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The Foundation for The Gator Nation

Evaluation and Demonstration of Smart Controllers in Orange County, FL

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WaterSmart Innovations 2013

Introduction

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- Water resource limitations in central Florida
  - Limiting groundwater withdrawals to 2013 demand
  - Increasing population past 2013 totals requires reductions in consumptive use

Objective

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- Evaluate two types of smart controllers to determine whether they can reduce irrigation application of high “irrigators” in Orange County

Materials and Methods

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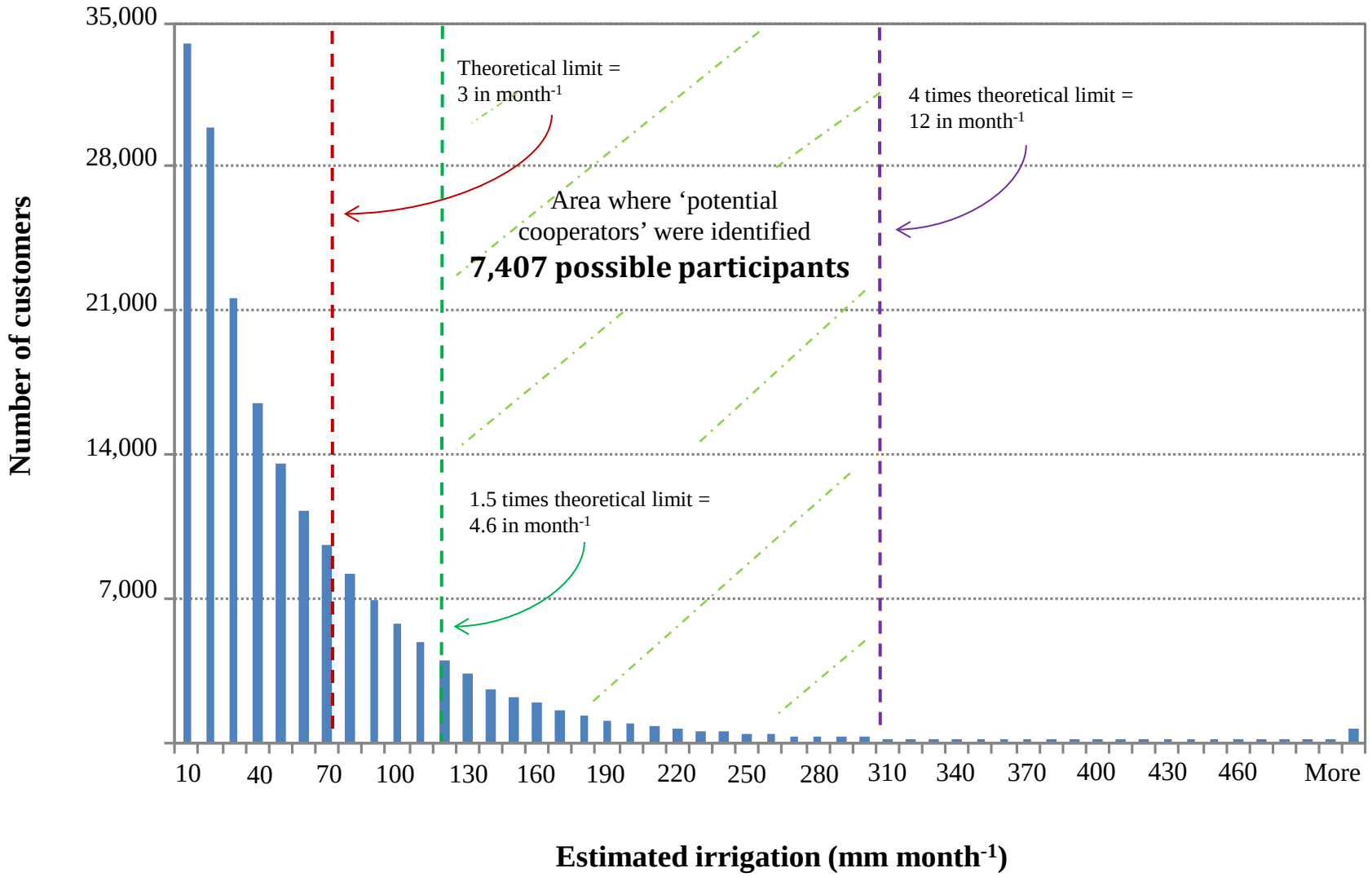
- Selection of High Irrigation Users



Materials and Methods

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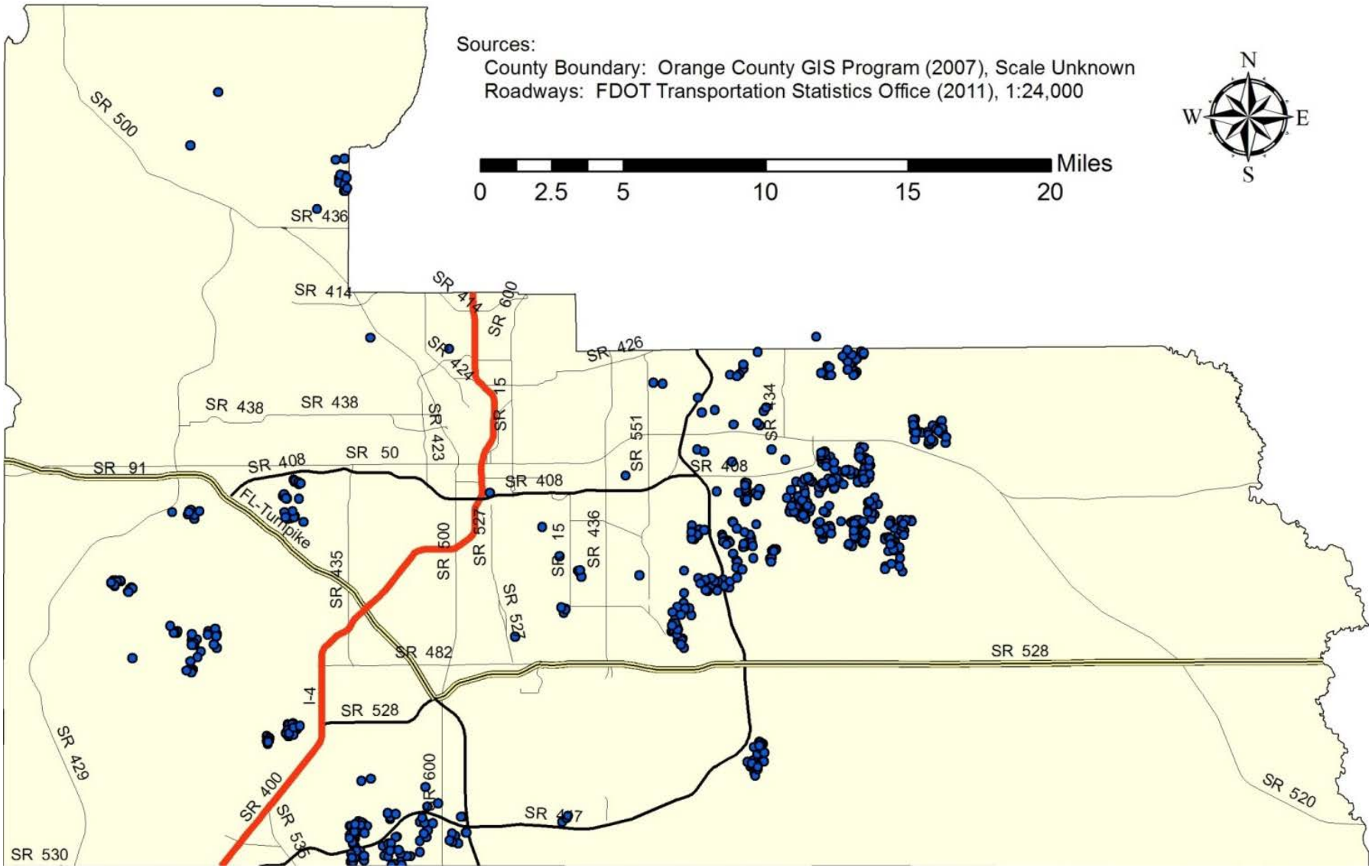
- 843 respondents to the questionnaire



Materials and Methods

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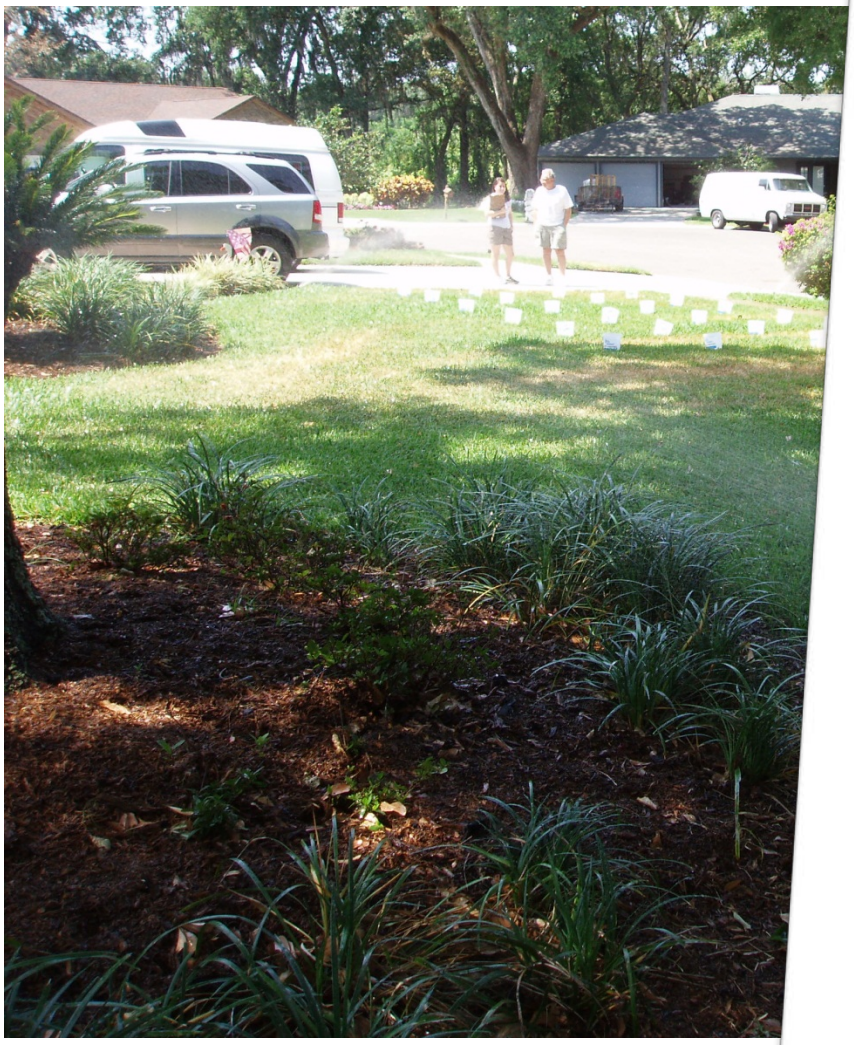
- On-site evaluations



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IRRIGATION SYSTEM EVALUATION

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- **Address:** _____
- **Timer location:** Garage ☐ Outside wall ☐ Other: _____ Date: _____
- **Original schedule:**
  - A) Start time(s): Mon _____ Tue _____ Wed _____ Thu _____ Fri _____ Sat _____ Sun _____
  - A) Run time/zone (min): 1 _____ 2 _____ 3 _____ 4 _____ 5 _____ 6 _____ 7 _____ 8 _____
  - B) Start time(s): Mon _____ Tue _____ Wed _____ Thu _____ Fri _____ Sat _____ Sun _____
  - B) Run time/zone (min): 1 _____ 2 _____ 3 _____ 4 _____ 5 _____ 6 _____ 7 _____ 8 _____
- **Rain sensor:** Location: Roofline Not connected ☐ Obstructed ☐ Misplaced ☐ Absent ☐

Irrigation Zones (stations)		1	2	3	4	5	6	7	8
1. Zone location from the house	a. Front	☐	☐	☐	☐	☐	☐	☐	☐
	b. Left	☐	☐	☐	☐	☐	☐	☐	☐
	c. Center	☐	☐	☐	☐	☐	☐	☐	☐
	d. Right	☐	☐	☐	☐	☐	☐	☐	☐
	e. Back	☐	☐	☐	☐	☐	☐	☐	☐
2. Sun reaching the zone	a. Full sun	☐	☐	☐	☐	☐	☐	☐	☐
	b. Mostly sunny	☐	☐	☐	☐	☐	☐	☐	☐
	c. Mostly shady	☐	☐	☐	☐	☐	☐	☐	☐
	d. Full shade	☐	☐	☐	☐	☐	☐	☐	☐
3. Plant type	a. Turf	☐	☐	☐	☐	☐	☐	☐	☐
	b. Ornamentals	☐	☐	☐	☐	☐	☐	☐	☐
	c. Mixed (%)	Turf							
		Orn.							
4. Turf Quality (1=Dead, 9=Top Qual.)									
5. Num. of irrigation heads	a. Sprinklers								
	b. Rotors								
	c. Microirrigation	☐	☐	☐	☐	☐	☐	☐	☐

Irrigated Area: Calculated (Aerial photo) _____ ft² Corrected (In situ) _____ ft²

Flow Test: Run time per zone _____ minutes Meter reading before _____ Meter reading after _____

Comments:

FOR UF USE ONLY Evaluator

Materials and Methods

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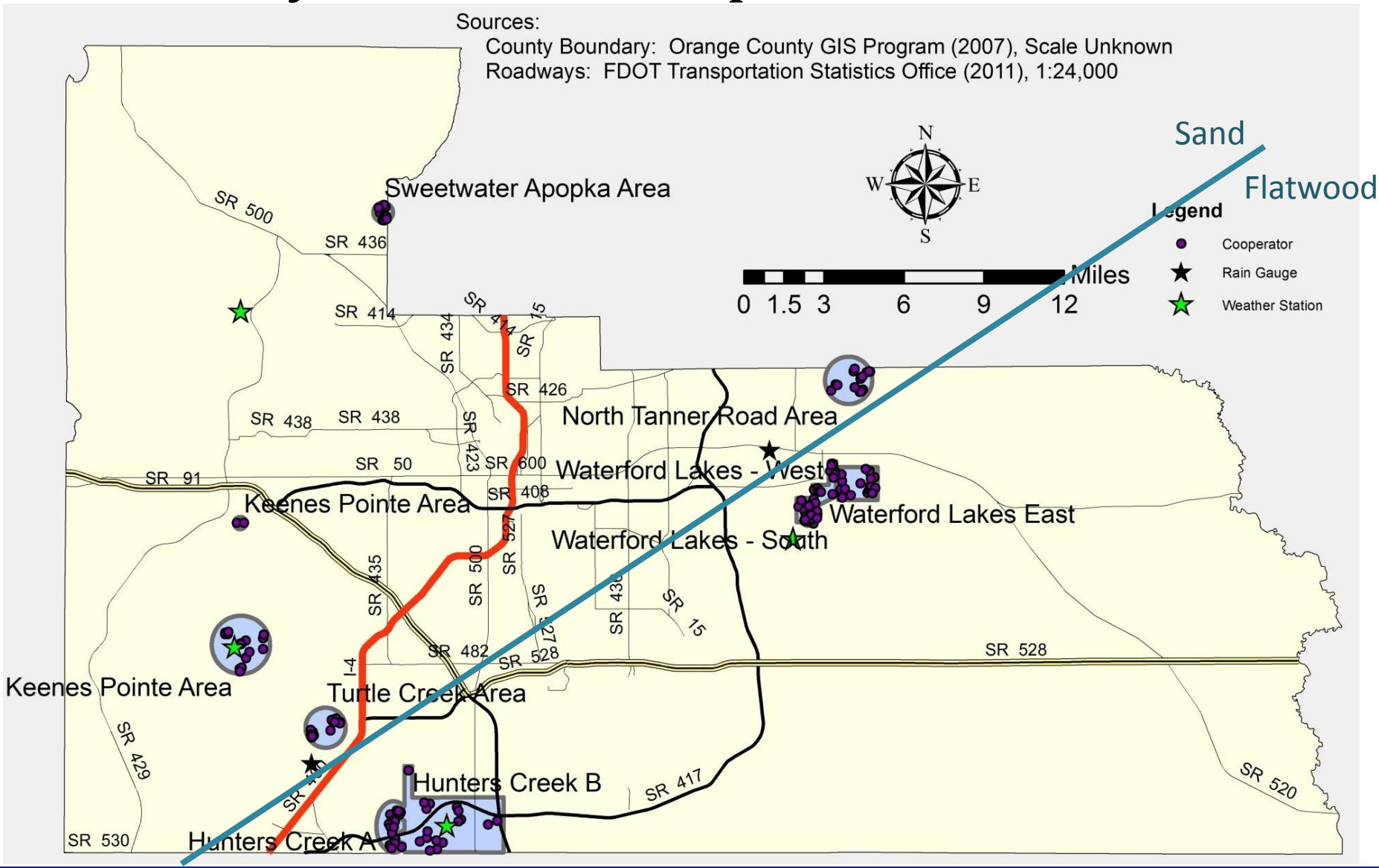
- Summary of Final Participants



Materials and Methods

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- Smart Technologies
  - Rain Bird ESP-SMT
    - ET treatment
    - Total Count = 28
    - Total Locations = 7

  - Baseline WaterTec S100
    - SMS treatment
    - Total count = 28
    - Total locations = 7

Materials and Methods

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- ET
  - Contractor programmed with default landscape settings
  - Daily water windows
  - Limited interaction with homeowner

- SMS
  - Buried at 6 inches in minimally compacted soil
  - Re-programmed time clock schedules for daily irrigation:
    - 20 minutes spray
    - 45 minutes rotor
  - Limited interaction with the homeowner

Materials and Methods

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- Educational Training
  - ET+Edu treatment
    - Reprogrammed for site specifics
    - 5 minute tutorial
    - Total Count = 38
    - Total Locations = 9
  - SMS+Edu treatment
    - Inserted into soil column at 3 inch depth
    - Reprogrammed for 0.25” per event, 2 events per day, 3 d/wk
    - 5 minute tutorial
    - Total count = 38
    - Total locations = 9

Materials and Methods

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- Summary of Treatments
  - ET
  - ET+Edu
  - SMS
  - SMS+Edu
  - Comparison
    - Monitored only (MO)
    - Total count = 35
    - Total locations = 9

- Monitoring Period
  - 10 Nov 2011 through 13 Jun 2013 (~20 months)

Materials and Methods

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- Automatic Meter Recording devices (AMRs)
  - Separated flow meter to measure irrigation only
  - Records hourly irrigation volumes
  - Monthly downloads

Materials and Methods

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- Turfgrass Quality

1

9

5

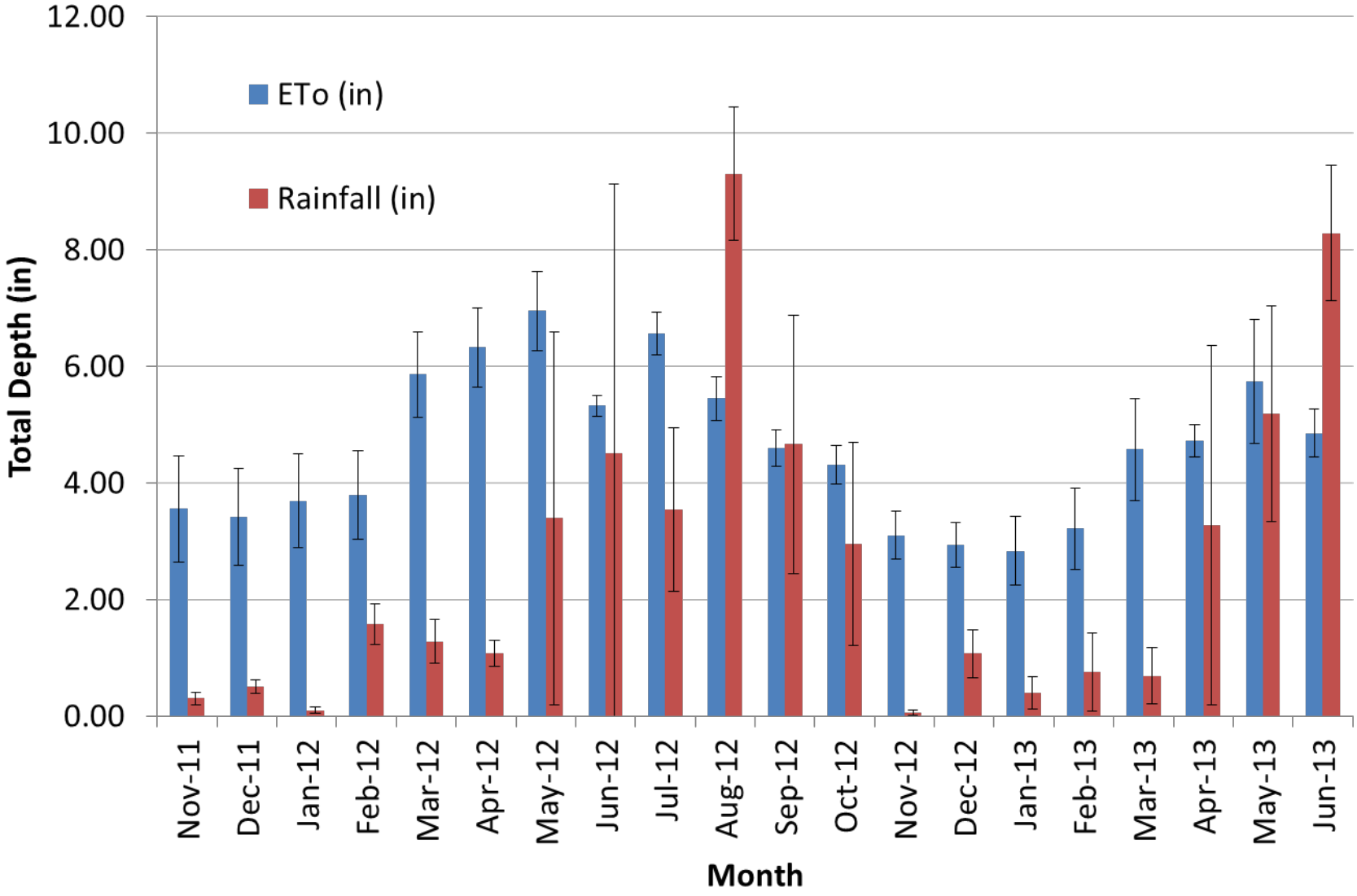
Materials and Methods

- Gross Irrigation Requirement (GIR)
  - If 0.5*AWHC was depleted,

$$GIR = \frac{ET_C - R_e}{DU_{lh}}$$

  - Assuming root depth of 8 inches,
    - AWHC was 0.56 inches (6.3%) for sand
    - AWC was 1.14 inches (14%) for flatwoods
  - DU_{lh} was 80%
  - GIR range selected as 1*GIR to 1.5*GIR

Preliminary Results



Preliminary Results

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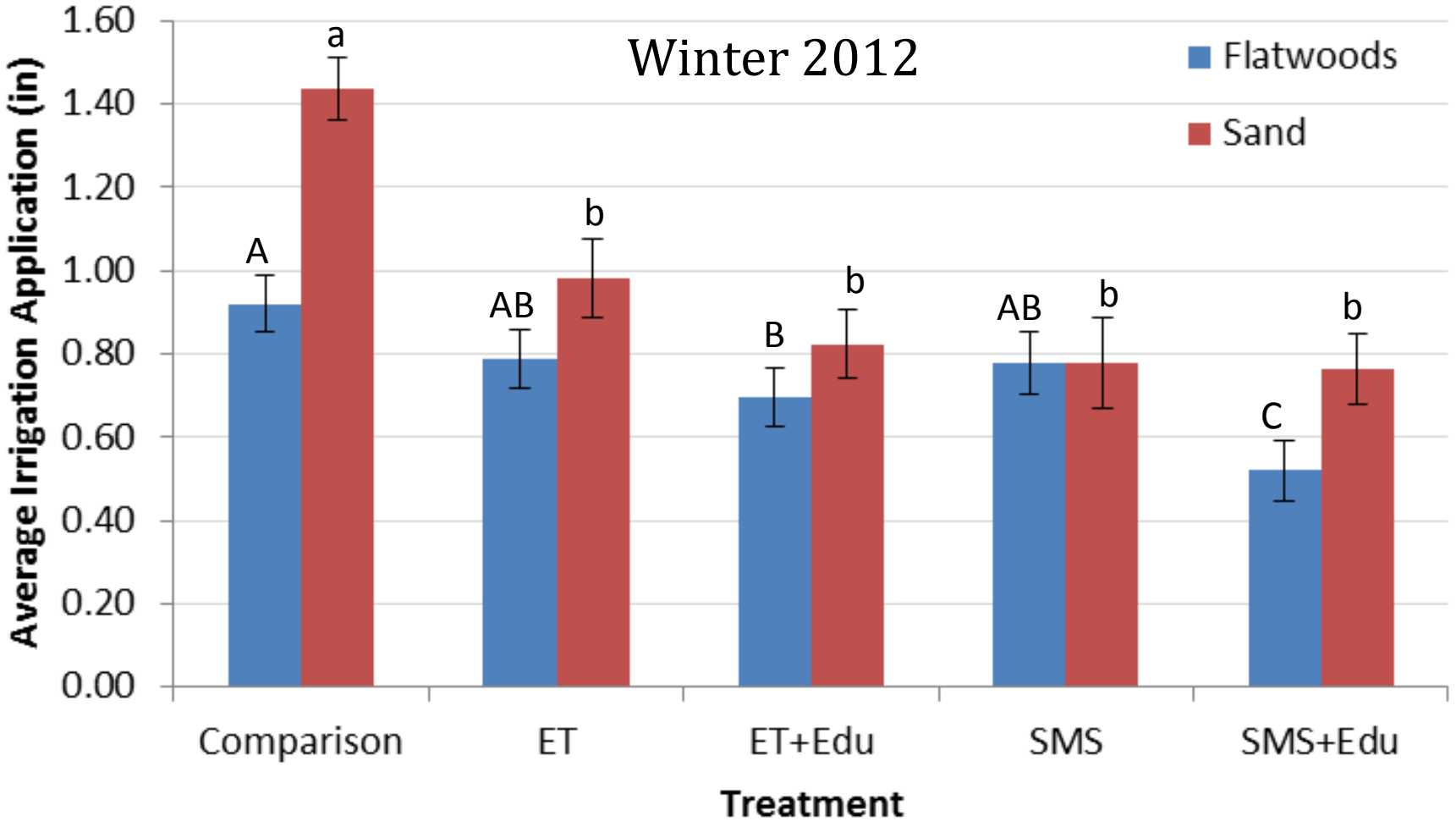
- Average irrigation application



Preliminary Results

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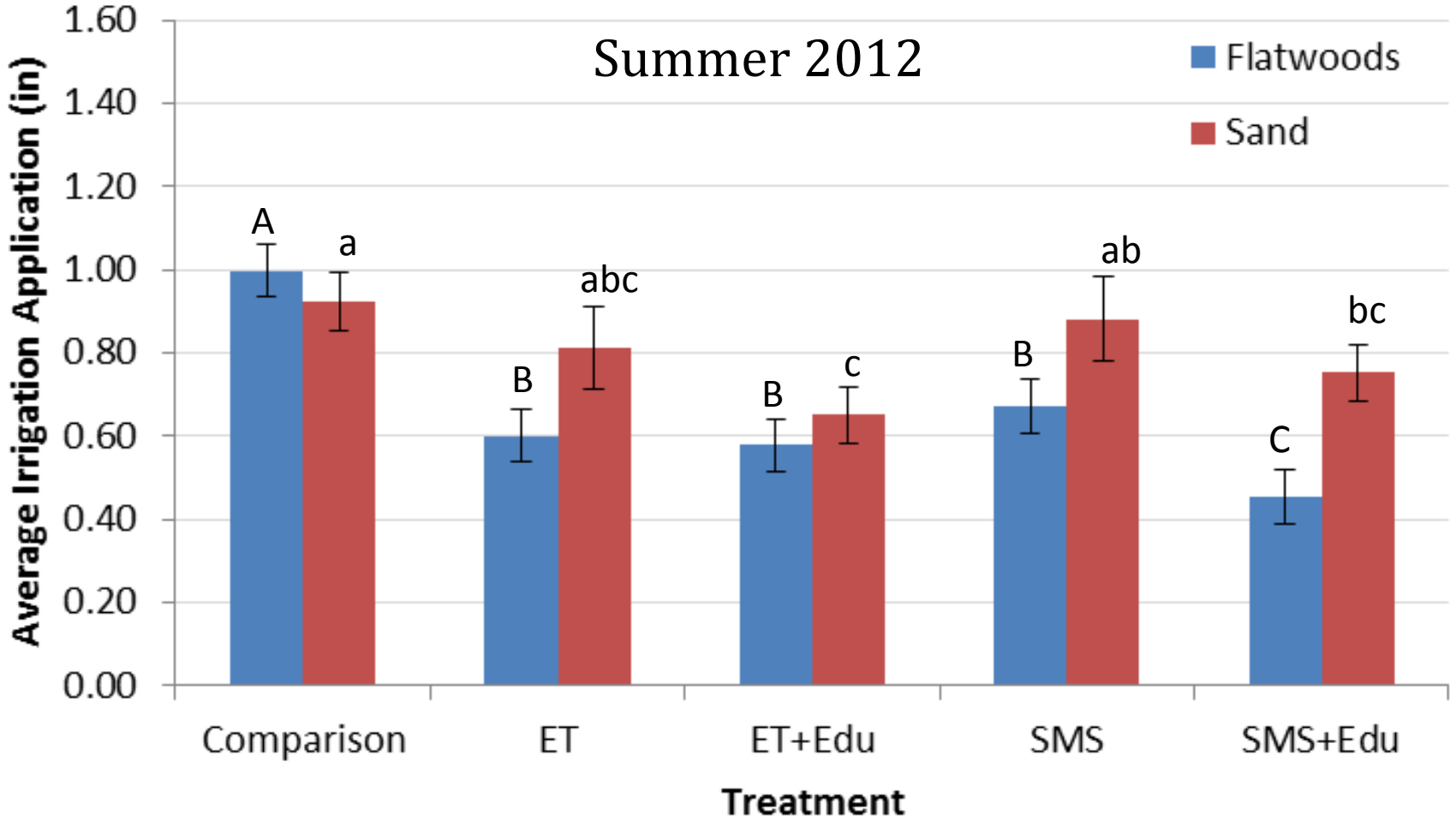

Preliminary Results

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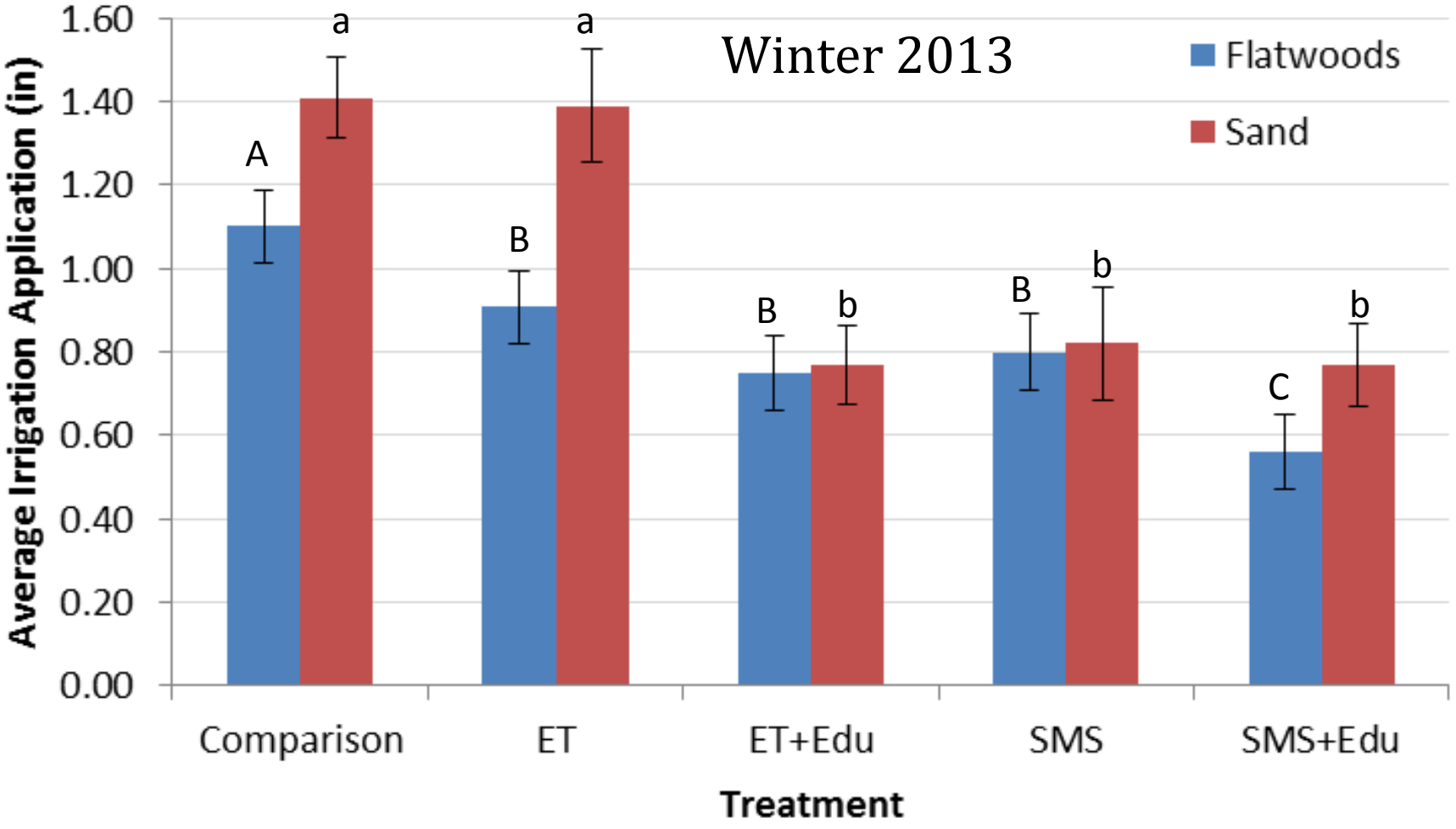

Preliminary Results

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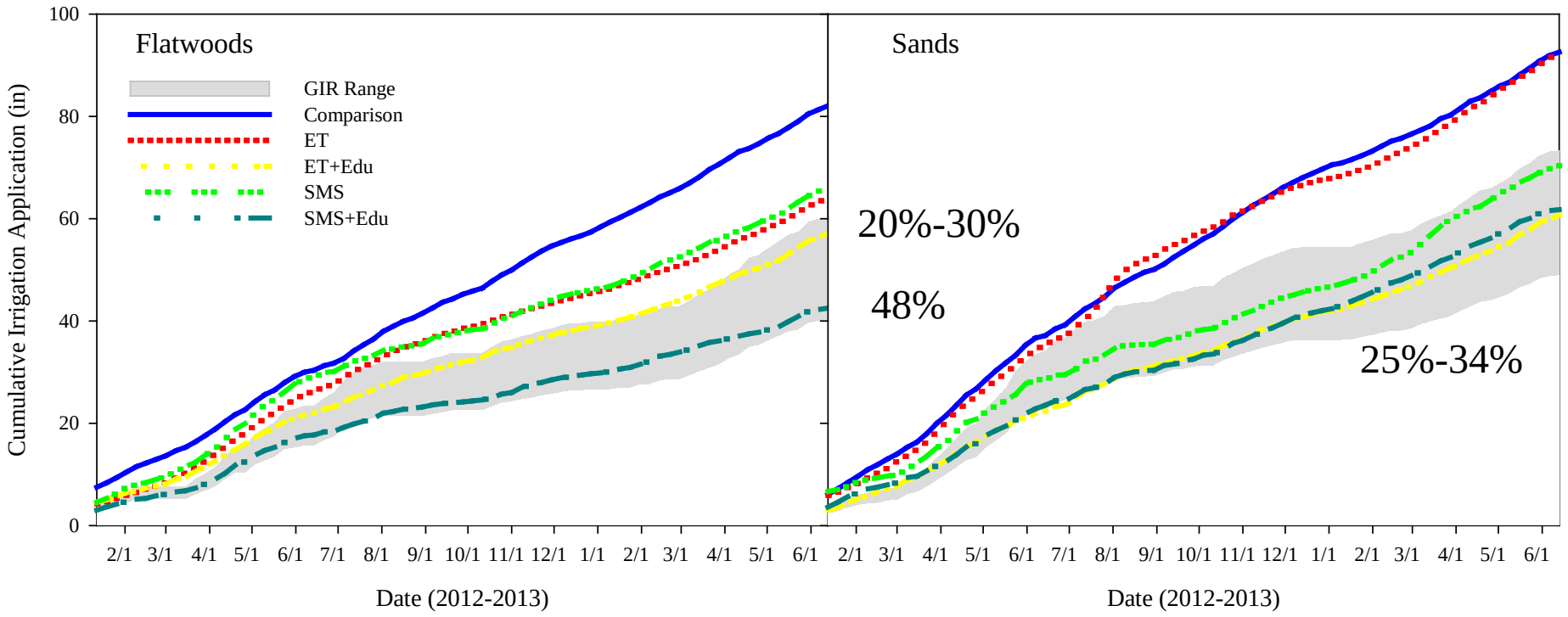
- Cumulative Irrigation Application



Preliminary Results

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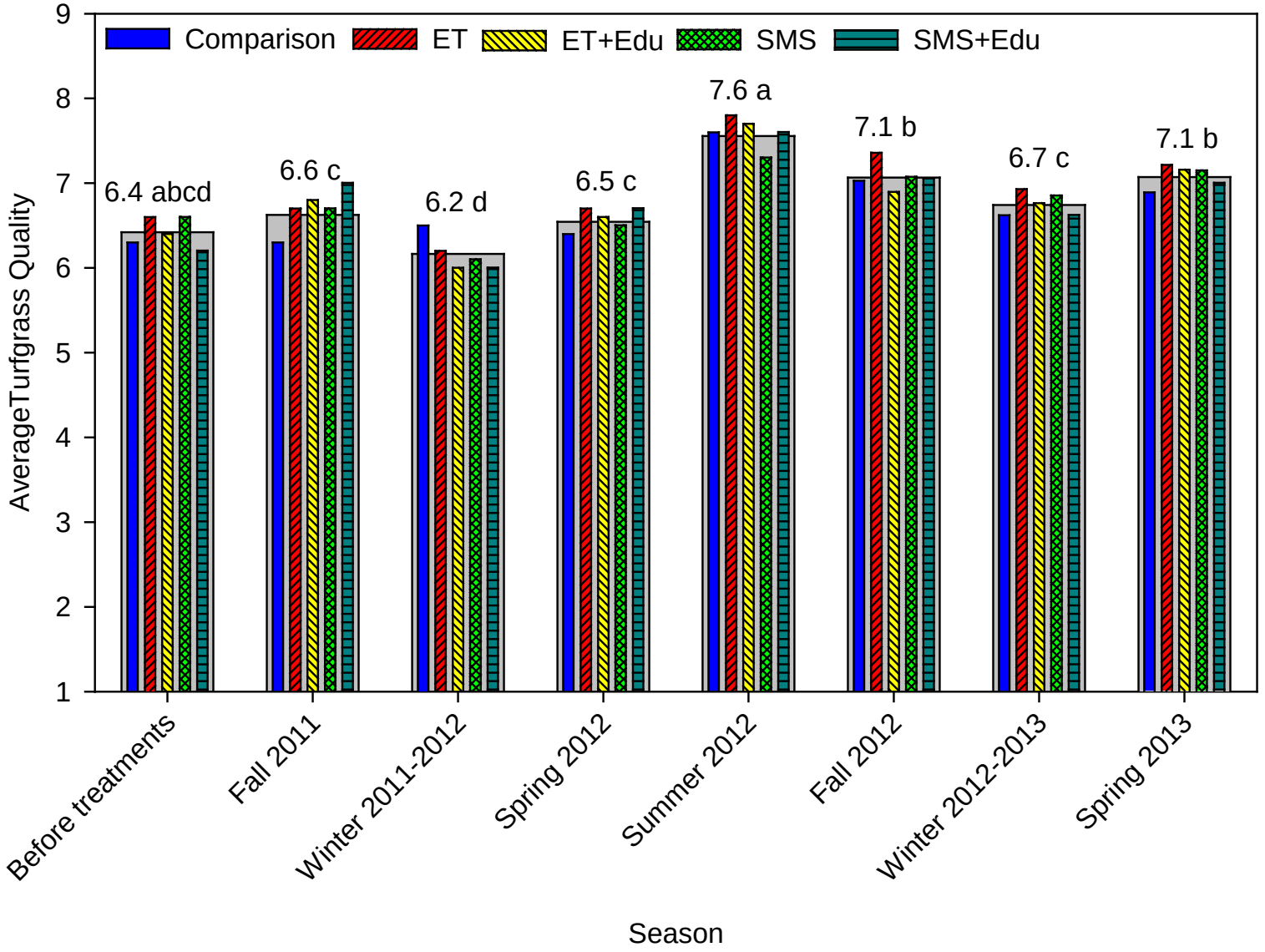
- Turfgrass Quality



Preliminary Results

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- Concerns analysis
  - Common responses
    - Too much irrigation/high water bill
    - Too little irrigation
    - Watering too soon after rainfall
    - Non-functioning controller/sensor

Preliminary Results

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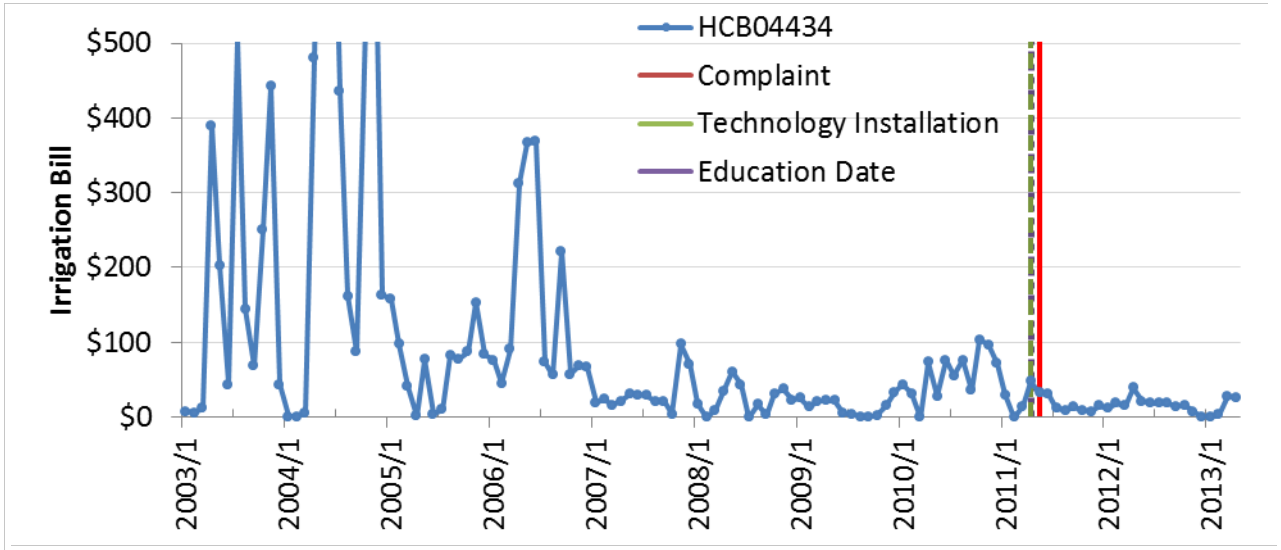
- Concerns analysis

Treatment	Count
ET	17
ET+Edu	25
SMS	8
SMS+Edu	21
Grand Total	71

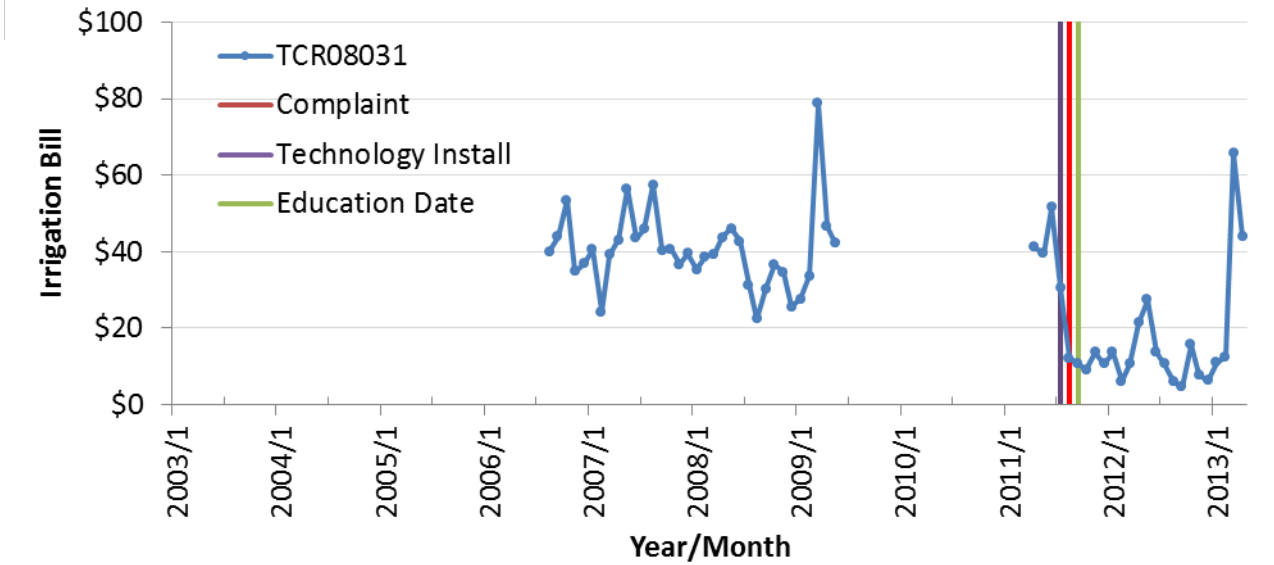
Year	Months Per Year	Count
2011	8	29
2012	12	34
2013	6	8
Grand Total		71

Preliminary Results

- Concerns analysis



ET+Edu



SMS+Edu

Summary to Date

- Technologies have shown overall water savings without sacrificing landscape quality
- Trend is additional savings due to the educational component
- Continued data collection for long term evaluation
- Technological concerns were initially high, but have tapered off

Acknowledgements

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Questions?