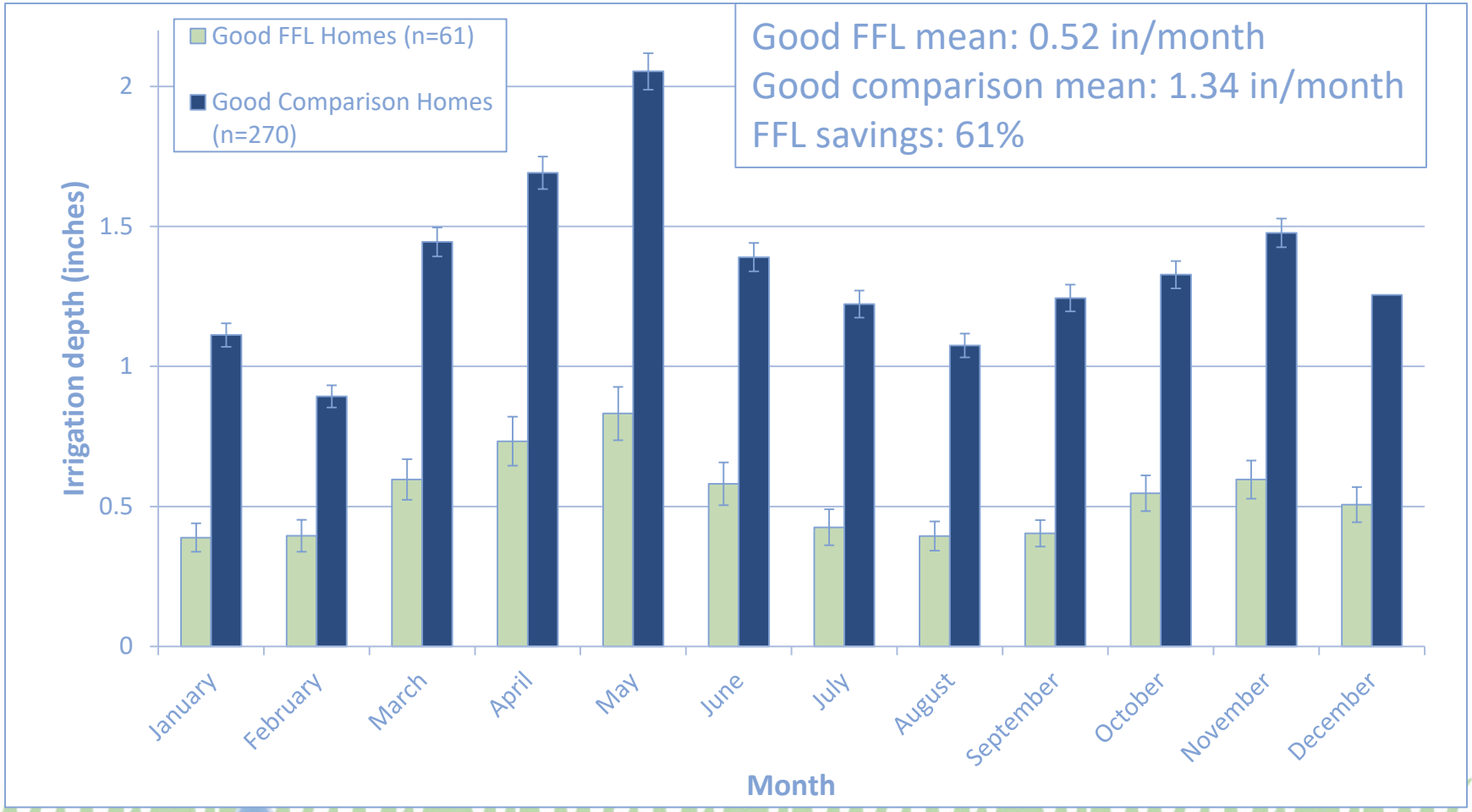
www.floridayards.org/landscape/FFY-TipCards.pdf

Good Quality FFL...


High quality
comparisons

“Good” Quality FFL vs. Neighbors



Irrigation “Efficiency”

- Comparison: 89%
- FFL: 181% ??????

Irrigation "Efficiency"

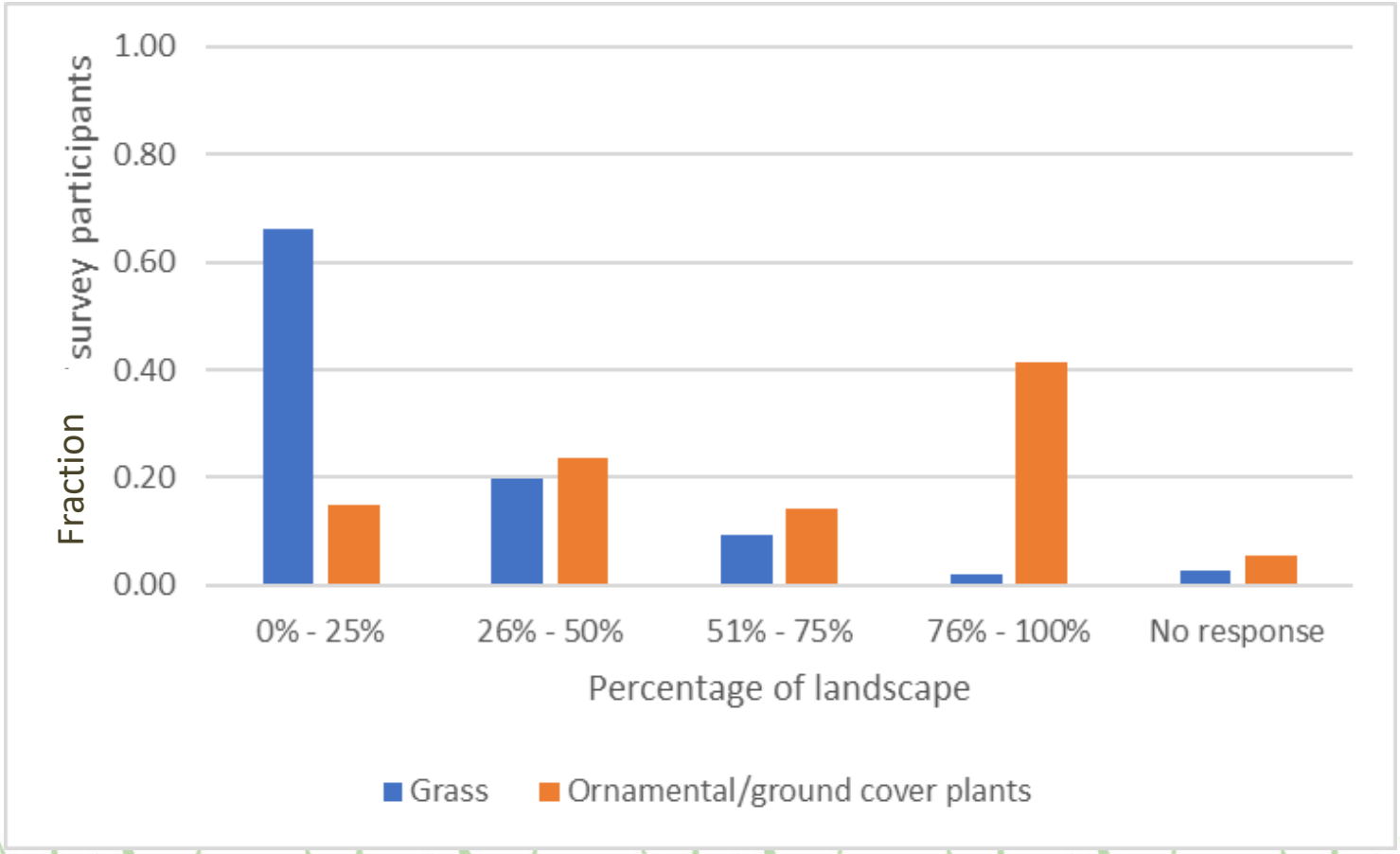
- Comparison: 89%
- FFL: 181% ??????
  - Deficit irrigation?
  - Irrigation on all green space?

- Assumes 79% "green space" irrigated to warm-season turf requirement
- Assumes sprinkler irrigation

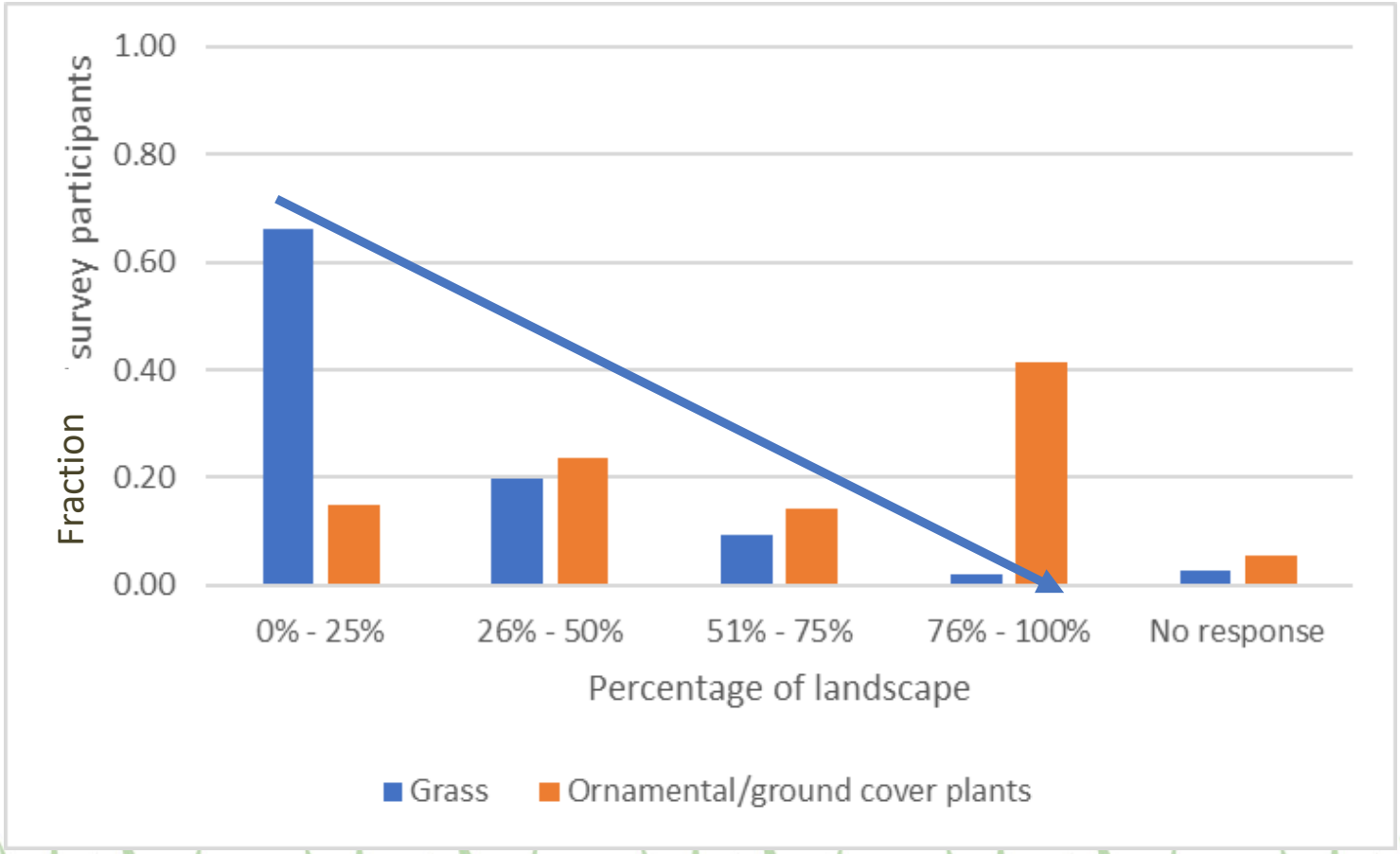
FFL Survey & Site Visits

- 227 recognized FFL
- Hillsborough, Manatee, Pinellas, Pasco, Polk
- 106 responses

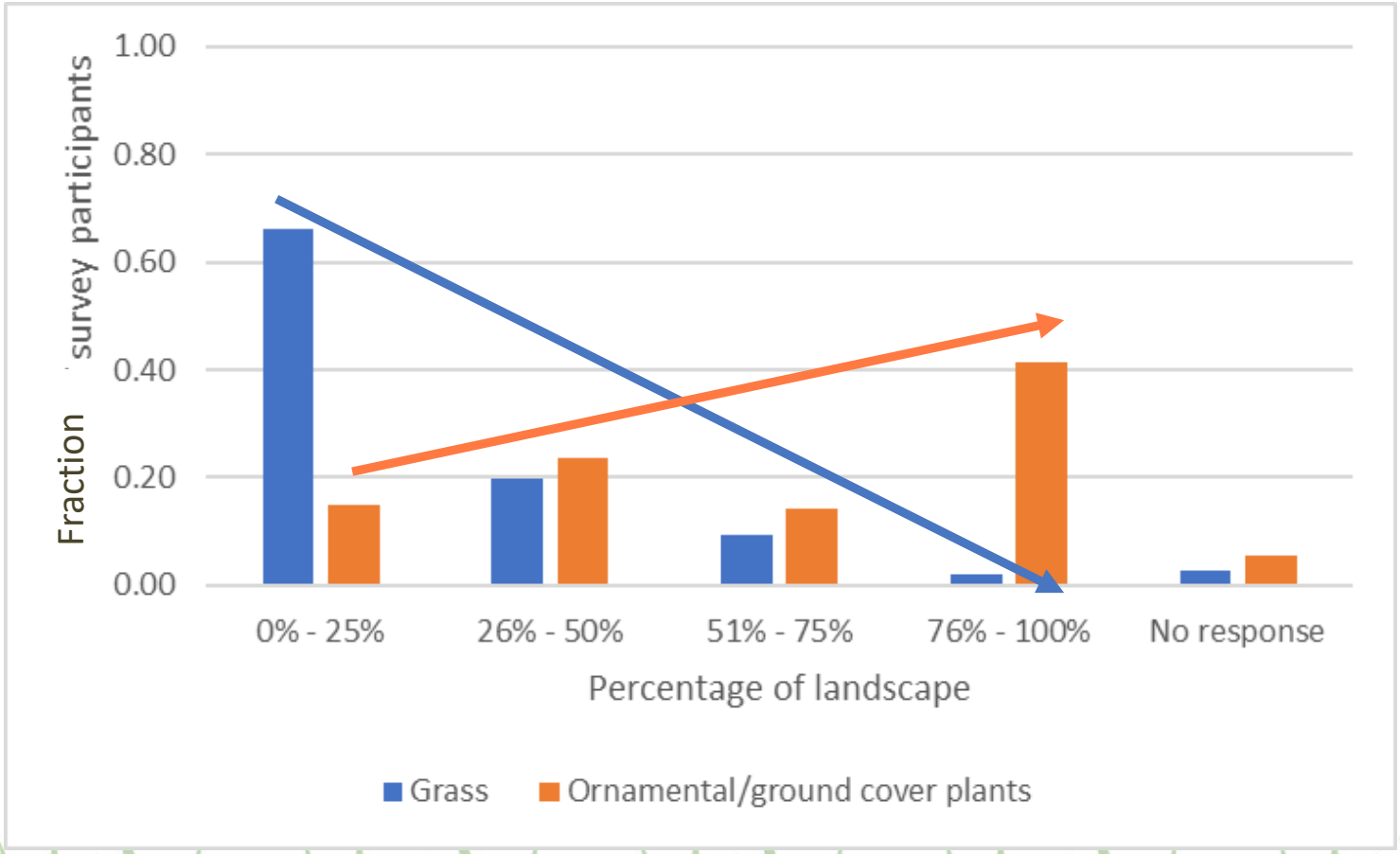
Landscape Composition



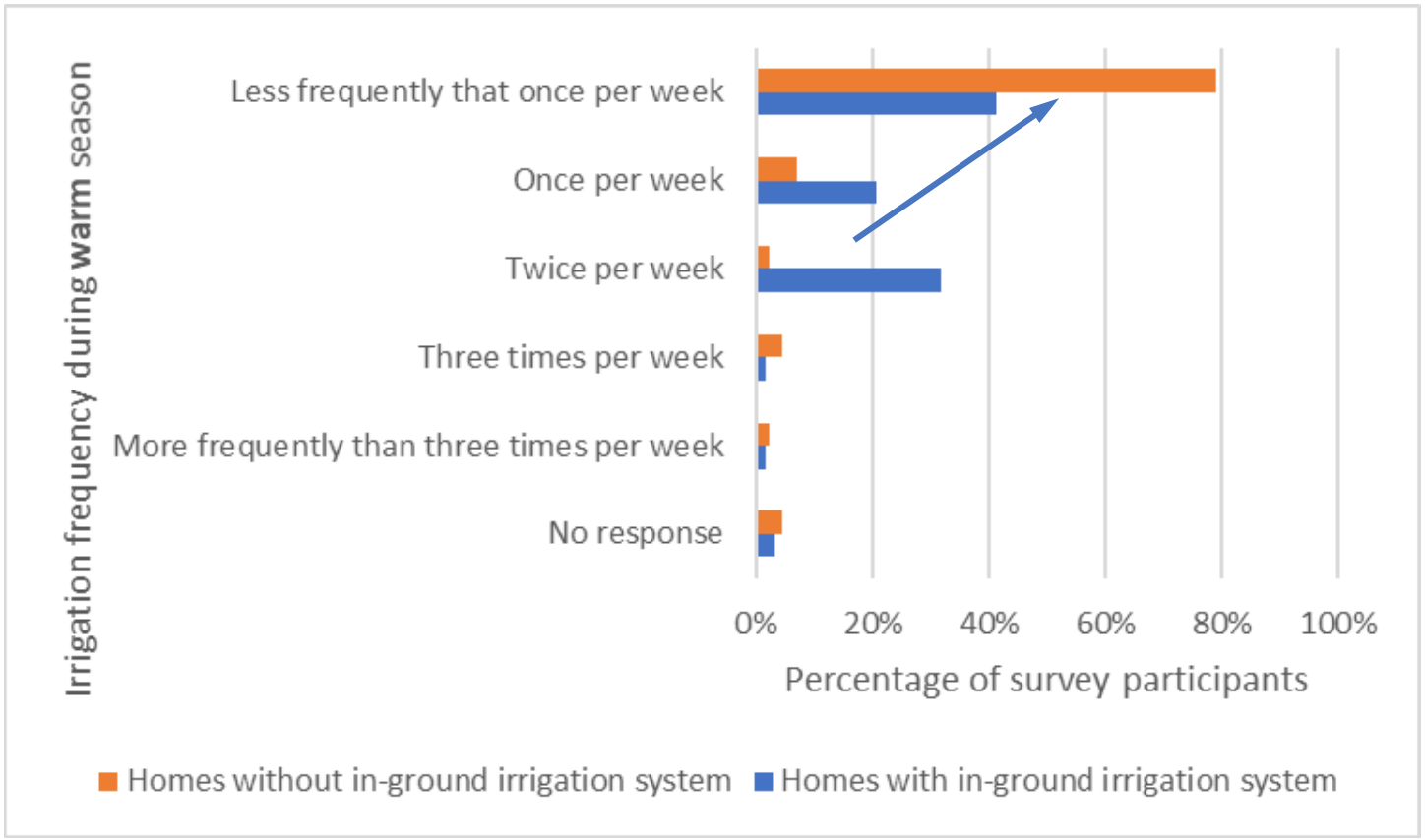
Landscape Composition



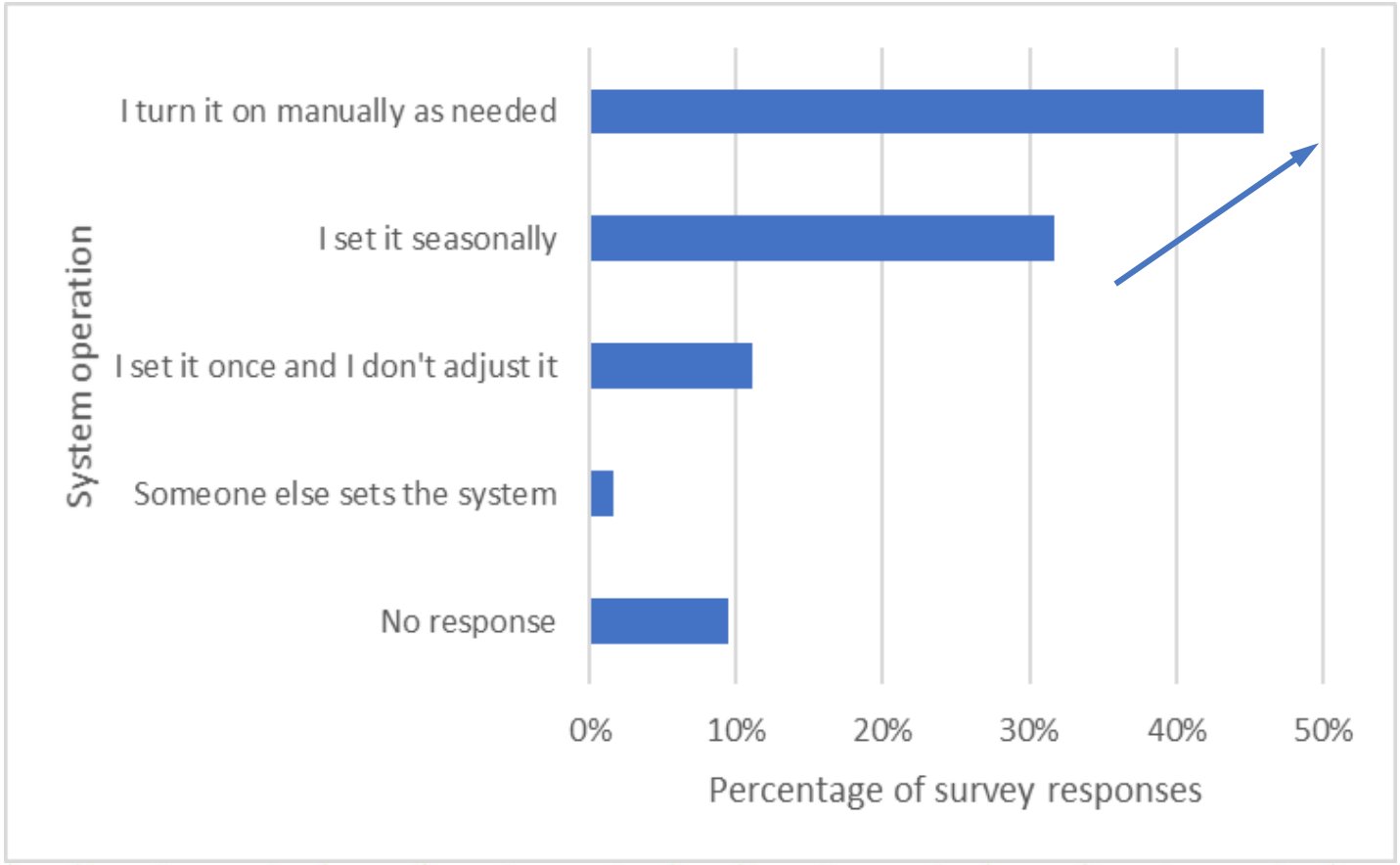
Landscape Composition



Irrigation Operation - Frequency

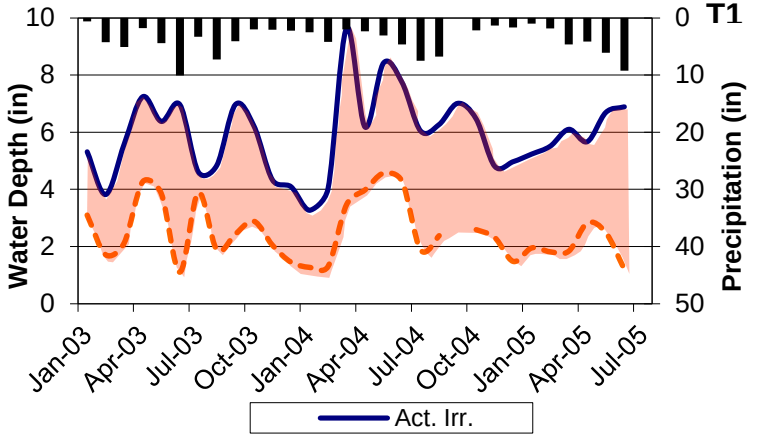


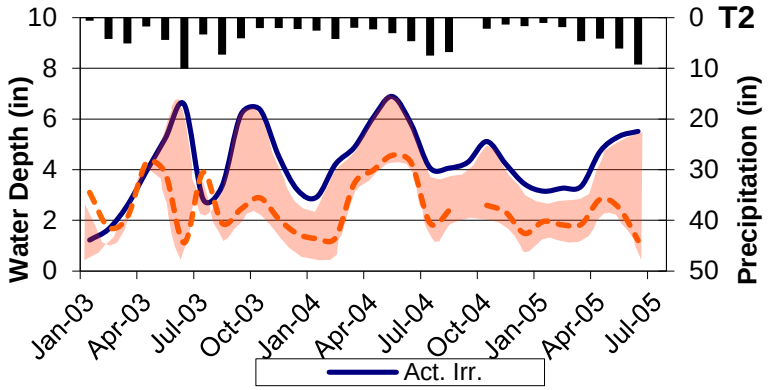
Irrigation Operation - Management

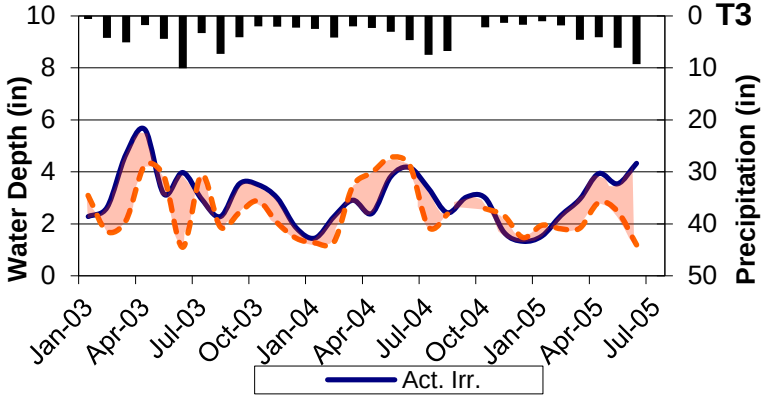


Efficiency

- T1, 42%
  - 2.4 gal pumped/gal req'd
- T2, 59%
  - 1.7 gal pumped/gal req'd
- T3, 78%
  - 1.3 gal pumped/gal req'd







Summary

- Better management of existing systems efficiency → ~40% to 60-70%
  - 33+% less water needed
  - "Acceptable"
- Alternative landscape and good irrigation design efficiency → ~40% to 80+%
  - "Achievable"
  - 50% less water needed

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

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mddukes@ufl.edu http://abe.ufl.edu/faculty/mdukes/