This presentation premiered at WaterSmart Innovations

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INNOVATIONS

Water Savings of ET vs. Timed Water Applications

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PURPOSE

- To compare and measure the water conservation capabilities of a conventional timer based control system operating on a set duration and frequency versus a weather driven evapotranspiration derived control system that utilizes a computer based algorithm to determine the frequency and duration of the irrigation cycle.
- Commenced in 2010, 3 year study.

METHODOLOGY

METHODOLOGY

- St. Augustine – Floratam
- Twelve 15’ x 15’ plots
  - 4 control
  - 4 weather based
  - 4 time based
- Spray Sprinklers
  - Toro 570Z-6PRXCOM
    - Pressure Regulating
    - Check Valve
    - Flow Stop
  - 15Q Precision Nozzles
- Irritrol 700-01 Valve
- 40 psi In-line Regulator

METHODOLOGY

- Rain Bird ESP-LX field controller
- Rain Bird MaxiCom central control
- Campbell Scientific weather station
  - 30 feet away
  - Same turf
- 8 Individual 5/8 inch water meters
- Effective rainfall first 0.5 inches of storm

METHODOLOGY

- Time Based Plots
  - 0.75 – 1 inch of reclaimed water per week as mandated
  - Tuesdays and Thursdays per existing South Florida Water Management District statute
- ET Based Plots
  - Time based on ET reading from the weather station
  - 0.8 landscape coefficient
  - As needed basis with no restriction on how many days per week

METHODOLOGY

- Control Plots
  - Watered for establishment
  - Received only direct rainfall
  - Maintained (mowing, fertilization, etc.) with same frequency and same strategy as irrigated plots

AUDITS

Valve #	Irrigation Type	DU_{LQ}	DU_{LH}	RTM	Precipitation Rate
8-16	ET	64.2 %	82.3%	1.28	0.93 inches/hr
8-17	ET	73.7%	85.5%	1.18	0.91 inches/hr
8-18	ET	64.4%	80.8%	1.28	0.88 inches/hr
8-19	ET	48.5%	72%	1.45	0.82 inches/hr
8-20	2x/week	64.8%	82.2 %	1.27	0.85 inches/hr
8-21	2x/week	55.5%	80.4%	1.36	0.88 inches/hr
8-22	2x/week	67.1%	83.9%	1.25	0.88 inches/hr
8-23	2x/week	61.4%	81.2%	1.31	0.85 inches/hr
Average ET	ET	70.6%	85.4%	1.22	0.87 inches/hr
Average 2x/week	2x/week	65.5%	84.6%	1.26	0.86 inches/hr
Average	All	69.7%	85.4%	1.22	0.87 inches/hr

- Each time based irrigation zone programmed to apply net of 0.875 inches/week using RTM (1.26) between the DU_{LH} and DU_{LQ} resulting in 77 minutes per week, 39 minutes per day
- November through March halved to 0.438 inches per week (20 minutes per day)

RECORDING & REPORTING

- Weather (rainfall), ET and run times tracked daily
- Water meters read and recorded monthly
- Photos of each plot taken monthly and a brief description of observed turf quality using the University of Florida protocol
- Log of mowing, fertilization, pest management, irrigation schedules and system maintenance

RECORDING & REPORTING

IRRIGATION TEST PLOT STUDY

WATER METER READINGS 1-Jul 31-Jul-12

ET irrigated test plots

Meter #	Zone number	Ending reading 31-Jul-12	Begining reading 1-Jul-11	Total gallons
71089660	8-16	10,361.5	10,013.2	348.3
71089661	8-17	11,542.5	11,175.2	367.3
71089663	8-18	10,365.1	10,005.9	359.2
71089665	8-19	9,147.4	8,823.7	323.7

ET irrigated test plots average total run time (min) per zone 1 July 12:01am to 31 July 11:59pm:
154

Time irrigated test plots

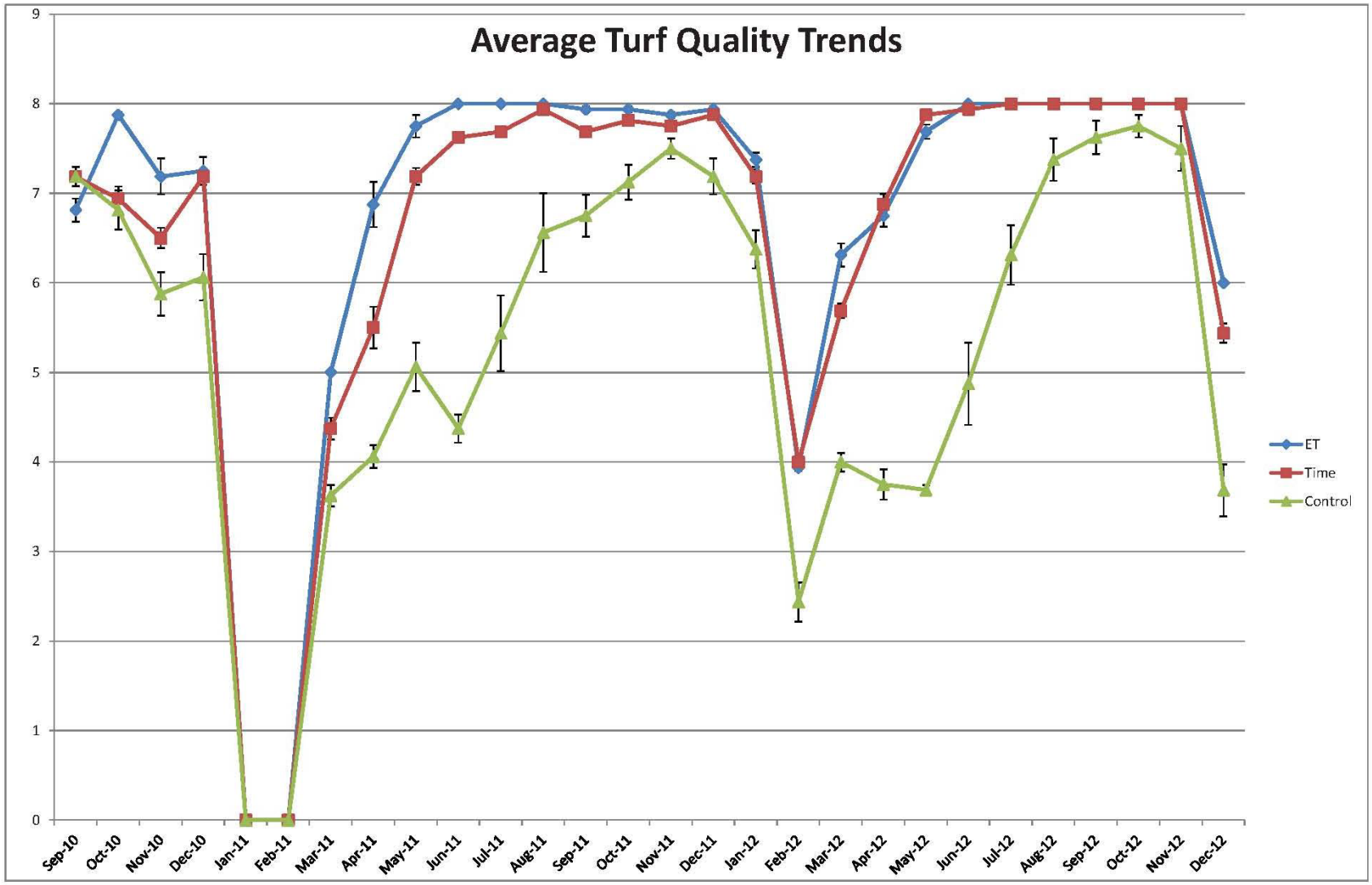
Meter #	Zone number	Ending reading 31-Jul-12	Begining reading 1-Jul	Total gallons
71089666	8-20	12,476.5	11,690.5	786.0
71089667	8-21	12,932.0	12,235.9	696.1
71089668	8-22	12,328.4	11,678.2	650.2
71089669	8-23	13,094.7	12,411.0	683.7

Timed irrigated test plots average total run time (min) per zone 1 July 12:01am to 31 July 11:59pm:
273

TURF QUALITY TRENDS

- As expected the irrigated plots have a higher quality than the control plots by a visible amount.
- The irrigated plots track close to the same but the ET plots at times show a slightly higher quality rating.
- In reality, both irrigation schedules provide acceptable turf quality.

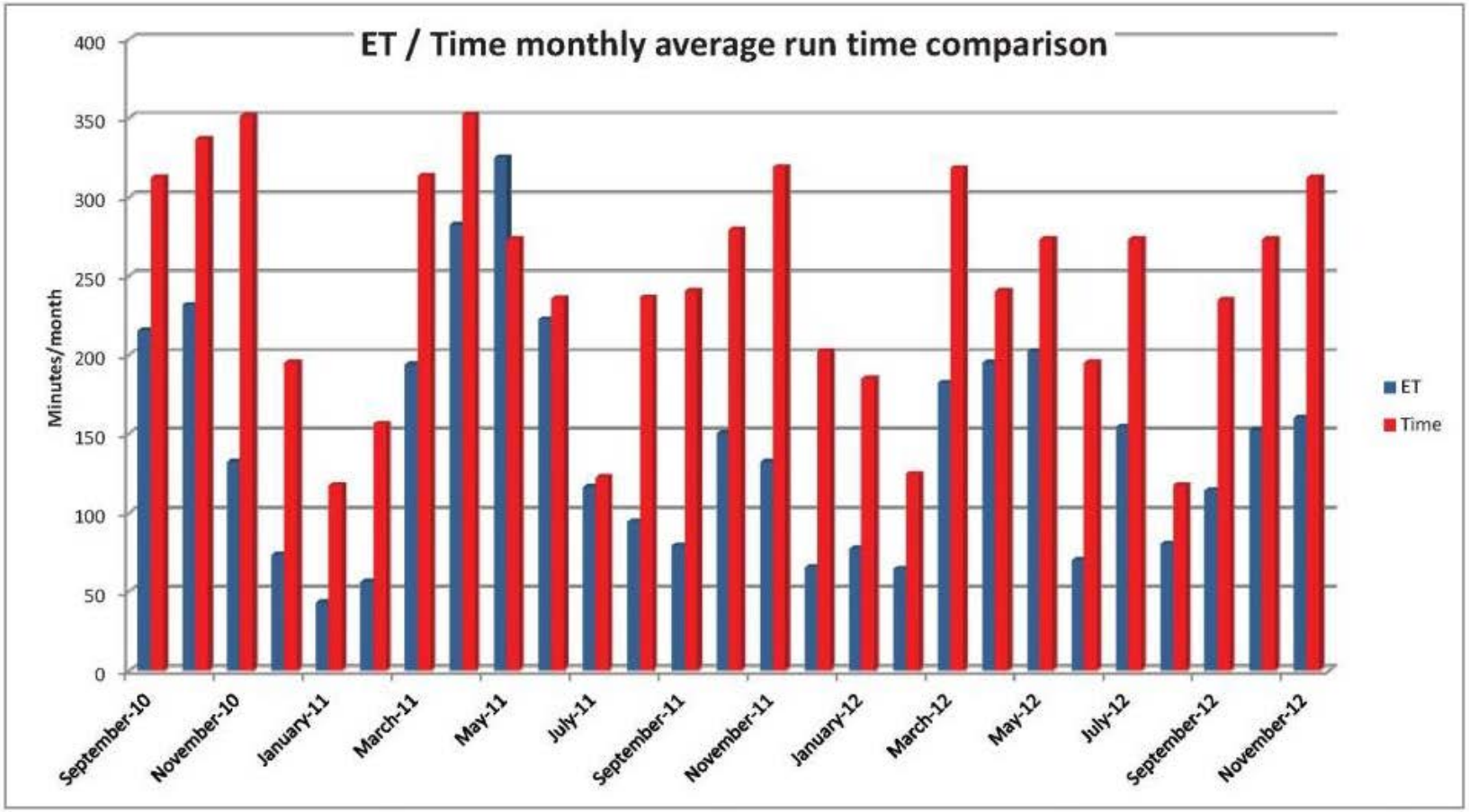
TURF QUALITY TRENDS



RUN TIME COMPARISON

- In all but one month the average monthly run time showed that the time scheduled irrigation operated longer than the ET based schedule.
- In May, June and July the two schedules are closer together time wise compared to rest of the year.
- In some months, the timed plots are operating over a 100 minutes more.

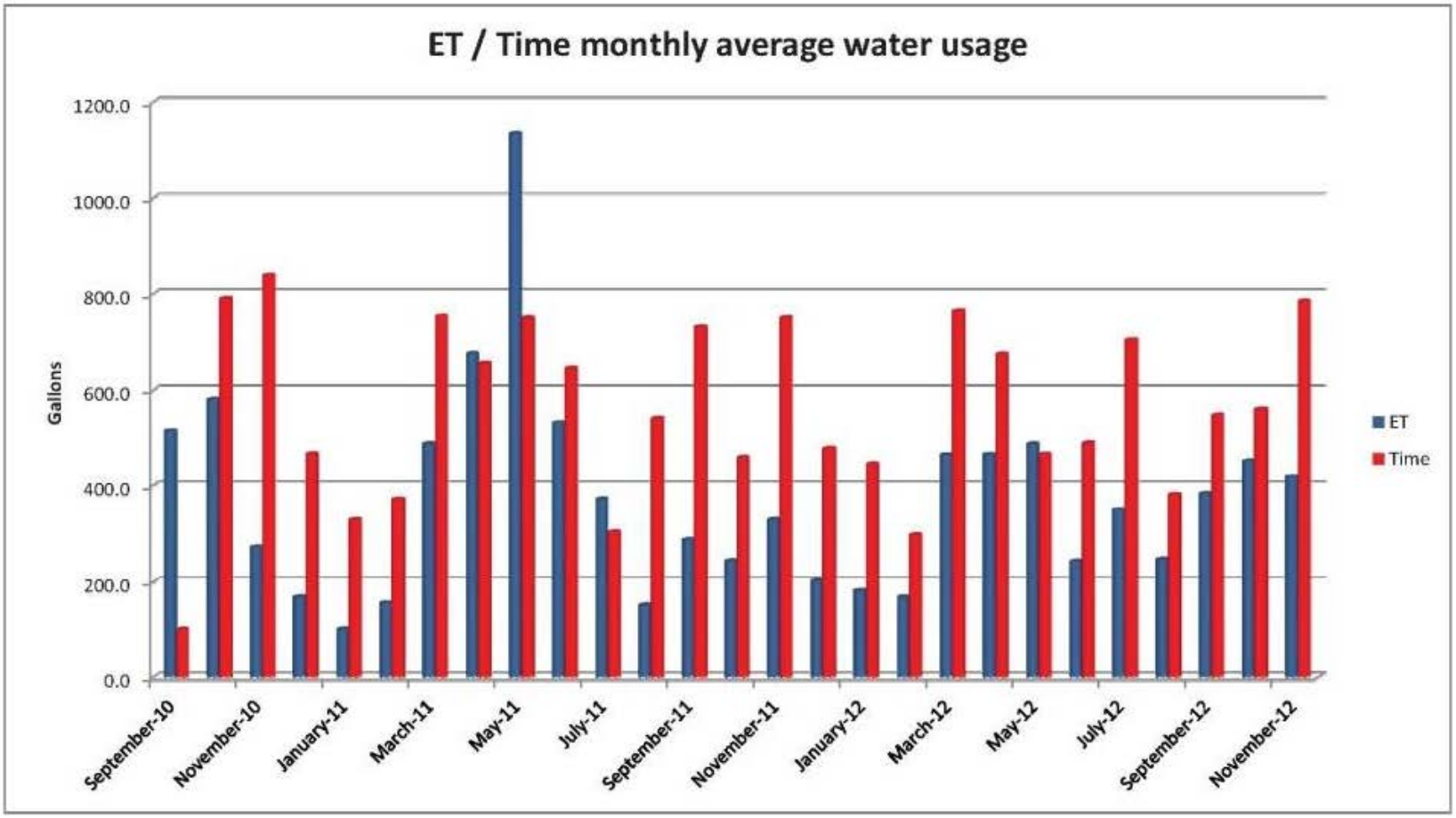
RUN TIME COMPARISON



WATER USE COMPARISON

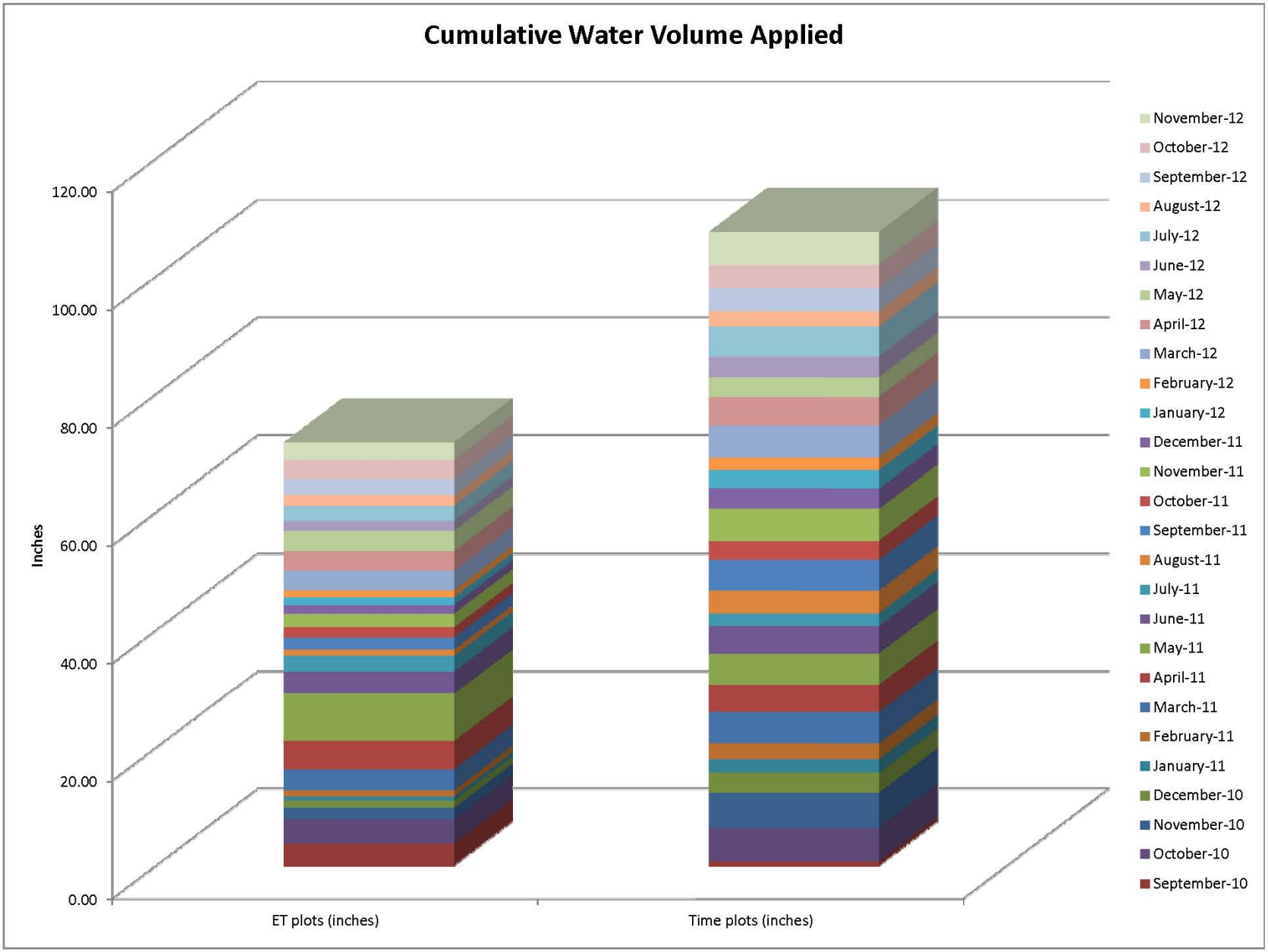
- Except for two months in the spring of 2011 (April and May –typical of Florida) the ET based schedule used less water than the time based schedule
- This was not unexpected as the ET based controllers are designed to match the weather.

WATER USE COMPARISON



CUMULATIVE WATER USE

- ET based plots have applied approximately 64.3 inches of water and used approximately 9,548 gallons
- Time based plots have applied approximately 101 inches of water and used over 15,082 gallons
- Represents over a 36.3% water savings over the 27 month study period (reduced from 36 months)
- Some months savings have been more than 50%


Cumulative Water Volume Applied
Inches
120.00
100.00
80.00
60.00
40.00
20.00
0.00
ET plots (inches)
Time plots (inches)
November-12
October-12
September-12
August-12
July-12
June-12
May-12
April-12
March-12
February-12
January-12
December-11
November-11
October-11
September-11
August-11
July-11
June-11
May-11
April-11
March-11
February-11
January-11
December-10
November-10
October-10
September-10

CONCLUSIONS

- Study shows that the ET based control system saves significant water over the mandated schedule.
- Rarely does the ET based schedule use more water than the time based schedule
- The quality of the turf is similar between the two schedules.
- Overall operating time on the ET based schedule is much lower which reduces the overall water window and wear and tear on equipment (study basis).
- Even though a weather station is used, could surmise that most ET based control should have similar water savings