ENVIRONMENTAL PROTECTION AND GROWTH MANAGEMENT DEPARTMENT
Environmental Planning and Community Resilience Division
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May 8, 2018

Larry Teich
City of Fort Lauderdale
949 NW 38th Street
Fort Lauderdale, Florida 33309

RE: NatureScape Irrigation Service Annual Summary Report, Year Three (4/2017 - 4/2018)

Dear Mr. Teich,

Accompanying this letter is the Annual Summary Report prepared by the Broward County NatureScape Irrigation Service (NIS) for Year Three of the current contract with the City of Fort Lauderdale. This report completes our obligations in support of our Interlocal Agreement (ILA) for the contract year.

The NIS program benefits the City of Fort Lauderdale by reducing impacts on water quality (supporting Total Maximum Daily Load limits for nutrients) by limiting irrigation runoff flow into local waterways, supporting the outdoor water conservation element as required by the South Florida Water Management District's Water Conservation Plan (Consumptive Use Permit), reducing demand on local water resources, and reducing expenses related to irrigation and landscape maintenance.

This report will summarize the evaluations conducted by the NIS at locations requested by staff at the City of Fort Lauderdale. It will cover water use and savings at those sites and will show the overall activity and impact of the NIS program across the County. An update on the Smart Irrigation Technology giveaway program will also be provided.

On behalf of the NIS and the Environmental Planning and Community Resilience Division of Broward County, I would like to thank you and the City of Fort Lauderdale for supporting this important water resource conservation program. I look forward to working with your staff to identify sites and coordinate evaluations for the coming year. Should you have any questions, please feel free to call me directly at (954) 519-1281.

Sincerely,

Robert Wanvestraut
NatureScape Irrigation Service Program Manager
Environmental Planning and Community Resilience Division
Broward County Environmental Protection and Growth Management Department

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Year Three NIS Report for City of Fort Lauderdale
(4/2017 – 4/2018)

Introduction

The Regional Water Availability Rule (February 2007; South Florida Water Management District) restricts urban withdrawals from the Biscayne Aquifer to pre-April 2006 levels. With this and the expectation of continued urban growth in mind, utilities and municipalities in Broward County will be forced to develop new, more expensive, alternative water supplies to meet increased future demands. To offset some of the future demand increases, water suppliers and governments in Broward have been encouraged by the SFWMD and local policymakers to conserve current supplies. Conservation is recognized as being the least expensive means to reduce, defer, or eliminate the need for future water supply and water treatment development.

More than half of all water in Broward County is used for landscape irrigation. Furthermore, the Environmental Protection Agency (EPA) estimates as much as 50% of outdoor water use is lost through evaporation, wind drift, runoff, and maintenance issues. With so much of Broward's water being used for irrigation and so much room for efficiency gains, it is imperative to operate programs which aim to increase outdoor water use efficiency, such as the NatureScape Irrigation Service (NIS).

Why the NatureScape Irrigation Service?

Considering the volume of water used for irrigation and the impacts on local resources from inefficient irrigation, any municipality or utility with a true water conservation ethic and program must address outdoor water use, i.e., irrigation efficiency. However, most cities (including many in South Florida) face the challenge of managing many large irrigation systems with few staff, often forcing them to prioritize issues of water loss over issues of water use efficiency. Fortunately, NIS staff are technically trained and skilled in irrigation efficiency and have time required to perform comprehensive system *audits*.

Irrigation system audits consist of tests and observations to identify design and performance issues which impact system water application *efficiency*. These issues are all identified by NIS staff at each site and outlined in our reports. In contrast, most irrigation staff conduct routine **'wet-checks'** on the systems they manage. **Wet-checks** are cursory tests meant primarily to identify larger breaks and leaks from damaged lines and/or sprinkler heads and associated losses in pressure. **Irrigation system audits** reveal all that and much more, but require significantly more training and time than many municipal staff are afforded. Therefore, the NIS serves to augment city staff's ability to keep their systems functioning at a high level of efficiency.

If the recommendations in NIS reports are followed and sources of inefficiency (not just water loss) are addressed; the landscapes affected should maintain a healthy, thriving appearance while using the optimal amount of water. This results in saving expenses related to pumping, chemical inputs, plant material replacement, system component wear and tear, and for the water itself (if potable water is used). It also reduces irrigation runoff, which is often a point source for nutrients entering local waterways.

Evaluations Conducted and Water Savings Achieved for the City of Fort Lauderdale

The NIS visits a minimum of 12 locations for the City of Fort Lauderdale and returns to at least three of those sites to document savings achieved by city staff implementing recommendations and repairs outlined in the NIS's site evaluation reports. Those return visits are referred to as "Follow-Up" evaluations. Only water savings visually observed by the NIS field staff are included in

this report. This means total annual savings for the city may be higher, as staff may have implemented savings measures at other sites not visited a second time.

A total of 19 evaluations were conducted by the NIS at 15 locations for the City of Fort Lauderdale during this most recent contract year. Fifteen of the 19 evaluations conducted for the City this year were originals and four were follow-up evaluations. This total includes four value-added evaluations, provided to the City at no charge. Of the 15 locations evaluated (as 'Original' evaluations), six sites were government-owned (non-park) properties, eight were commercial properties and one was a city park. All 15 locations evaluated for the City during 2017/2018 used city irrigation metered water. All evaluation reports were sent to the designated point(s) of contact at City of Fort Lauderdale.

The cumulative original water use at the 15 locations evaluated was 13.4 million gallons/year. The overall Actual Water Savings (demand reduction) for these locations was determined to be 6.4 million gallons/year. This represents a 48% savings from the original use. The average Actual Water Savings per evaluation was 31%. *Once again, these savings do not reflect any repairs or adjustments City staff may have made at the locations not revisited during a Follow-Up.*

In last year's annual report, the Irrigation System Repair Checklist was introduced as being a new addition to the NIS reports. This past year, the NIS streamlined its reporting format further, with the same goal of maintaining content, but presenting it in an easy-to-read manner. A graphic showing the new format has been included in Appendix A. of this report.

Table 1. below shows a summarized breakdown of the evaluations, including water use, savings, and site and source types, conducted in the City of Fort Lauderdale during this reporting period. Some information is examined further in sections that follow.

Table 1. Summary of NatureScape Irrigation Service Evaluations for the City of Fort Lauderdale April 2017 - April 2018.

Eval #	Water Source	Site Name	Site Type	DU%	Site Cond.	Original Water Use Gals/Yr	AWS Clock Sett. Gals/Yr	AWS Sys.Repairs Gals/Yr	AWS Smart Tech. Gals/Yr	Smart Tech. Device	Total AWS Gals/Yr	New Usage Gals/Yr	Total AWS % of Orig. Use	Total Site Demand Reduct.
17-132	CIM	Bayview Drive Median 57th St to 55th St.	Gov.	67%	Fair	739,440	410,800	-	-	-	410,800	328,640	56%	56%
17-131	CIM	Bayview Drive Median at US1	Gov.	67%	Fair	814,320	452,400	-	-	-	452,400	361,920	56%	56%
17-238	CIM	Coral Ridge Mall Movie Theater	Bus.	65%	Fair	232,128	-	-	-	-	-	232,128	0%	0%
17-239	CIM	Coral Ridge Mall Front Office Clock	Bus.	69%	Fair	187,200	-	-	-	-	-	187,200	0%	0%
17-237	CIM	Coral Ridge Mall Northside Clocks	Bus.	68%	Fair	584,272	-	-	-	-	-	584,272	0%	0%
17-235	CIM	Coral Ridge Mall Northwest Corner	Bus.	68%	Fair	137,800	-	-	-	-	-	137,800	0%	0%
17-236	CIM	Coral Ridge Mall West Side of Publix	Bus.	65%	Fair	483,600	161,200	-	-	-	161,200	322,400	33%	33%
17-240	CIM	Hilton Marina Parking Lot (east)	Bus.	68%	Fair	2,096,640	299,520	-	-	-	299,520	-	14%	66%
18-096		Hilton Marina Parking Lot Follow-Up		69%	Fair	-	898,560	-	179,712	SMTe	1,078,272	718,848	60%	
17-241	CIM	Hilton Marina Pool Clock	Bus.	69%	Fair	692,640	173,160	-	-	-	173,160	-	25%	70%
18-104		Hilton Marina Pool Clock Follow-Up		70%	Good	-	-	212,160	96,096	SMTe	308,256	211,224	59%	
17-242	CIM	Hilton Marina West Villas	Bus.	66%	Fair	3,032,120	-	-	-	-	0	-	0%	38%
18-105		Hilton Marina West Villa Follow-Up		69%	Fair	-	687,960	-	474,656	SMTe	1,162,616	1,869,504	38%	
17-060	CIM	Stranahan Landing	Park	67%	Fair	144,768	-	-	-	-	0	-	0%	25%
17-061		Stranahan Landing Follow-Up		69%	Fair	-	-	-	36,192	SMS	36,192	108,576	25%	
17-127	CIM	US1 Median 27th	Gov.	69%	Fair	1,422,720	790,400	-	-	-	790,400	632,320	56%	56%
17-129	CIM	US1 Median 3935 to 4501	Gov.	69%	Fair	884,520	491,400	-	-	-	491,400	393,120	56%	56%
17-130	CIM	US1 Median 5100 to 5130	Gov.	69%	Fair	870,480	483,600	-	-	-	483,600	386,880	56%	56%
17-128	CIM	US1 Median Oakland Park Blvd	Gov.	69%	Fair	1,104,480	613,600	-	-	-	613,600	490,880	56%	56%
					Totals	**13,427,128**	**5,462,600**	**212,160**	**786,656**		**6,461,416**	**6,965,712**	**31%**	**48%**

Abbreviations and Notes:

Water Sources: CM – City main (meter); CIM – City irrigation metered water; SUR – Surface water; Well – Well water; Reuse – Reclaim, reuse water.
Site Types: Park – city owned public park; Gov. – city owned non-park, Res. – Residential (multi-family); Bus. – Commercial business
DU% – Distribution Uniformity; this is metric reflecting the efficiency of the system. Poor <56; Fair 56-69; Good 70-79; Excellent >80.
Gals/Yr. – Gallons per year
Original Water Use – Site water use pre-evaluation
AWS – Actual water savings
AWS Clock Sett. – Actual water savings achieved by setting irrigation clock to a more appropriate/efficient schedule
AWS Sys. Repairs – Actual water savings achieved through system repairs (leaks, replacing bad sprinkler heads etc.) and calculated savings expected from engaging a rain sensor (rain sensor engagement assumes only minimum expected savings of 15% for systems running three or more days/week and 8% for systems running two days/week)
Smart Tech. Device – Smart irrigation technology device deployed, if applicable (controller, SMS-soil moisture sensor, ET-evapotranspiration sensor)
AWS Smart Tech. – Actual water savings achieved through the addition of a Smart irrigation technological device
ET Sensor – Evapotranspiration-based weather sensor (added to an existing digital controller)
Controller – 'Smart' irrigation (evapotranspiration-based) controller
Total AWS – Total actual water savings (AWS Clock + AWS Smart Tech. + AWS Sys. Repairs)
New Usage – Site water use post-evaluation (and addition of Smart irrigation device, if applicable)
Total AWS % of Orig. Use– The percentage of total actual water savings achieved (as per evaluation); "Total" is a column average
Total Site Demand Reduct. – The total percentage of demand reduction at the site (location); "Total" equals ∑Total AWS/∑Original water use

Smart Irrigation Technology Deployment Program – A Value-Added Benefit for ILA Partners
The NIS's 'Smart' irrigation device giveaway program is coming to a close. The program's goal was to disseminate 106 'Smart' irrigation devices across the County, primarily to its ILA partners **at no charge** to them. These 'Smart' devices provide on-site sensing of weather and other conditions and fall into three categories: 1) a full 'Smart' controller, with on-site weather station; 2) an evapotranspiration sensor add-on device added to an existing digital controller; and 3) soil moisture sensors. These "Smart" devices have been shown in field studies in Central Florida (conducted by the University of Florida) to reduce water use from 20% to more than 40%, if installed by a professional. Appendix B. shows a graphic summary of results of the Orange County Utility Smart Irrigation Technology Study.

What these device types have in common is they use weather and other data to adjust irrigation schedules and runtimes so as to not exceed the water needs of the landscape material. Conditions are measured on-site (not at a remote location) and in real time. In addition, because these devices are not receiving weather data from an external location or source, none of them requires a (data) subscription fee.

At this point in the grant cycle, nearly all 106 devices have been deployed, and only about a dozen are left. Once all devices have been installed and their installation verified, the NIS will prepare a summary report on the program. Figure 2a, 2b, and 2c. show typical devices replaced and used in this program.

Figure 2a. A typical controller replacement under the NIS's 'Smart' Irrigation Technology Deployment Program. Antiquated clock timers (shown at left) are replaced with state-of-the-art digital controllers and on-site weather sensors (photo at right).

Figure 2b. On-site weather sensing pods. These pods contain several sensors measuring weather and climate conditions. Information is then sent to the controller, which 'knows' the general characteristics of the landscape and soil. Irrigation timing and volumes are then adjusted to meet, but not exceed, plant needs.

Figure 2c. A battery-powered soil moisture sensor (left photo). This device has wide application potential in areas which do not have a permanent power supply, such as in traffic medians (right photo). Traditionally, these sites do not have any type of rain shut-off device.

After the NIS staff conducted Original evaluations for the City of Fort Lauderdale, recommendations for sites and device-types were sent to the NIS staff counterparts at the City for their approval. The devices recommended to the City were practical and compatible with the existing irrigation systems and components. This year, the NIS provided free 'Smart' device deployment for four sites within the City, listed below in Table 3.

Table 3. Sites and 'Smart' irrigation devices deployed as part of the 'Smart' irrigation device giveaway program within the City of Fort Lauderdale.

Site	Device
Hilton Marina Pool Clock	Controller
Hilton Marina West Villas	Controller
Hilton Marina Parking Lot	Controller
Stranahan Landing	Soil Moisture Sensor

NIS Program Status Update 01-17-18

This past January, the NIS held a Program Status Update meeting in the County's downtown Ft. Lauderdale facility. The purpose of the meeting was to reintroduce the program to our partners, review the NIS program metrics and recent achievements, and to discuss how partners can get the most out of the program. The agenda ended with time allotted for open discussion to allow partners to provide feedback to NIS staff on the program. The discussion was extremely positive and facilitated good exchange of information. The event drew staff from eight ILA partner cities. Going forward, the NIS intends to host other such meetings twice yearly.

Figure 3. The NIS Program Status Update, held January 17th, 2018.

Landscape and Irrigation Water Use Efficiency Workshop – Another Value-Added Benefit for ILA Partners

On July 19th, 2017, the NIS partnered with the Florida Nursery Growers and Landscapers Association and the South Florida and St. Johns River Water Management Districts to host the Florida Water Star℠ Accredited Professional (AP) training program for landscape and irrigation professionals. This event drew 36 individuals from twelve municipalities and several private businesses (see Figure 3., below). Continuing Education Units were awarded to all who attended both the landscaping and the irrigation modules. Eighteen individuals sat for the Florida Water Star℠ AP exam, all but two passed. Feedback from the participants was very positive and we have received inquiries as to when another similar event will be held. The NIS, along with its partner agencies, will likely host another such workshop later this year and, just as before, will insource as much as possible to keep attendance costs at or below $50 per attendee.

Figures 3. Florida Water Star[SM] training for landscape and irrigation professionals, July 19th, 2016. This workshop targeted municipal irrigation staff from 20 partner cities and utilities in Broward County, but was open to private sector professionals as well.

Considerations for Year Four and Beyond

As stated earlier, the EPA's WaterSense program "Water Efficiency Management Guide: Landscape and Irrigation" (November 2017) states that maintaining an irrigation system, "*requires a full audit of the irrigation system every three years by a qualified irrigation auditor*". The full document is available via this LINK. Such audits are more complex than routine maintenance wet-checks, requiring significantly more time and should be done by individuals with specific training in irrigation design efficiency.

Three years seems appropriate when one considers how much landscape can change as well as how much damage can occur to lines and other components, both above and below ground, from vehicle traffic, regular wear and tear, and vandalism. Add to those considerations how often the use of space changes (including plant placement and landscaping without altering the irrigation system). With all this in mind, the NIS should be revisiting sites it evaluated three or more years ago in addition to sites identified by city staff as needing major work.

County-Wide Interlocal Agreement Highlights Year Three
4/13/2017- 4/12/2018

The subsections below will summarize the NIS's activities and achievements across all 19 ILA partners during Year Three of the current (third) contract. A final closing section follows.

Evaluations Conducted and Water Savings Achieved

During Year Three of the current Interlocal Agreement, the NIS conducted 188 evaluations within the ILA partner areas. This includes 15 value-added evaluations. One hundred and twenty-nine were Originals and 59 were Follow-Up evaluations. Initial water use at the 129 locations evaluated totaled 248 million gallons/year. Following the implementation of repairs and recommendations of the NIS, staff at ILA partner municipalities and utilities were able to reduce overall demand at these sites by 61 million gallons/year or 25% of the original use. Average Actual Water Saving per evaluation was 18%. Table 4. below summarizes the NIS program metric totals for Year Three of the current ILA agreement. As stated in the preceding section, savings reported on the County-wide aggregate do not reflect savings gained by City staff on any of the 68 sites not revisited as a Follow-Up evaluation.

Table 4. Summary of NatureScape Irrigation Service program metrics for all Interlocal Agreement partners April 2015 to April 2016.

Reporting Period	Total Evaluations Conducted	Individual Locations Evaluated	Total Original Use (MGY)	AWS Total (MGY)	Average AWS/ Evaluation	Overall Demand Reduction
ILA – 3 Year – 3	188	129	247.6	61.0	18%	25%

AWS – Actual Water Savings
MGY – Million gallons per year

Year Three Water Source

From a water management standpoint, the NIS believes all water should be used efficiently, regardless of source. Therefore, the NIS evaluates sites supplied by all types of sources, including well, surface, reuse, and potable. Of the 129 locations evaluated throughout the County during Year Three, 73 sites irrigated with potable water 33 by surface water, and 22 by well water. One site evaluated was sourced by reuse water.

Year Three Site Types

The breakdown of sites the NIS evaluated for its ILA partners is as follows: 58 sites were large government-owned parks; 41 were other city government (non-park) properties; 13 were commercial sites; one school-related property, and 16 were residential multi-family properties.

In Closing

The NIS evaluated 15 sites for the City of Fort Lauderdale this past year. The actions taken by city staff at those locations, based on recommendations provided by the NIS, resulted in a demand reduction of 6.5 million gallons/year (or 48% of the total original use), with an average Actual Water Savings of 31% per evaluation. Across all 19 of our ILA partners, the NIS recorded reduced water use by 61 million gallons (or 25% of the total original use), with an average reduction of 18% per evaluation. Additional water savings may have occurred at site not revisited.

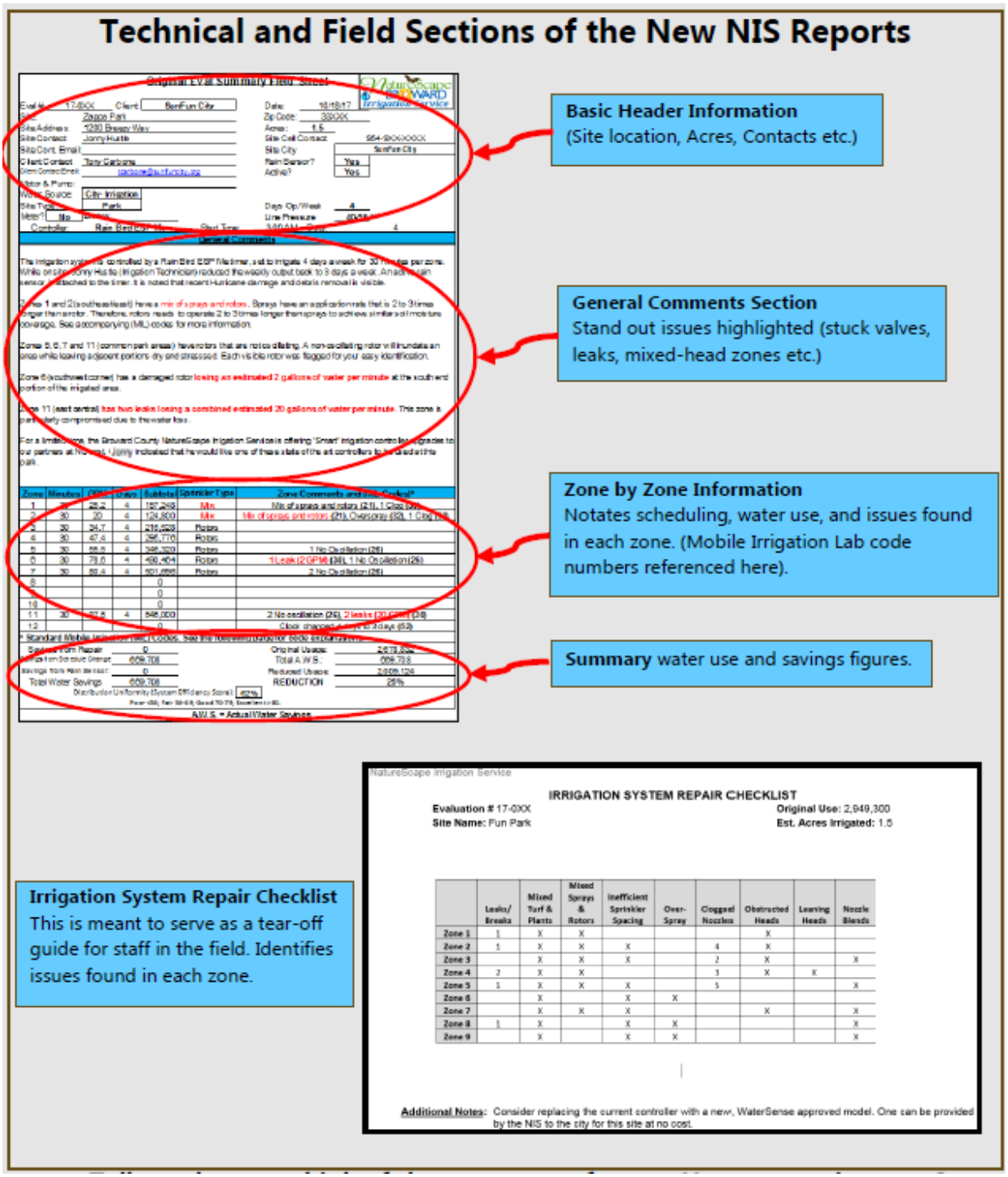
The NIS has generated an updated historical list of all sites it has evaluated for the City of Fort Lauderdale. Following the best management practice recommendation as prescribed by the EPA, we recommend consideration for this year's evaluations be given to those sites which have not been evaluated in three or more years. This list was recently sent to our counterparts at the city to assist them identify which sites they would like evaluated during Year Four of the current contract.

It is our sincere hope you will continue to promote a message of water resource conservation to the public and your staff. We hope this type of messaging, along with continued support from our cities, will encourage and enable our counterparts to implement NIS recommendations related to improving the water use efficiency as well as reducing and eliminating water loss of the systems they evaluate. Additionally, we urge you to consider supporting your staff's continuing education by sending them to future NIS sponsored trainings. Training fees will be kept low for ILA partners.

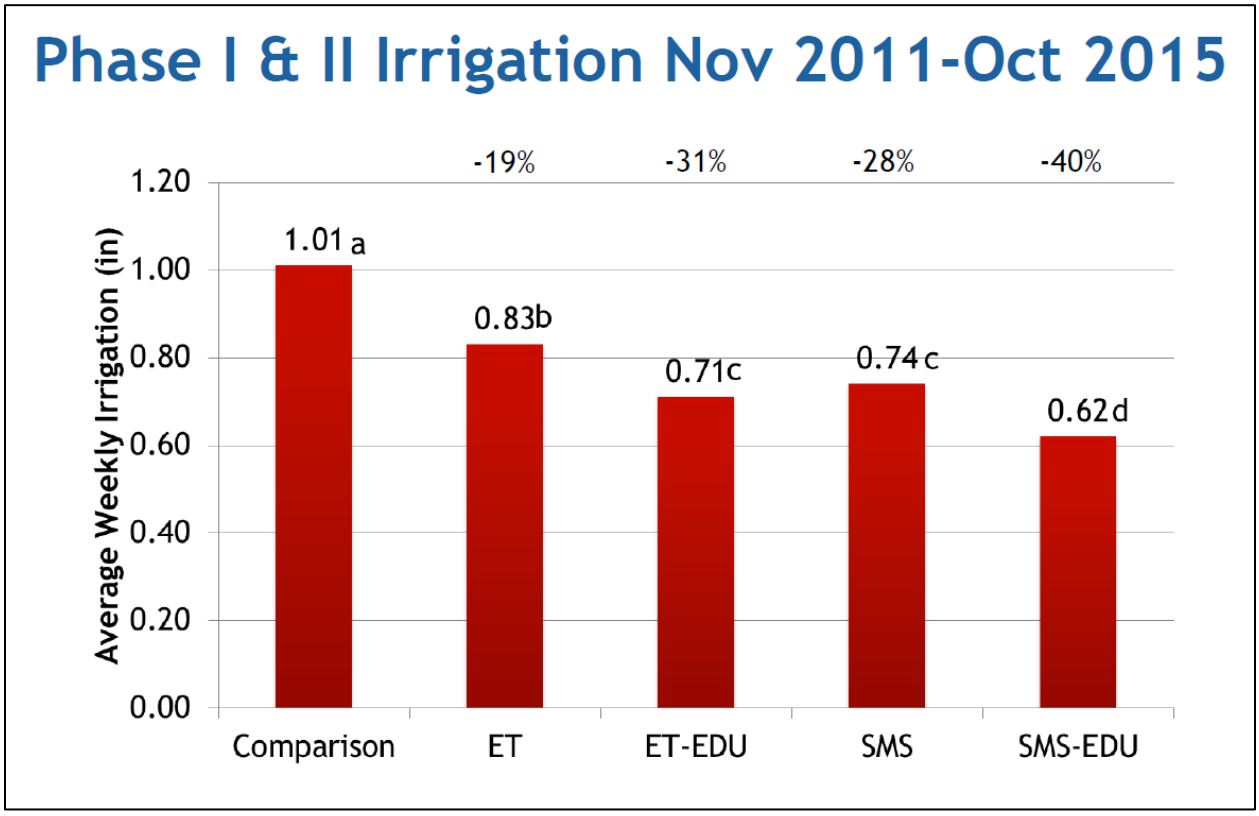
The NIS would also like to encourage you and your staff to consider achieving NatureScape recognition for your city-owned properties. NatureScape properties implement Florida-friendly landscaping principles that conserve water, protect water quality, and create wildlife habitat. To qualify, you can have the property(ies) certified through either the Florida Yards and

Neighborhoods program or the National Wildlife Federation's Backyard Wildlife Habitat Program (www.broward.org/naturalresources/naturescape). For more information, please feel free to contact our NatureScape team at (954-519-0317).

Appendix A. A graphic representation of the new NIS reporting format.
In addition to what is shown here, each report contains a glossary defining the standard mobile irrigation lab issues codes as well as links to other landscape and irrigation-related programs and best management practices.



Appendix B. A graphic summary of results of the Orange County Utility Smart Irrigation Technology Study.



Graphic from the Water Research Foundation and University of Florida, Institute of Food and Agriculture Science.

This graphic shows irrigation water use (in inches) by five groups of users in Central Florida over a six-year period.
Comparison shows irrigation water use by a group using conventional timers.
ET shows irrigation water use (inches) a group using an evapotranspiration controller (Rain Bird SMTe).
SMS shows irrigation water use by a group using an evapotranspiration controller (Baseline S100).
EDU indicates some amount of education on how to use the device was provided to the user.