Performance Monitoring of GLRI SWIF Projects in Lucas County, OH

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The main goal of this project was to work with Lucas County SWIF project managers to acquire, analyze, and share performance (quantity, water quality, O&M) and cost data. Data is needed by <u>local/regional stormwater stakeholders</u> to promote and plan future green stormwater infrastructure.

GLRI SWIF Projects in Lucas County, OH
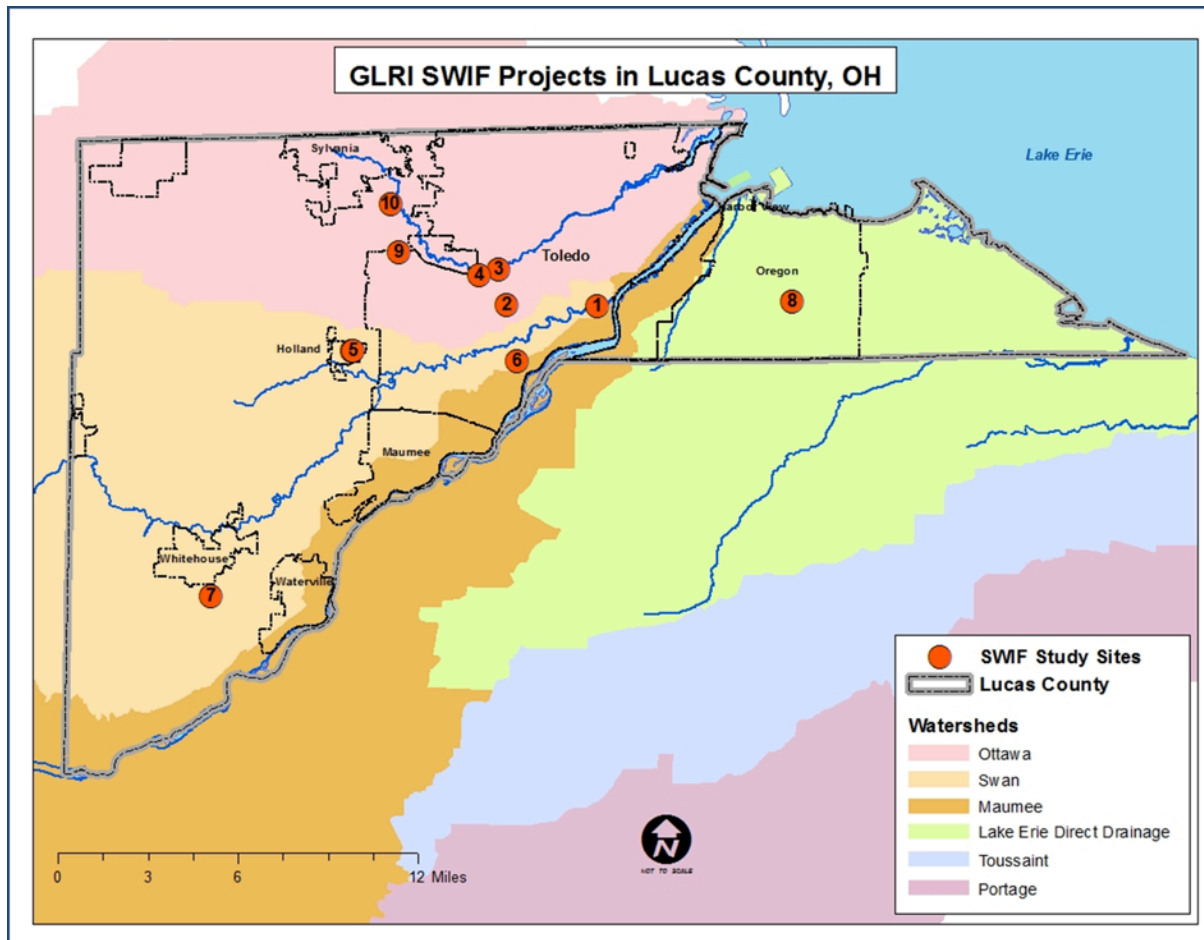
SWIF Site Details:
Designer, Contractor, Cost, O&M and Monitoring Plans

| ID	Site Name	Project Manager	Significant Features	Installation Date	Site Designer	Contractor	Costs	O&M	Monitoring plans
1	South Erie St Rain Garden	Regina Collins, COT Env. Services	2900 sq.ft. raingarden on brownfield site runoff from high traffic street	July 2013	Hull & Associates	Hull & Associates	$8,000	performed and funded by COT	Visual monitoring
2	Conrad Alternative Street Improvement	Andy Stepnick, COT Eng. Services	Bioretention on uncurbed residential streets (5,000 sq.ft.)	September 2013	Andy Stepnick	Geddis Paving, Inc	$180,000	performed and funded by homeowner	Visual monitoring
3	UT Savage Bioswale	Cyndee Gruden, UT	800 sq.ft. biofiltration collecting parking lot run-off	June 2014	Cyndee Gruden	TBD	$25,000	UT Facilities and student volunteers	Automated WQ and flow
4	UT Tree Filter	Cyndee Gruden, UT	Tree Filters	June 2014	Cyndee Gruden	TBD	$40,000	UT Facilities	Automated WQ and flow
5	Lucas County Engineer's Rain Garden	Brian Miller, Lucas County Engineers	1800 sq.ft. rain garden and 2900 sq.ft. permeable pavement	May 2014	Doug Parrish and Mike Melnyk	LC Eng and Mike Melnyk	$43,900	performed and funded by LC Eng/ SW Utility	Visual monitoring
6	Larc Lane Permeable Pavement	Mike Melnyk, Lucas County Engineers	permeable pavement	TBD	TBD	TBD	$39,600	performed and funded by LC Eng	Visual monitoring
7	Blue Creek Conservation Area	Joseph E. Fausnaugh Toledo Metroparks	Wetland Restoration and Two-Stage Ditch	May 2014	Mannik & Smith	TBD	$171,000	performed and funded by Metroparks	TBD: Visual monitoring, automated monitoring
8	Oregon Bioretention Facility	Don Nelson, COO	Bioretention cells totaling 13,850 sq.ft.	July 2014	City of Oregon	TBD	$104,600	Performed and funded by COO	Automated WQ and flow monitoring
9	TBG Pavers and Rain Garden	Doug Conley, TBG	Pavers and Rain Garden	May 2014	NA	NA	NA	TBG Staff	Visual monitoring
10	Camp Miakonda Pavers and Rain Garden	Andrew Curran, Boy Scouts of America	Pavers and Rain Garden	June 2014	Blanchard Tree and Lawn	Blanchard Tree and Lawn	$48,000	Volunteer	As possible work with contractor

End User Driven Data Collection:

Site Design Information
Site Cost and Installation Information
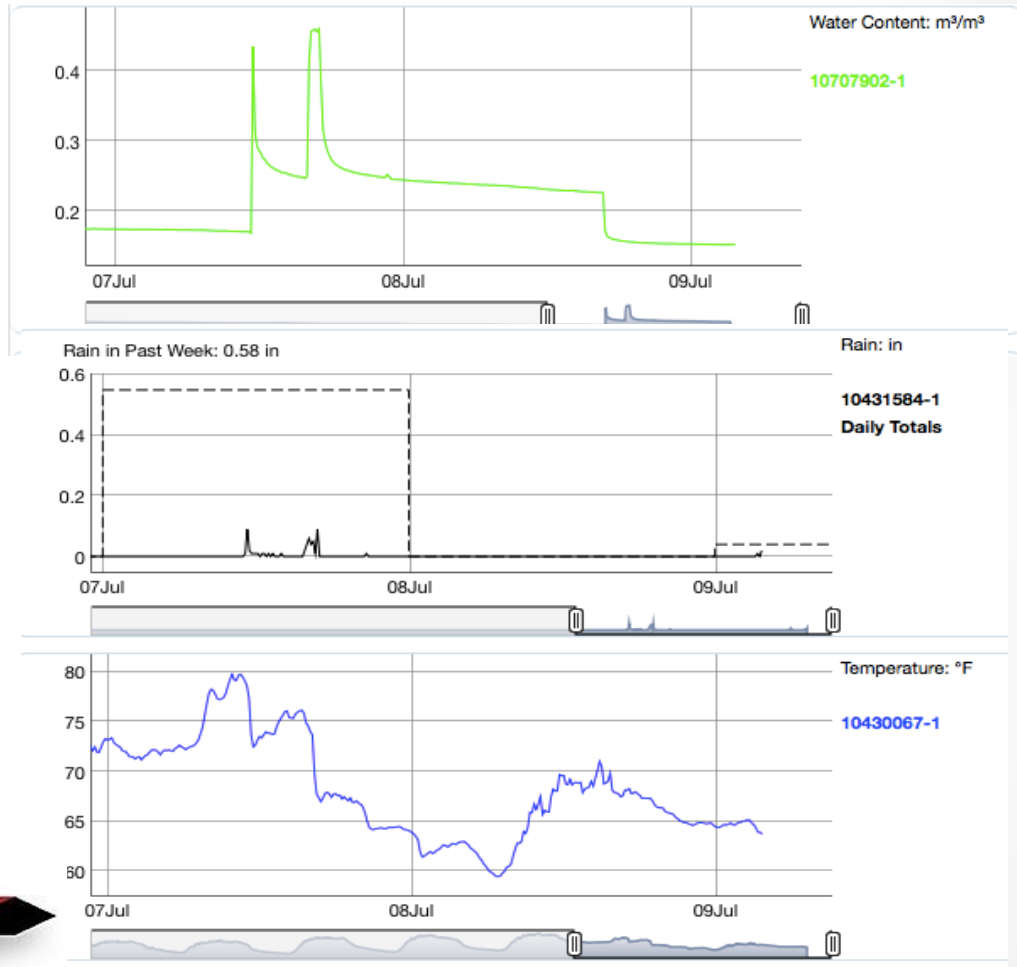**Performance Tracking**
Maintenance Tracking

Overall BMP Condition
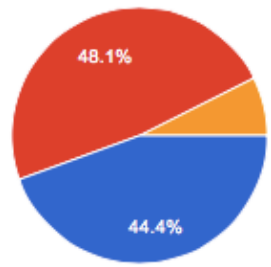
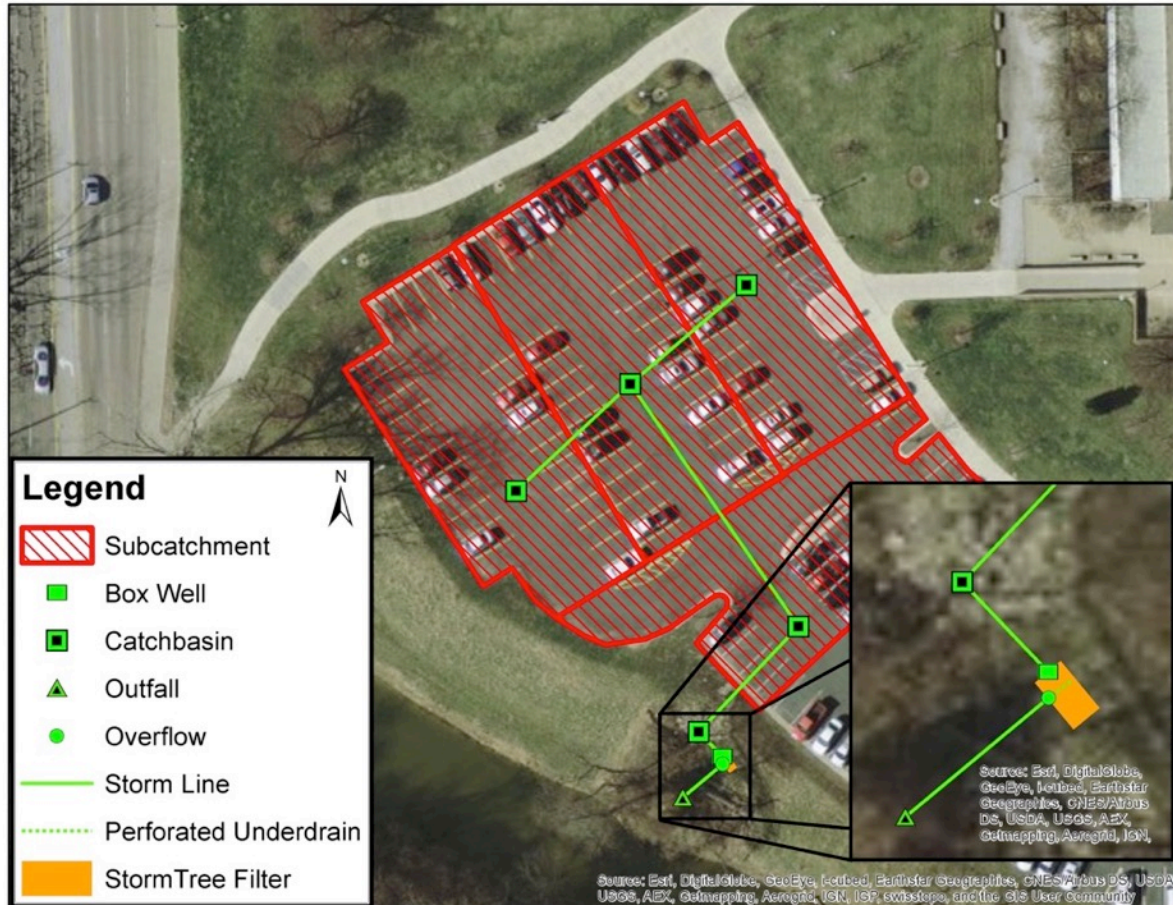|		
Good condition. Well maintained, no action required.	12	40%
Moderate condition. Adequately maintained, routine maintenance required	13	43.3%
Degraded condition. Poorly maintained, routine maintenance required	2	6.7%
Serious condition. Immediate need for repair or replacement.	0	0%

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Performance Monitoring

HOBO RX3000 Station - CELL-3G

UT Weather Station: https://www.hobolink.com/p/aa90e60bbfbbb7ef63a9da89c178cc8e

UT Law School : Tree Filter Site

section view

Legend
- Subcatchment
- Box Well
- Catchbasin
- Outfall
- Overflow
- Storm Line
- Perforated Underdrain
- StormTree Filter
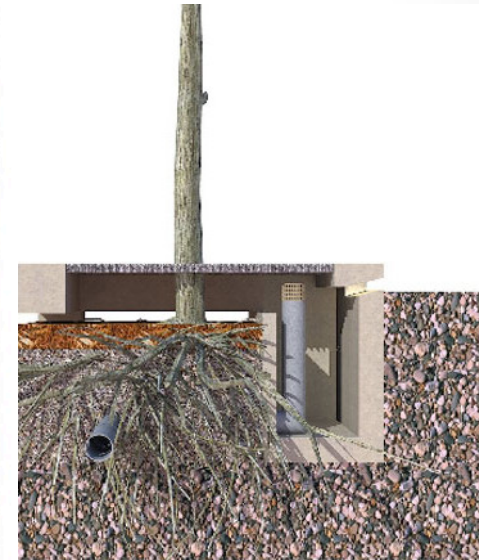
contributing watershed is 0.8 acre
curbed parking lot with 4 catch basins

Performance Monitoring

Autosampler

Spring 2015 Rain Events

DATE	RAIN (inches)	Time (min)	ADD (days)
Apr 13	0.07	45	2
Apr 19	0.60	360	5
May 10	0.34	240	4
May 15	0.23	240	3
May 20	0.02	15	2

Grab samples collected at most events. Composite samples were not possible for all events because of limited volumes.
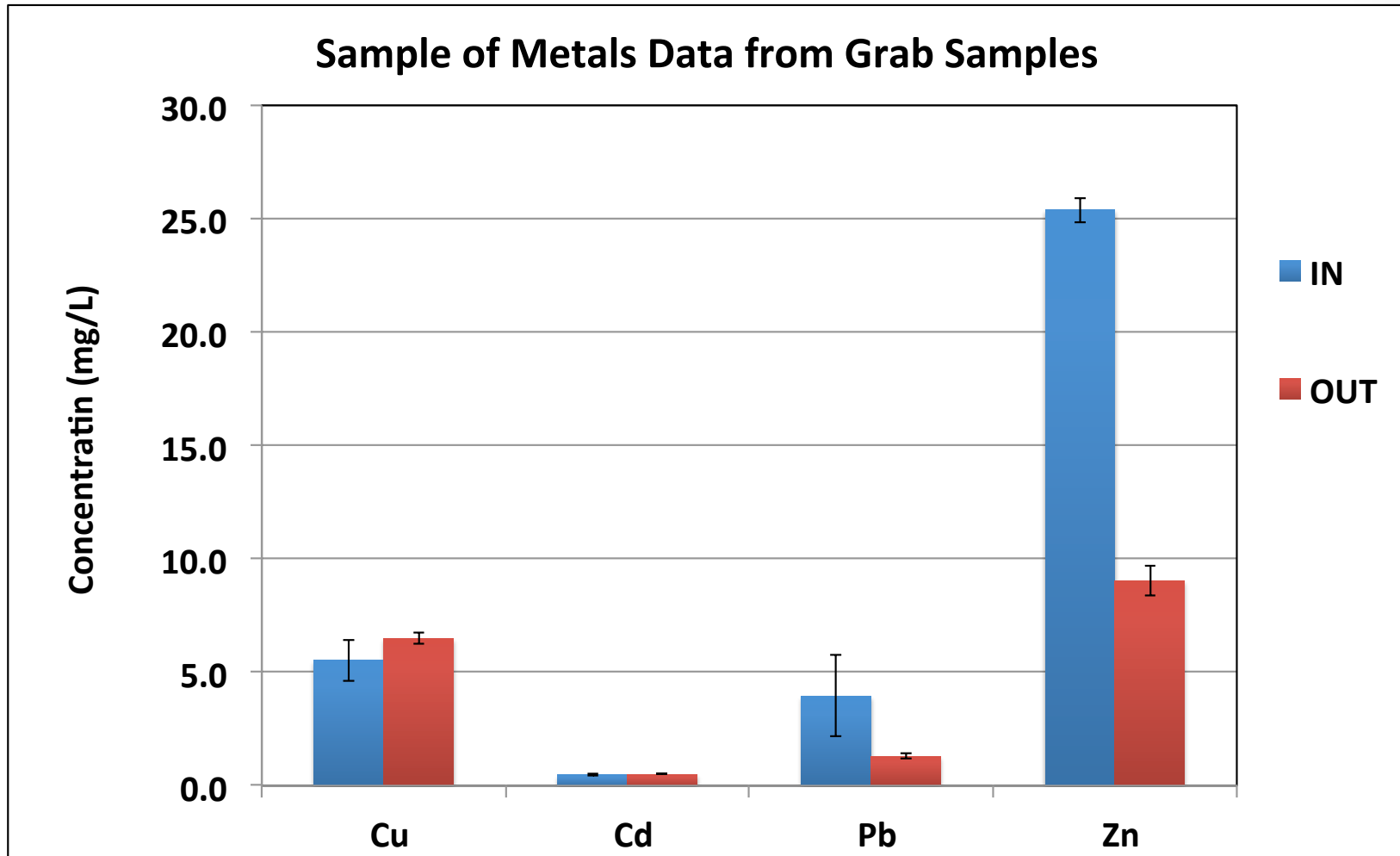
Water Quality Results: TSS
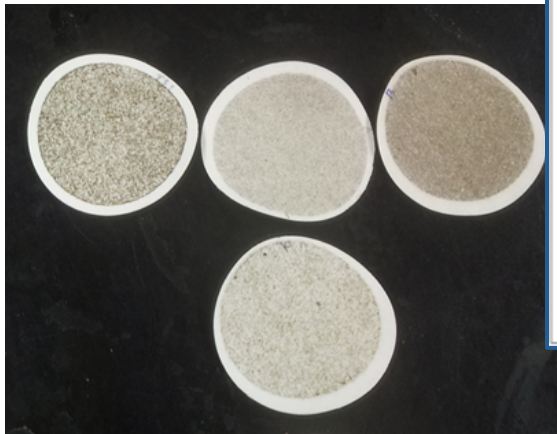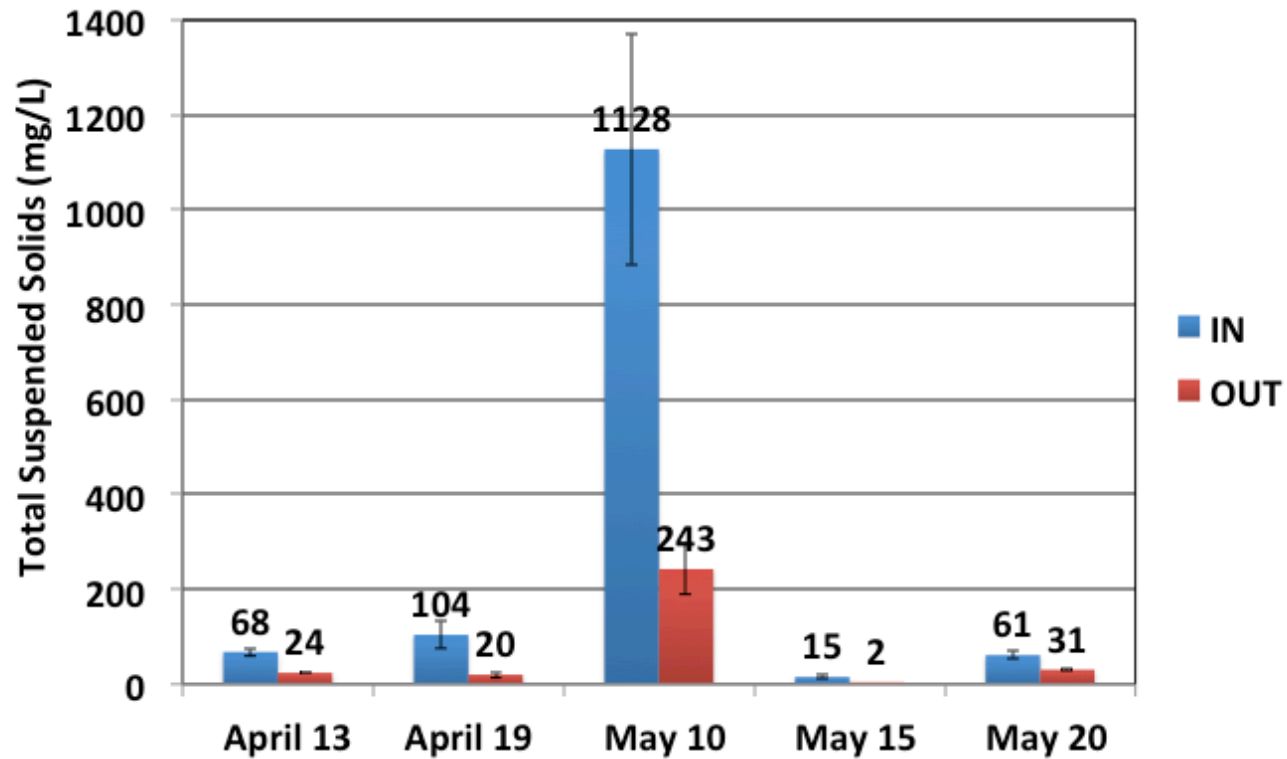
Statistically significant decrease in TSS for five separate events in Spring 2015.

Water Quality Results: Metals

Sample of Metals Data from Grab Samples
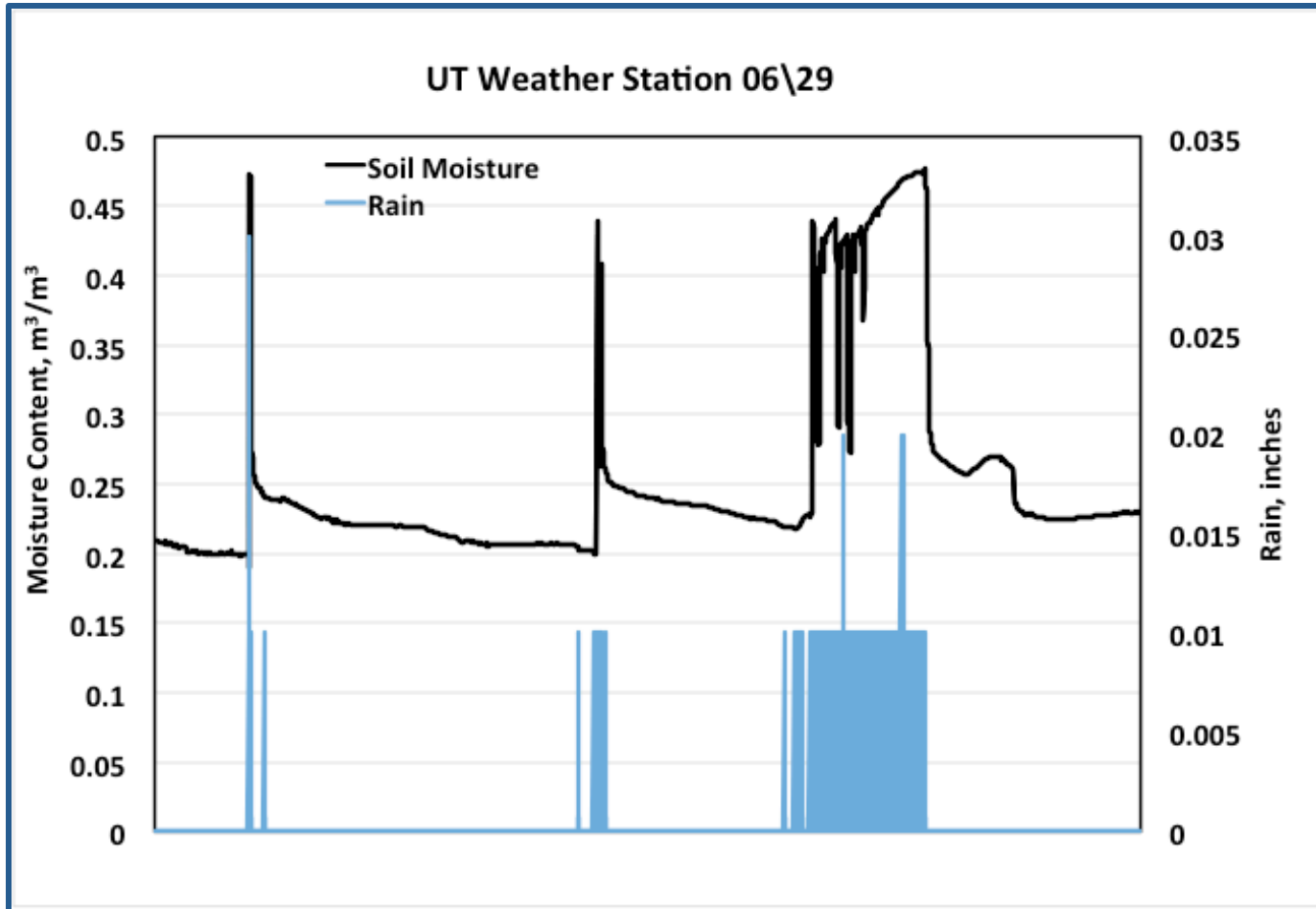
No statistically-significant differences in metals except zinc.
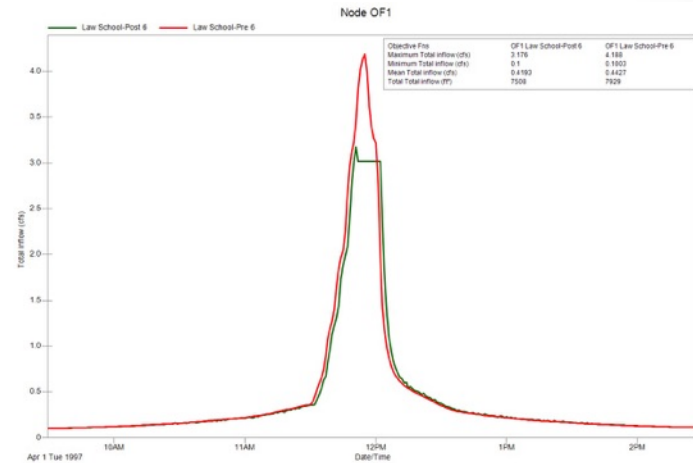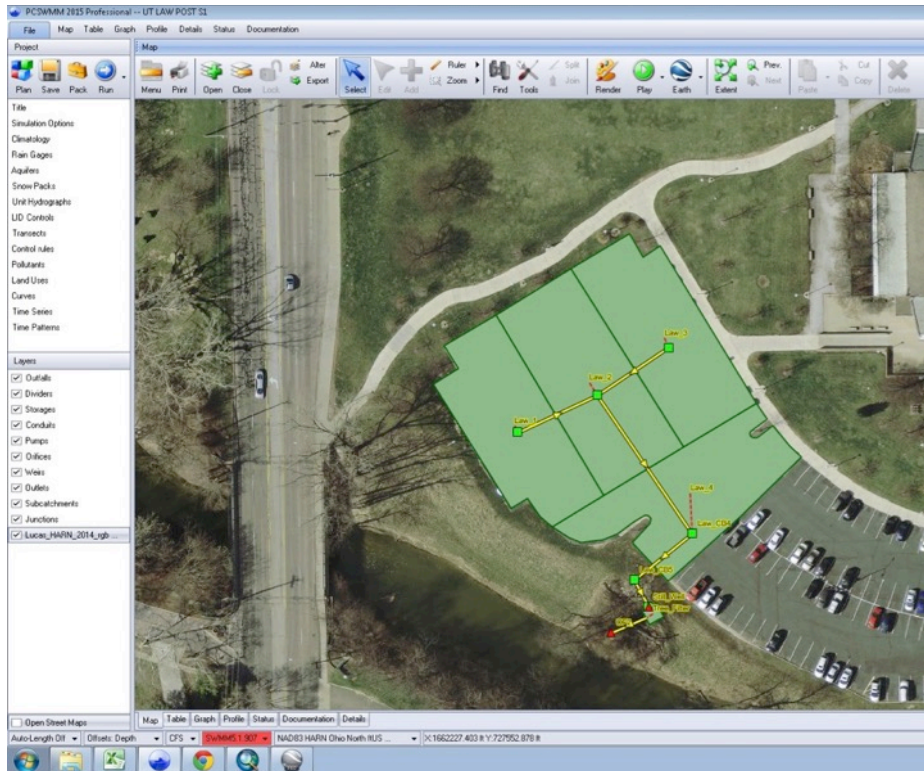Zinc was significantly reduced in 3 of the 5 events.

Soil Moisture Sensors:
Stormwater Infrastructure Performance

Soil moisture sensors as a tool to remotely determine if green stormwater infrastructure is working properly

SWMM Modeling

| Simulation Event	Volume Reduction (gallons)	% Volume Reduction
5 Year Continuous	8000 gallons/year	1.30%
90 Percent Storm	1700 gallons	11.90%
10 year Storm	4825 gallons	5.90%

Water Level Logger:
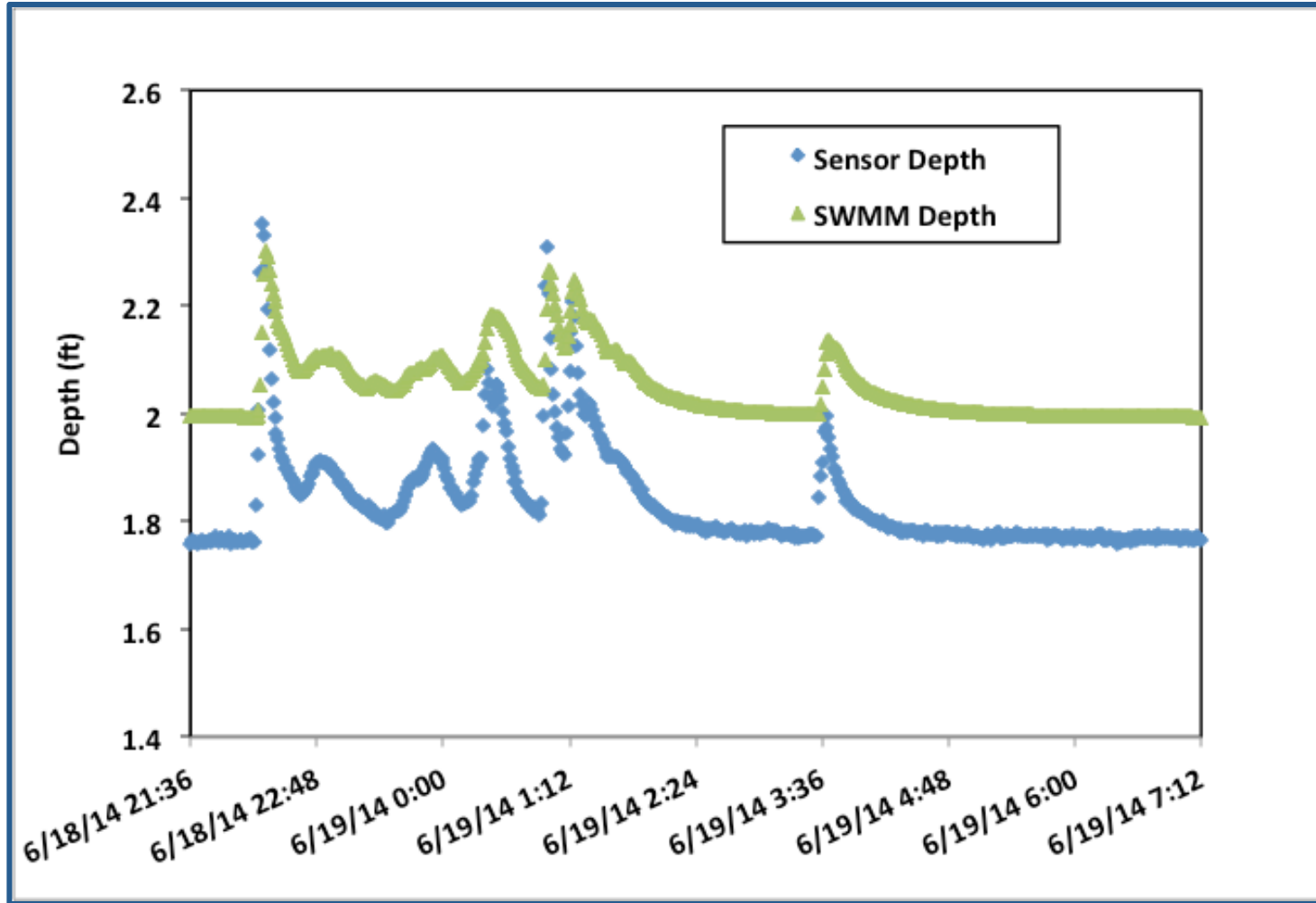## Surrogate Measure of Flow

Onset HOBO U20 Water Level Logger

- **Water level fluctuations are recorded and used to estimate flow.**
- **Time series CB level data can be used to calibrate SWMM rainfall-runoff model**
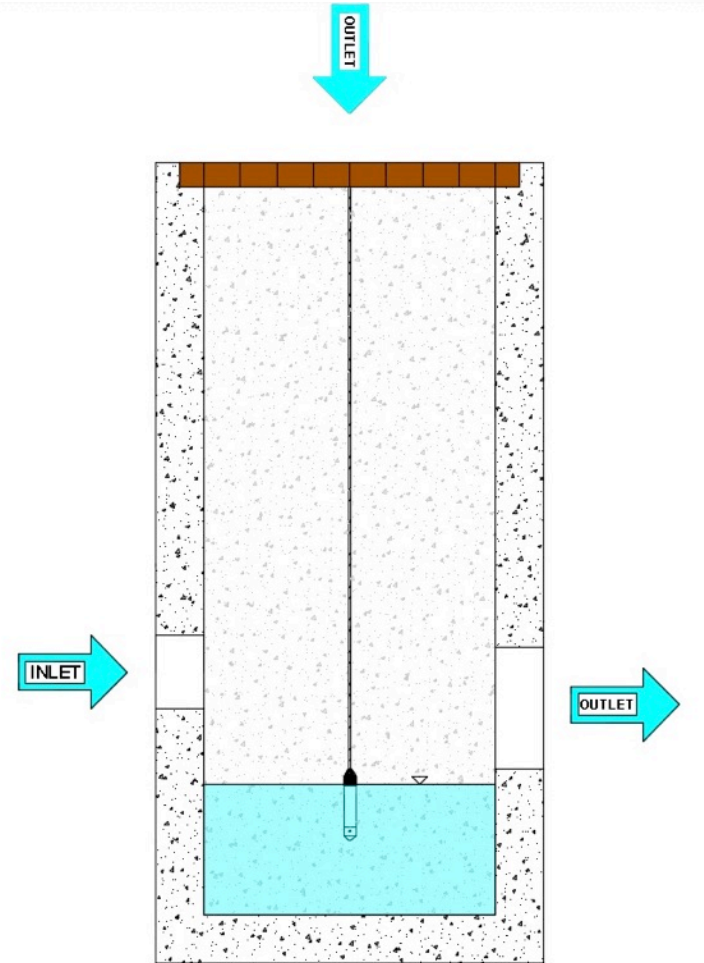
SWMM Model Calibration:
Depth Sensor

Pressure-based depth sensor to calibrate SWMM models

Project Outputs:

- **SWIF site performance and cost data collected, shared, and analyzed for inclusion in the WERF's International Stormwater BMP database.**
- **Maintenance and data collection training.**
- **Data Collection and Dissemination: quarterly project meetings and monthly SWAG meetings hosted by TMACOG as well as OHSWA and EWRI conferences.**
- **Permanent web links and SWIF site databases.**
- **Remote sensing (soil moisture and/or water level loggers) to determine GSI performance and calibrate models.**

Acknowledgements:

End Users and Contributors:

- **Mike Melnyk and Brian Miller – Lucas County Engineers**

- **Patekka Bannister, Regina Collins, Lorie Haslinger, and Andy Stepnick – City of Toledo Engineering Services**

- **SWIF Site Managers in Lucas County**