MARTIN SWCD

Mobile Irrigation Lab
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QUARTERLY REPORT

Fiscal Year 2005

April 1st to June 31st

E-Mail: mswcd@earthlink.net **Web:** http://www.martinswcd.org

Martin Soil & Water Conservation District FY 2005

MIL 3rd Quarter Report

DISTRICT BOARD MEMBERS

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Susan Barrett

MIL TEAM
Charles A. Lambert - Markus Braunschweiger

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Acknowledgements

The Martin Soil and Water Conservation District (MSWCD) recognizes the following entities for their technical support and funding for the Martin Urban Mobile Irrigation Lab:
South Florida Water Management District
USDA Natural Resources Conservation Service
Martin County Commissioners.

Abstract

The Martin Urban Mobile Irrigation Lab completed 35 evaluations in the three months starting April 1st 2005 and ending June 30th 2005. These evaluations produced Potential Water Savings (PWS) of 11,693,850 gallons per year (35.8 acre-feet per year) and Actual Water Savings (AWS) of 4,004,758 gallons per year (12.3 acre-feet per year).
The Martin Mobile Irrigation Lab made 44 water conservation presentations contacting 289 people in the process.

Introduction

The Martin Soil and water Conservation District Urban Mobile Irrigation Lab was established in 1998. Its mission is to promote water conservation through on-site evaluations of irrigation systems and conservation education.

Evaluation Methods

There are three levels of evaluation; visual inspection, pressure and flow check, and the catch can test. Visual inspections are conducted first to determine if the system is in disrepair or has poor coverage. If the system is found to be in poor condition the other levels of evaluation are not carried out. Pressure and flow checks on individual sprinkler heads or emitters are carried next. If pressure and flow are found to be uniform a catch can test may be performed to determine optimum run times for the zones in the system.

Evaluation Results

Between April 1st 2005 and June 30th 2005 the Martin MIL performed 35 evaluations on 12.7 acres and discovered Potential Water Savings (PWS) of 11,693,850 gallons per year (Table 1). The Martin MIL performed 5 follow-up evaluations and documented Actual Water Savings (AWS) of 4,004,758 gallons per year (Tables 1 and 2). By recommending time clock adjustments, other system adjustments and quick repairs that could be carried out during the initial evaluation additional Actual Water Savings was gained.

Problems

The Martin Mobile Irrigation Lab found the two most prevalent problems were "Operating time too frequent" (52) and "Turf and Landscape area irrigated in the same zone" (10).

FY 2005 MOBILE IRRIGATION LAB LOG

MIL ID: 06 FY: 2005 QTR: 3rd County: Martin

ZIP CODE	EVAL ID #	ACRES	SYSTEM TYPE	SOIL	WATER SOURCE	pH	TDS	SYSTEM AVE. DISCHARGE (GPM)	DU	RATING	PROBLEMS	PWS GALLONS	AWS GALLONS	Follow-UP Y/N
34996	M053109	0.16	Sprinkler	0	Meter	7.4	94	40.50	65	Fair	52	106,826		N
34996	M053110	0.19	Sprinkler	0	Meter	7.5	112	40.00	65	Fair	10,52	180,409		N
34996	M053111	0.17	Sprinkler	0	Meter	7.5	112	45.3	65.0	Fair	10,52	194,223		N
34996	M053112	0.36	Sprinkler	0	Well	7.0	404	56.5	65.0	Fair	10,20,53	1,101,665	763,880	N
33455	M053113	0.26	Sprinkler	0	Well	7.3	116	47.5	65.0	Fair	10,52	421,872		N
34957	M053114	0.32	Sprinkler	0	Well	7.3	248	73.0	65.0	Fair	52	336,500		N
34996	M053115	0.13	Sprinkler	0	Meter	7.4	157	33.5	65.0	Fair	10,52	201,570		N
34996	M053116	0.22	Sprinkler	0	Meter	7.7	141	37.5	65.0	Fair	10,52	59,371		N
34996	M053117	0.14	Sprinkler	0	Meter	7.3	101	37.0	65.0	Fair	10,23,52	115,332		N
34996	M053118	0.24	Sprinkler	0	Well	7.5	192	43.0	65.0	Fair	10,20,52	339,091		N
33455	M053119	0.33	Sprinkler	0	Meter	7.0	152	73.5	65.0	Fair	10,40,52	663,666		N
34957	M053120	0.20	Sprinkler	0	Meter	7.4	44	35.5	65.0	Fair	10,50,52	428,782	155,050	N
34996	M053121	0.39	Sprinkler	0	Well	8.0	299	142.5	65.0	Fair	20,50,52	2,780,683	1,945,125	N
34957	M053122	0.09	Sprinkler	0	Meter	7.7	140	31.0	65.0	Fair	10,50	134,137		N
34957	M053123	0.09	Sprinkler	0	Meter	7.7	140	31.0	65.0	Fair	10,50	136,691		N
34957	M053124	0.09	Sprinkler	0	Meter	7.7	140	24.0	65.0	Fair	10,50	108,679		N
34957	M053125	0.09	Sprinkler	0	Meter	7.7	140	28.0	65.0	Fair	10,50	121,931		N
34957	M053126	0.09	Sprinkler	0	Meter	7.7	140	31.0	65.0	Fair	10,50	137,010		N
34957	M053127	0.09	Sprinkler	0	Meter	7.7	140	28.0	65.0	Fair	10,50	120,552		N
34957	M053128	0.09	Sprinkler	0	Meter	7.7	140	41.0	65.0	Fair	10,50	182,199		N
34957	M053129	0.14	Sprinkler	0	Meter	7.0	94	37.5	65.0	Fair	52	165,472		N
34996	M053130	0.27	Sprinkler	0	Well	6.9	274	86.0	65.0	Fair	10,40,52	1,067,260		N
34996	M053131	0.47	Sprinkler	0	Well	7.0	114	85.5	65.0	Fair	10,20,52	1,122,878		N
34996	M053132	0.37	Sprinkler	0	Well	7.5	182	70.5	65.0	Fair	52	291,008		N
34996	M053133	0.16	Sprinkler	0	Meter	7.2	122	39.0	65.0	Fair	52	99,460		N
34996	M053134	0.19	Sprinkler	0	Meter	7.5	119	35.0	65.0	Fair	52	69,046		N
34996	M053135	0.30	Sprinkler	0	Meter	7.4	119	43.0	65.0	Fair	52	171,226		N
34996	M053136	0.14	Sprinkler	0	Meter	7.4	103	36.0	65.0	Fair	52	155,467		N
34996	M053137	0.56	Sprinkler	0	Well	7.6	86	67.0	65.0	Fair	20,50,52	424,972		N
34957	M053138	0.33	Sprinkler	0	Well	6.9	144	63.6	65.0	Fair	33,40,52	255,874	57,876	N
34957	M053139	0.36	Sprinkler	0	Meter	7.9	155	79.0	65.0	Fair	30,34,54		247,260	Y
34957	M053140	0.19	Sprinkler	0	Well	7.1	217	50.0	65.0	Fair	20,50,54		273,780	Y
34957	M053141	0.14	Sprinkler	0	Meter	8.0	211	71.0	65.0	Fair	30,50,52		191,378	Y
34990	M053142	0.74	Sprinkler	0	Well	7.5	244	85.5	65.0	Fair	26,33		66,261	Y
34957	M053143	0.20	Sprinkler	0	Well	7.6	194	53.0	65.0	Fair	20,50,52		304,148	Y
TOTALS	35	8.3										11,693,850.1	4,004,758.0	

Table 2. Original Evaluation and Follow up Tracking Table

ID#	Crop	System Type	Acres	PWS	AWS	
M051039	Mixed	Sprinkler	.36	312,529		*Orig. Eval.*
M053139	Mixed	Sprinkler	.36		247,260	*Follow up*
M051040	Mixed	Sprinkler	.19	313,450		*Orig. Eval.*
M053140	Mixed	Sprinkler	.19		273,780	*Follow up*
M051043	Mixed	Sprinkler	.14	196,455		*Orig. Eval.*
M053141	Mixed	Sprinkler	.14		191,378	*Follow up*
M051045	Mixed	Sprinkler	.74	93,802		*Orig. Eval.*
M053142	Mixed	Sprinkler	.74		66,261	*Follow up*
M051055	Mixed	Sprinkler	.20	336,047		*Orig. Eval.*
M053143	Mixed	Sprinkler	.20		304,148	*Follow up*

Conservation Education/Outreach

Between April 1st 2005 and June 30th 2005 Martin Mobile Irrigation Lab gave 44 presentations to school, homeowners, homeowners associations, and other interested groups, reaching 289 people. These presentations are documented in Table 3.

Training (in-house or staff training**)**

There has been a weekly Staff meeting in which some training has taken place, presided over by George Johnson of NRCS.

TABLE 3. MOBILE IRRIGATION LAB CONSERVATION EDUCATION REPORT
NAME OF LAB: MARTIN MOBILE IRRIGATION LAB
PERIOD BETWEEN: APRIL 1ST 2005 AND JUNE 30TH 2005

DATE	TYPE OF PRESENTATION	NAME OF GROUP	NUMBER ATTENDING	LOCATION	TIME
3rd Quarter	Report & Verbal Presentations	Homeowners, Neighbors & Walk-ins	18	Stuart	20 Hrs.
3rd Quarter	Report & Verbal Presentations	Homeowners, Neighbors & Walk-ins	1	Palm City	1 Hrs.
3rd Quarter	Report & Verbal Presentations	Homeowners, Neighbors & Walk-ins	16	Jensen Beach	17 Hrs.
3rd Quarter	Report & Verbal Presentations	Homeowners, Neighbors & Walk-ins	1	Port Salerno	3 Hrs.
3rd Quarter	Report & Verbal Presentations	Homeowners, Neighbors & Walk-ins	2	Hobe Sound	2 Hrs.
3rd Quarter	Report & Verbal Presentations	Homeowners, Neighbors & Walk-ins	2	Sewells Point	3 Hrs.
3rd Quarter	Support Staff	Florida State Envirothon		Hillsborough State Park	20 Hrs.
3rd Quarter	MIL Presentation	Master Gardners Class	25	Stuart	3 Hrs.
3rd Quarter	Soils Presentation	Earthday - DuPuis	200	Du Puis Reserve - Canal Point	14 Hrs.
3rd Quarter	Verbal Presentation	Citizens Emergency Response Team	20	Martin County	25 Hrs.
3rd Quarter	MIL Presentation	Poincianna Park	4	Hobe Sound	2 Hrs.

NOTES:

Appendix A Definitions

AWS and PWS Definitions

The goal of an irrigation evaluation is to determine the capacity and efficiency of an irrigation system. This information is then used to develop a sound Irrigation Water Management Plan in which, irrigation water is applied only when needed and only in amounts which can be fully utilized by healthy plants.

Properly managed irrigation is used to supplement natural rainfall. The amount of irrigation required annually is the Net Irrigation Requirement (NIR) and is defined as;

NIR = Crop water requirement – Effective rainfall

The efficiency of an irrigation system is defined in terms of Distribution Uniformity (DU) for sprinklers and Emission Uniformity (EU) for microirrigation. These terms are defined in the USDA-NRCS Urban Irrigation Evaluation Manual. These numbers, in the form of percentages, are used to calculate the run times of irrigation events. The annual water use of a properly managed irrigation system is;

Gross application = NIR/DU or EU

Potential Water Savings (PWS) – The total amount of irrigation water that can be saved annually by following the recommendations derived from an irrigation system evaluation.

$PWS_{(management)}$ - The amount of irrigation water that can be saved annually by schedule changes (run time and frequency) alone.

PWS(man) = measured water use – projected water use

PWS(design) – The additional amount of irrigation water that can be saved annually by improving the performance of the system and readjusting the schedule.

$$NIR/DU_{(present)} - NIR/DU_{(projected)}$$

Actual Water Savings (AWS) - The total amount of water which is saved for a period of 1 year as a direct result of following the recommendations derived from an irrigation system evaluation.

Instant AWS can be achieved if repairs are made, resulting in quantifiable water savings or if the controller settings are adjusted (schedule change) at the time of the evaluation or when the report is delivered.

AWS schedule changes can be documented in person or by phone and AWS design and repairs can be documented by follow-up evaluations.

Appendix B Methods

The following definitions and formulas are taken from the "Mobile Irrigation Laboratory Urban Irrigation Evaluation & Troubleshooting Training Manual" (Mickler1998).

1. Determine average application rate (Meter records water use in gallons)

$$AAR = \frac{Volume}{Area \times Time} \times 5775.4 \quad \textbf{OR} \quad AAR = \frac{Final\ Reading - Initial\ reading}{Area \times Operating\ Time} \times 96.25$$

Where *Average application rate* = Inches per hour (iph)
Volume = Volume required for needle in water meter to make one complete revolution (gal)
Area = Irrigated area (ft^2)
Time = Time required for needle in water meter to make one complete revolution (s)

No water meter present

$$Flow\ rate = \frac{Volume}{Time} \times 0.01585 \quad \textbf{OR} \quad AAR = \frac{Total\ Flow\ Rate}{Area} \times 96.25$$

Where *Flow rate* = Gallons per minute (GPM)
Volume = Volume collected (ml)
Time = Time that water was collected (s)

2. Determine distribution uniformity

$$DU = \frac{Low\ quarter\ average}{Total\ average} \times 100 \quad \textbf{OR} \quad \text{Use DU estimate sheet}$$

When *DU* = Distribution uniformity in percent
Low quarter average = Average volume in the 25% of cans that received the least water (ml)
Total average = Average volume of all cans (ml)

3. Determine the effective application rate

$$\textit{Effective application rate} = \textit{Average application rate} \times DU$$

4. **Calculate operating time**

$$\textit{Watering time} = \frac{\textit{Plant water requirement}}{\textit{Effective application rate}} \times 60$$

Where *Watering time* = Suggested time that a zone should be operated (min)
Plant watering requirement = 0.5 or 0.25 depending on location (in)
Effective application rate = From step 3 (iph)

5. Determine water used per operating cycle

When used per operating cycle is calculated by the following equation:

$$\textit{Current usage} = \textit{Flow rate} \times \textit{time}$$

Where *Current usage* = Total water used for a given zone per irrigation cycle (gal)
Flow rate = Determined from equations below (gpm)
Time = Time a zone is operated during a scheduled irrigation cycle (min)

Appendix C

Problem Descriptions - Problems are irrigation system or management factors that limit irrigation system performance or efficiency. Problems are noted during the site visit, system evaluation, and/or through discussions with the operator.

Code	Description of Problems
Pressure / Application Rate	
1	Under-sized pump for number and type of sprinkler heads or emitters
2	Pressure loss between pump and sprinklers/emitters due to inadequate pipe size
3	Higher pressure than manufacturer's specifications
4	Lower pressure than manufacturer's specifications
5	Low pressure due to water supply
6	Different pressure between manifolds
7	Small wetted area
8	Application rate > soil infiltration rate (ponding)
9	Air in pipelines
10	Turf and landscape area irrigated in the same zone
11	Pressure variation due to elevation differences
Emitters / Sprinklers	
20	Mixed sprinkler/emitter sizes & unmatched precipitation in the same zone
21	Mixed sprinkler/emitter brands or types in the same zone
22	Poor emitter/sprinkler uniformity due to worn orifice
23	Poor overlap due to improper sprinkler/emitter alignment or spacing
24	Various riser heights in same zone
25	Emitter/sprinkler spacing varies in same zone
26	Missing/malfunctioning emitters or sprinklers
27	Missing/malfunctioning pressure gauge/regulator/filter
Maintenance - Irrigation System	
30	Leaks and broken valves, pipe, laterals lines (Poly-tubing), emitters, sprinklers
31	Clogged filter or filter screen
32	Sprinkler heads not properly adjusted, causing overflow on paved areas
33	Clogged emitters/nozzles (due to biological, chemical or physical factors)
34	Leaning sprinklers/emitters causing non-uniform distribution
35	Malfunctioning valves
Maintenance – Landscape	
40	Stream of water blocked by vegetation
41	Variable crop spacing and stage of growth
42	Poor drainage, requiring water control
Operation / Management	
50	Operating time too long
51	Operating time too short
52	Operating time too frequent
53	No rain shut-off device
54	No soil moisture measuring device or rain gage
55	No irrigation water management plan

Appendix D

MARTIN COUNTY SOIL TYPES

SYMBOL	NAME
2	Lawnwood fine sand
3	Lawnwood fine sand, depressional
4	Waveland sand
5	Waveland sand, depressional
6	Paola sand, 0 to 8% slope
7	St. Lucie sand, 0 to 8% slope
8	Palm Beach sand, 0 to 8% slope
9	Pomello sand, 0 to 5% slope
10	Basinger fine sand, depressional
12	St. Johns Variant sand
13	Placid sand
14	Satellite Variant sand
15	Electra fine sand
16	Oldsmar fine sand
17	Wabasso sand
19	Winder sand
20	Riviera fine sand
21	Pineda sand
22	Okeelanta muck
23	Urban land
24	Orsino sand, 0 to5% slope
25	Beaches
26	Pompano fine sand
27	Arents, organic substrat, 0 to 2% slope
28	Canaveral sand, 0 to 5% slope
29	Canaveral sand, 0 to 5% slope
30	Bessie muck
31	Cocoa Variant sand
32	Udorthents, 0 to 35% slope
33	Paola-Urban land complex, 0/8% slope
34	St. Lucie-Urban land complex, 0/8%
35	Salerno sand
36	Arents, 0 to 2% slope
38	Floridana fine sand, depressional
39	Quartzipsamments, 0 to 8% slope
40	Sanibel muck
41	Jonathan sand, 0 to 5% slope
42	Hallandale sand
44	Boca fine sand
45	Hilolo fine sand
46	Sanibel muck
47	Pinellas fine sand
48	Jupiter sand
49	Riviera fine sand, depressional
50	Okeelanta Variant, muck
51	Pompano fine sand, occ. flooded
52	Malabar sand
53	Arents, 2 to 35% slope
54	Oldsmar fine sand, depressional
55	Basinger fine sand
56	Wabasso sand, depressional
57	Chobee loamy sand
58	Gator muck
60	Tequesta variant muck
61	Hobe fine sand, 0 to 5% slope
62	Nettles sand, depressional
63	Nettles sand
64	EauGallie fine sand
65	Tuscawilla sand
66	Holopaw fine sand
67	Aquents, frequently flooded
68	Pits
69	Hontoon muck
70	Canova Variant muck
72	Adamsville Variant sand, 0 to 5% slope
73	Samsula muck
74	Torry muck
75	Ft. Drum fine sand
76	Valkaria fine sand
77	St. Lucie sand, 8 to 20% slope
78	Pomello Variant fine sand
79	Terra Ceia Variant muck
86	Paola sand, 8 to 20% slope

Appendix E

Software programs utilized:

a.) **Microsoft Excel**
Corel Quatro Pro - For Spreadsheet programs
b.) **Microsoft Word**
Word Perfect - For word processors
c.) **Adobe Photo Shop 7.0** - For scanning & photo manipulation
d.) **Microsoft Streets2005** - For location maps
e.) **Sierra Land Design** - For irrigation design & illustration
f.) **Microsoft Office2005** - For Publications (web site, flyers, award certificates, presentations, etc. etc..)
g.) **Adobe Acrobat 6.0** – For reports published on the internet and transferred by E-mail

Appendix F

Program History

(Brief history of individual lab.)

(Brief history of Florida's MIL program)
Lab Start Dates

1988 Lower West coast MIL
1992 South Dade MIL
1992 Indian River Lagoon MIL
1994 Palm Beach MIL
1994 Lee MIL
1998 Martin MIL
2000 St. Lucie MIL
2001 Big Cypress Basin MIL

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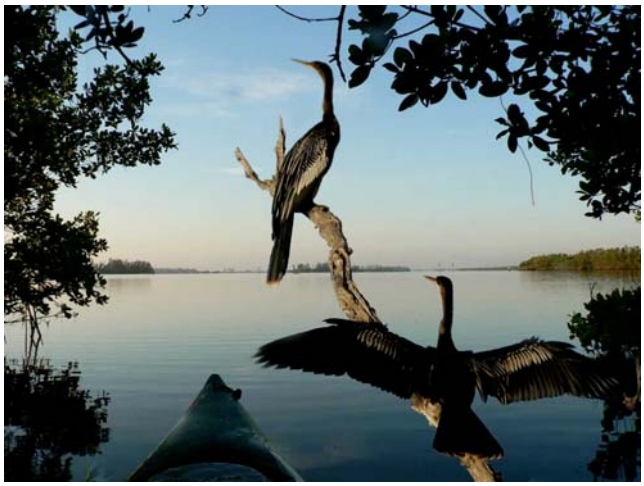

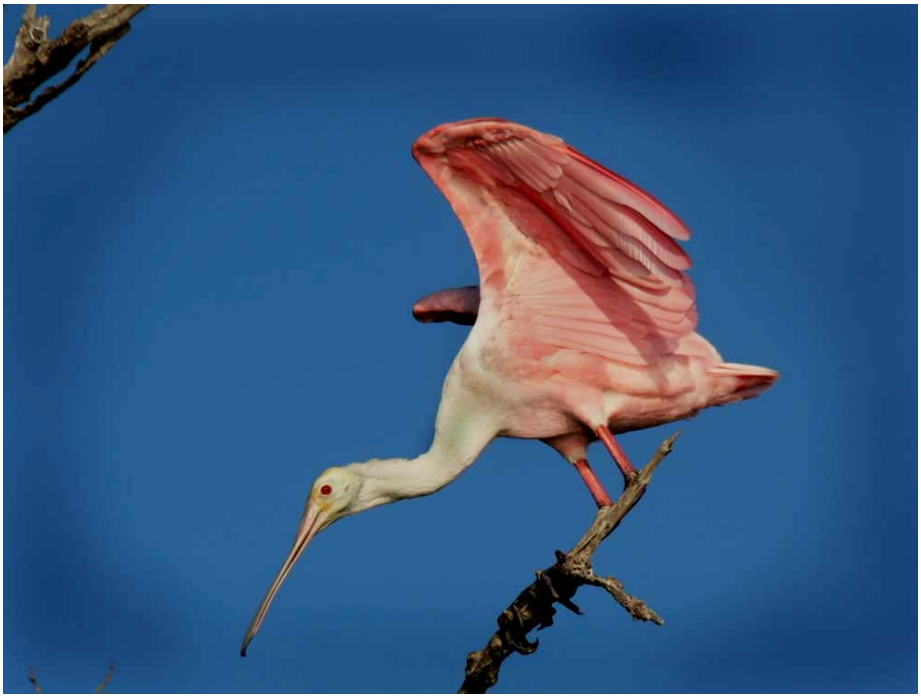

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