Oneida County Sewer District
A Case Study for Continuous Improvement

Answers through Flow Monitoring

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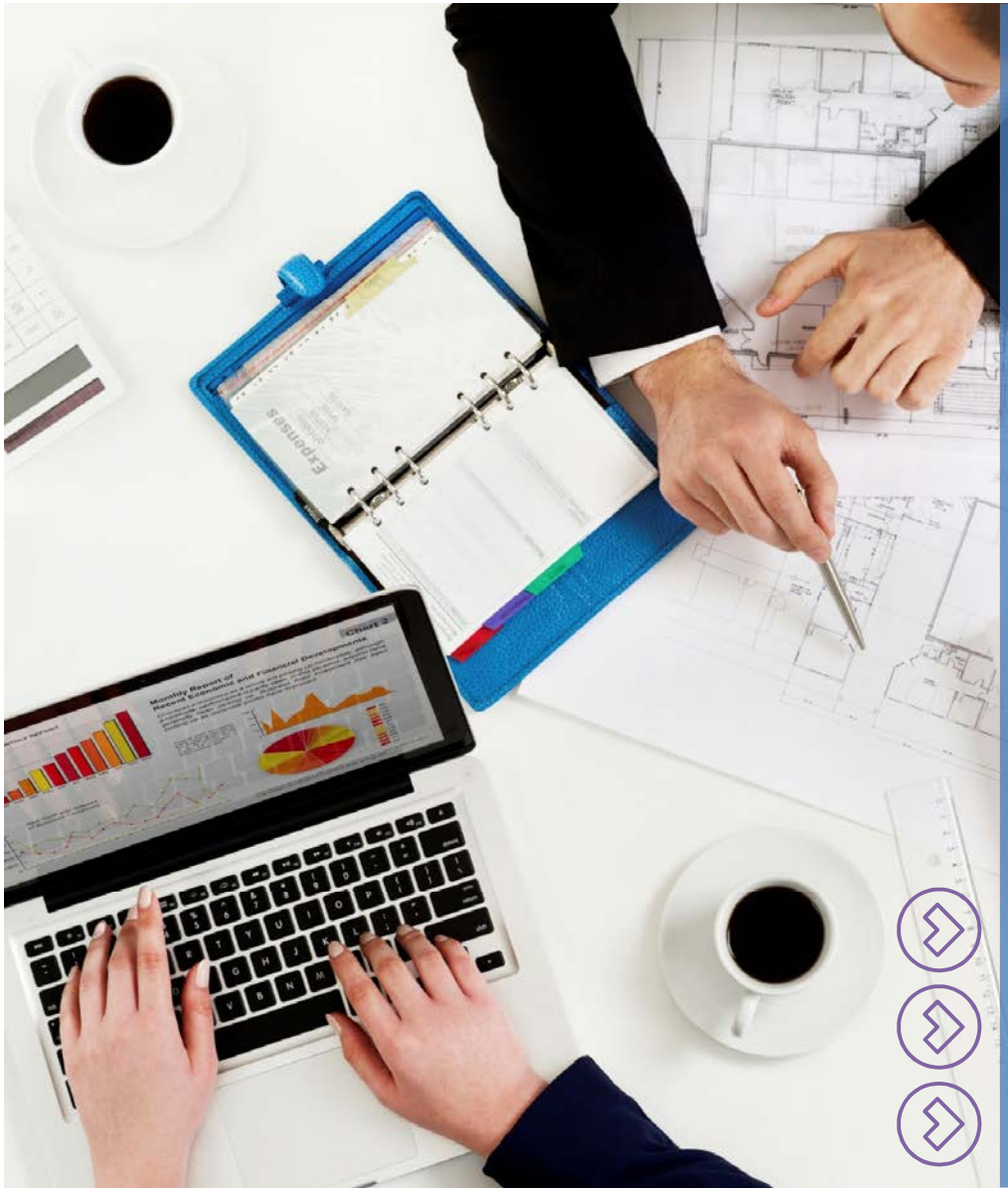


AGENDA

History

Problem

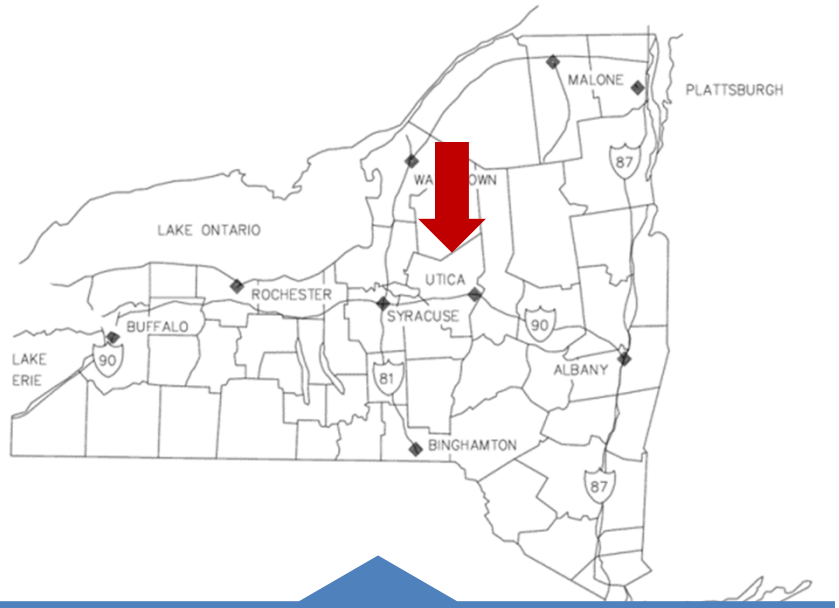
Work Completed to Date

Flow Monitoring Program

Conclusions

Questions and Review

History



OCSD formed to improve sanitary sewage treatment and disposal, and water quality in the Mohawk River

Oneida County, New York

- Oneida County Sewer District-1965
- 15 Municipalities
- Centralized Treatment replaces:
  - Remote Primary Systems
  - Septic Systems
  - No Treatment
- WPCP, SCPS, Interceptor Sewers

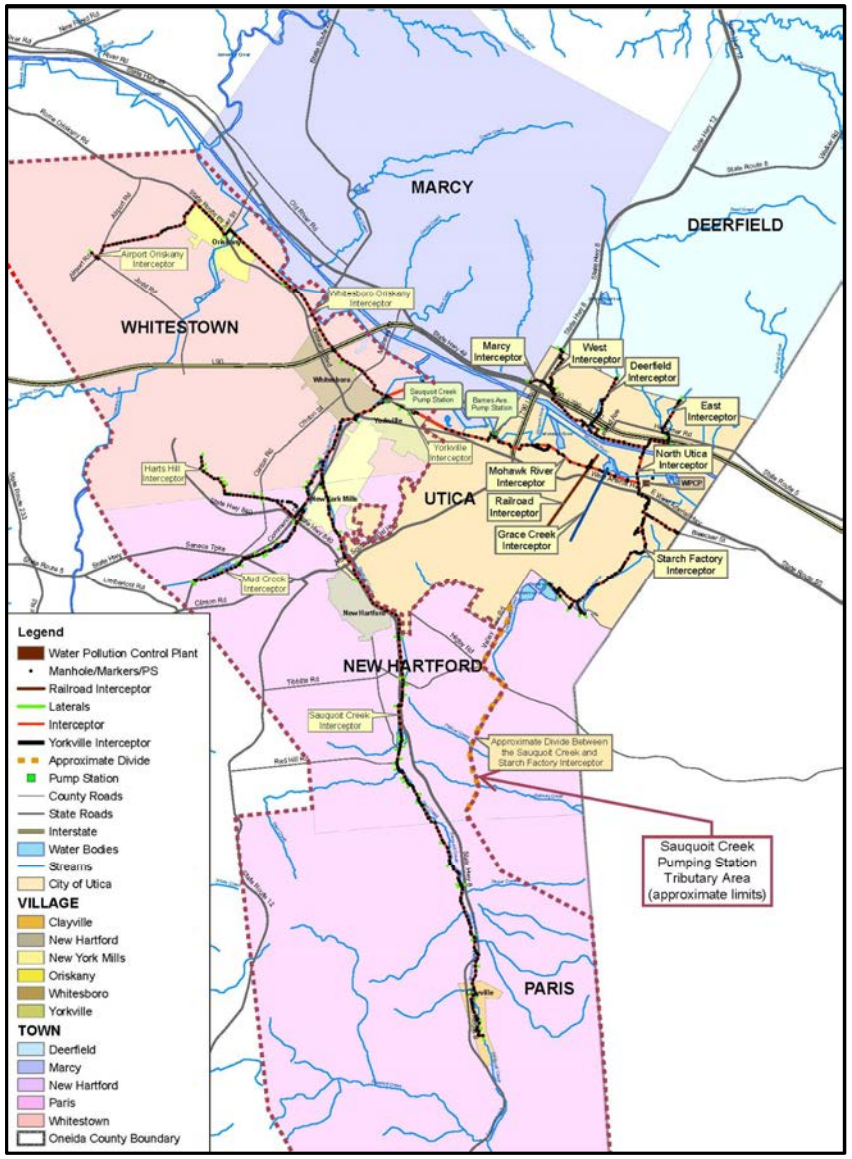
1 City

7 Towns (1 by IMA)

7 Villages (1 by IMA)

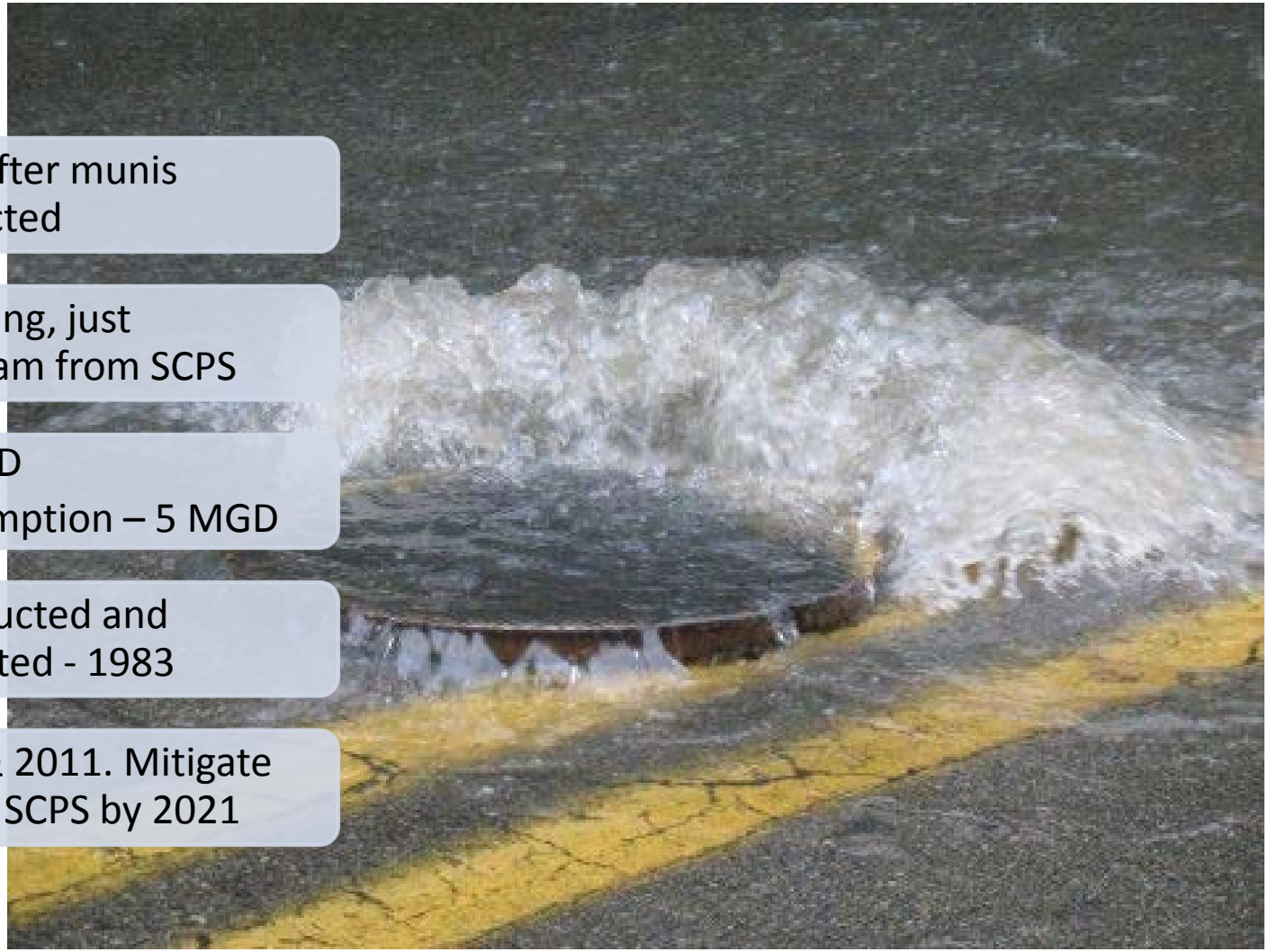
Municipally Owned Collection

District Owned Treatment

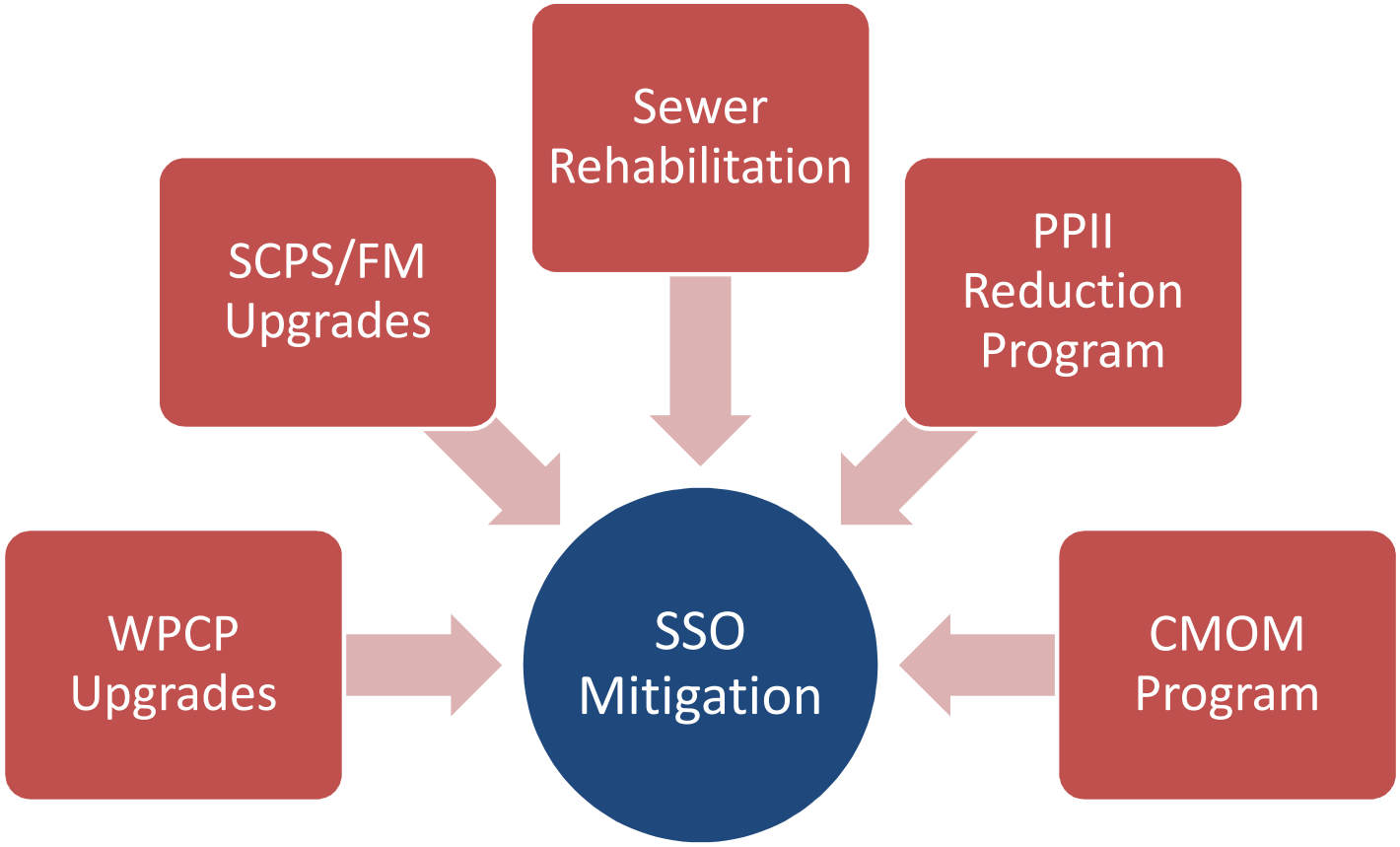


Problem

SSOs	• Soon after munis connected
Villages	• Low-lying, just upstream from SCPS
SCPS Capacity	• 15 MGD • Consumption – 5 MGD
Pumped Overflow	• Constructed and permitted - 1983
Consent Order	• 2007 & 2011. Mitigate SSO @ SCPS by 2021



2010 SSO Mitigation Plan




Mohawk
Werz Ave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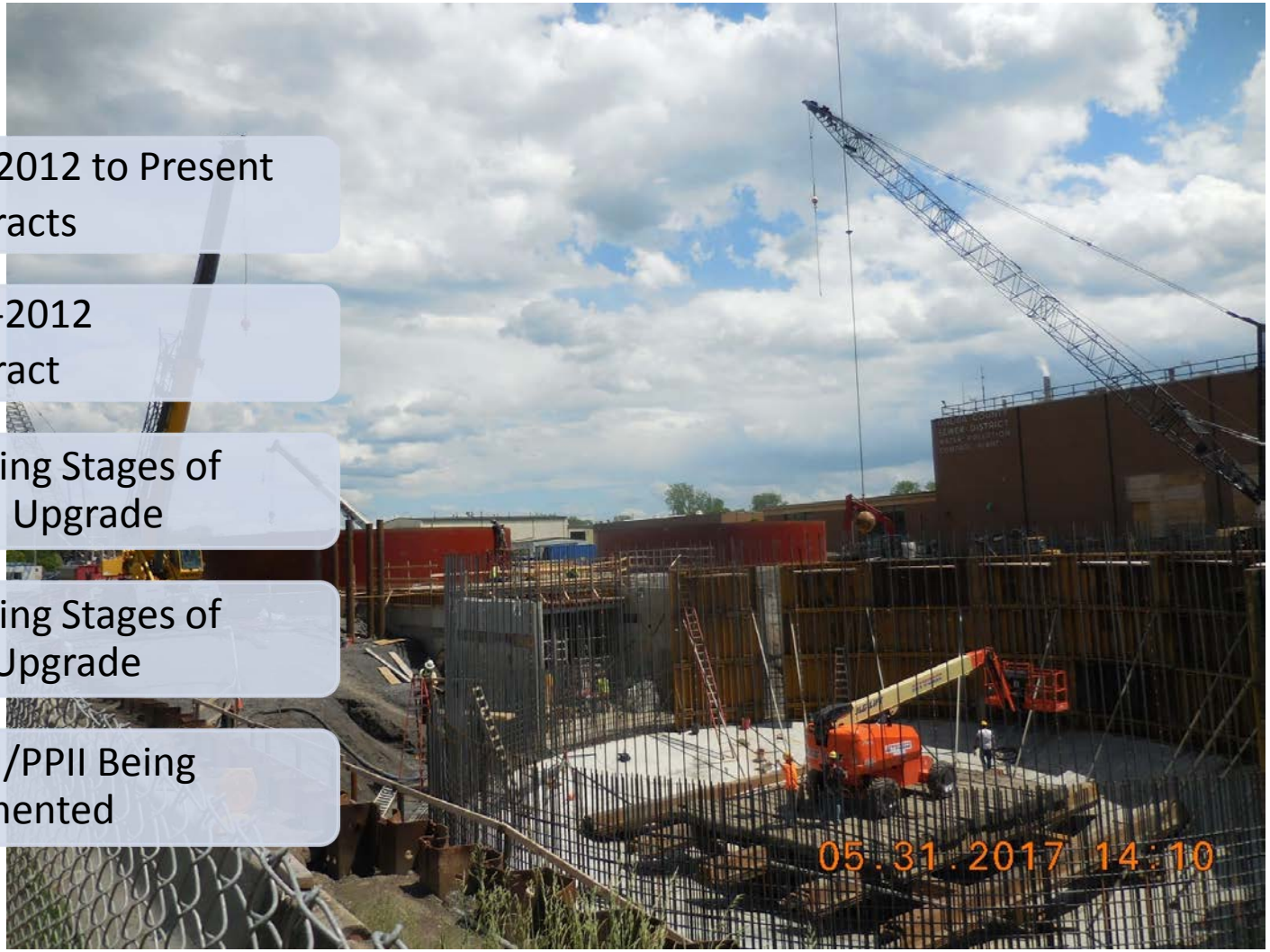
10/15/2012

Work Completed to Date

GIS Mapping	• Year 2000 - Ongoing
CCTV	• 180 Miles (84% of SCPS Basin) since 2009
Smoke Testing	• 99 Miles - 2009
MH Inspections	• Approximately 5,000 Inspected 2008 - 2010
Flow Monitoring	• 2008 and 2015 to present

Sewer Rehabilitation	• $15M-2012 to Present • 8 Contracts
Manhole Rehabilitation	• $1.8M-2012 • 1 Contract
WPCP Upgrades	• Beginning Stages of $250M Upgrade
SCPS/FM Upgrades	• Beginning Stages of $50M Upgrade
Programs	• CMOM/PPII Being Implemented

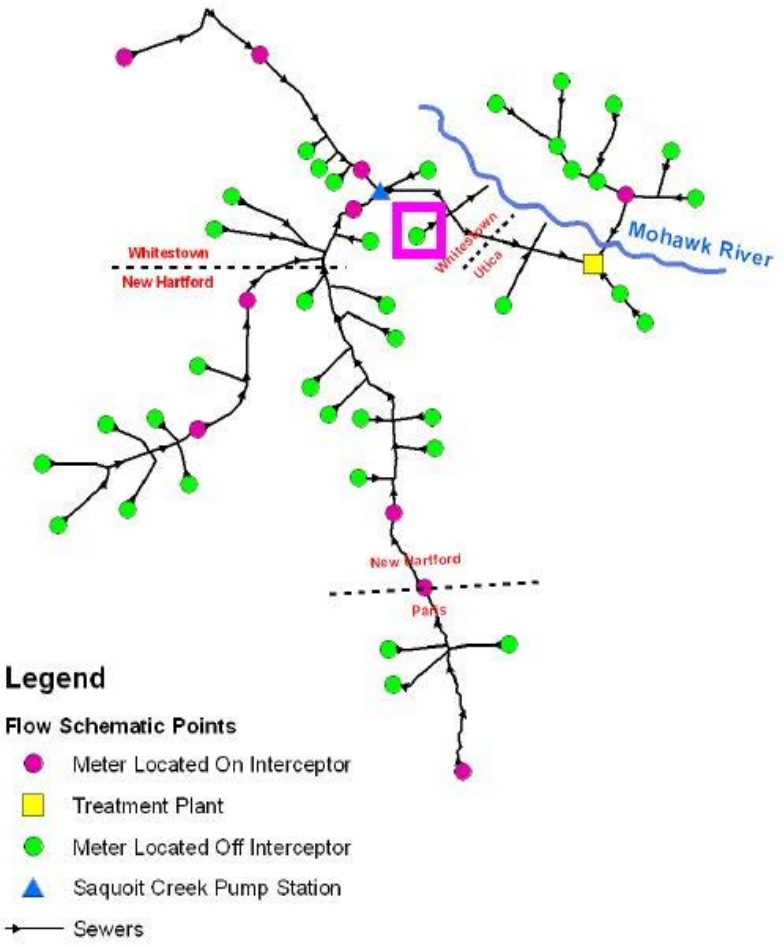


Flow Monitoring 2008

March 2008 to September 2008

2008 Flow Monitoring Program

- 51 Flow Meters
  - 35 in SCPS Basin
  - 16 Outside SCPS Basin
- 5 Rain Gauges
- Manual Data Collection
- Supplemented With Night-time Flow Observations

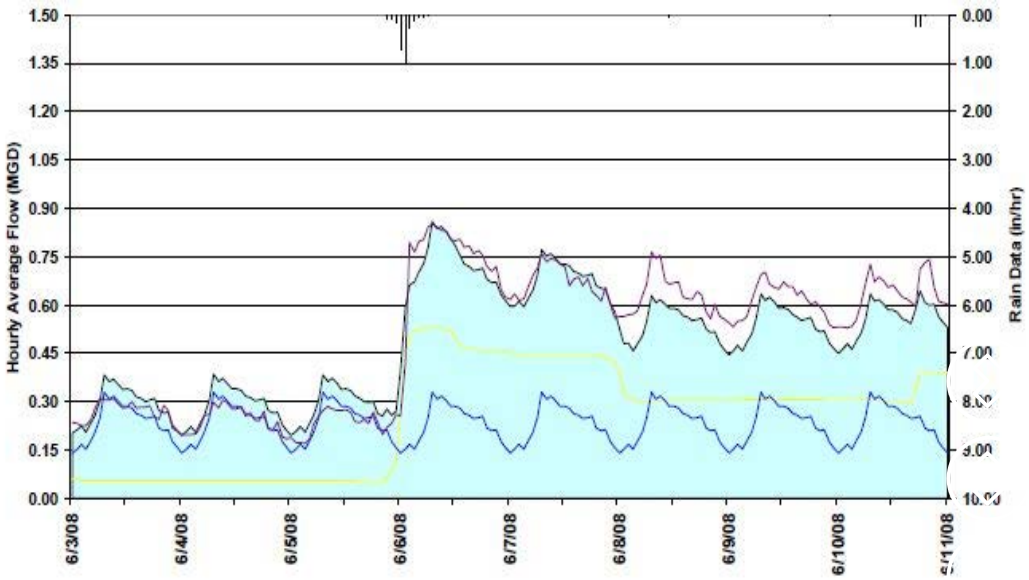


Things Done Right

- Picked a great year to monitor (winter rain & snow, summer rain)
- Mostly put meters in good locations
- Used flow meter and rain gauge data to calibrate a hydraulic model
- Used flow monitoring hydrographs to analyze each metered basin

Things to Improve

- Mapping
- Smaller basins
- Cellular data collection/communication
- More rain gauges



- Widespread BI and RDII
- Not limited to older systems
- Peaking Factors 3X to >10X
- Previous assumptions not valid

What Did We Learn?

Flow monitoring, hydrograph decomposition and hydraulic/hydrologic modeling revealed problem areas in collection systems – Everywhere!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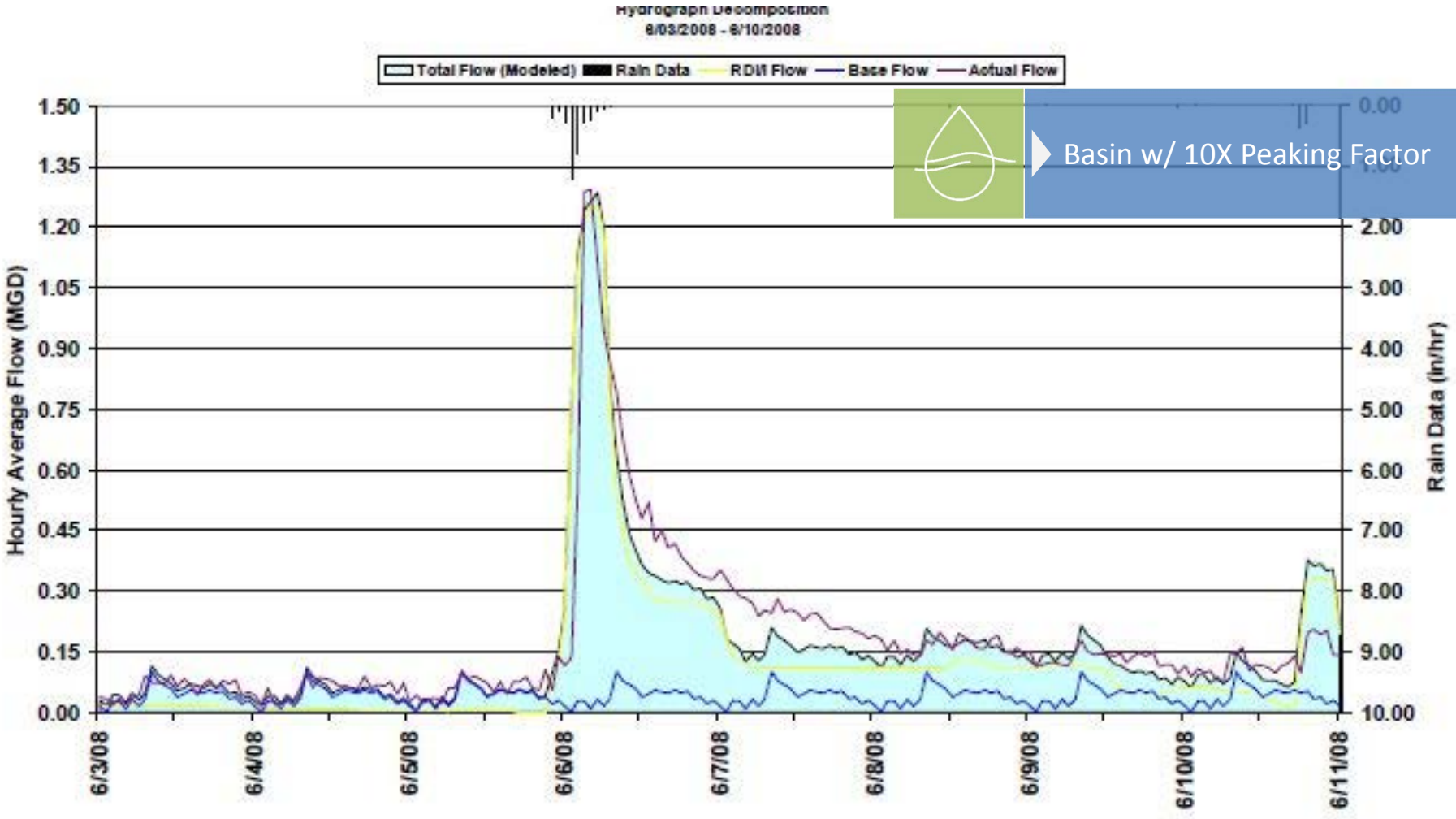
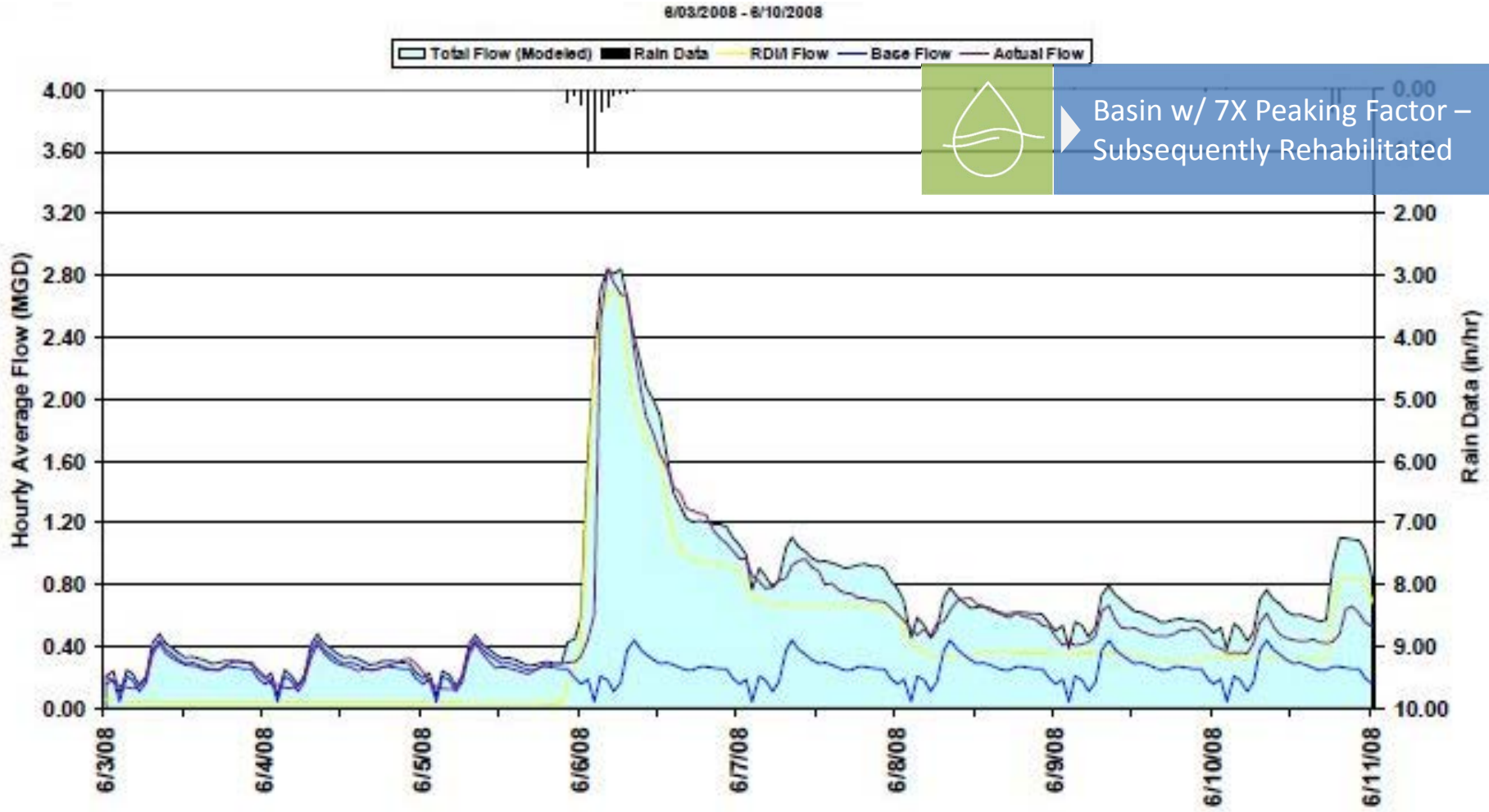
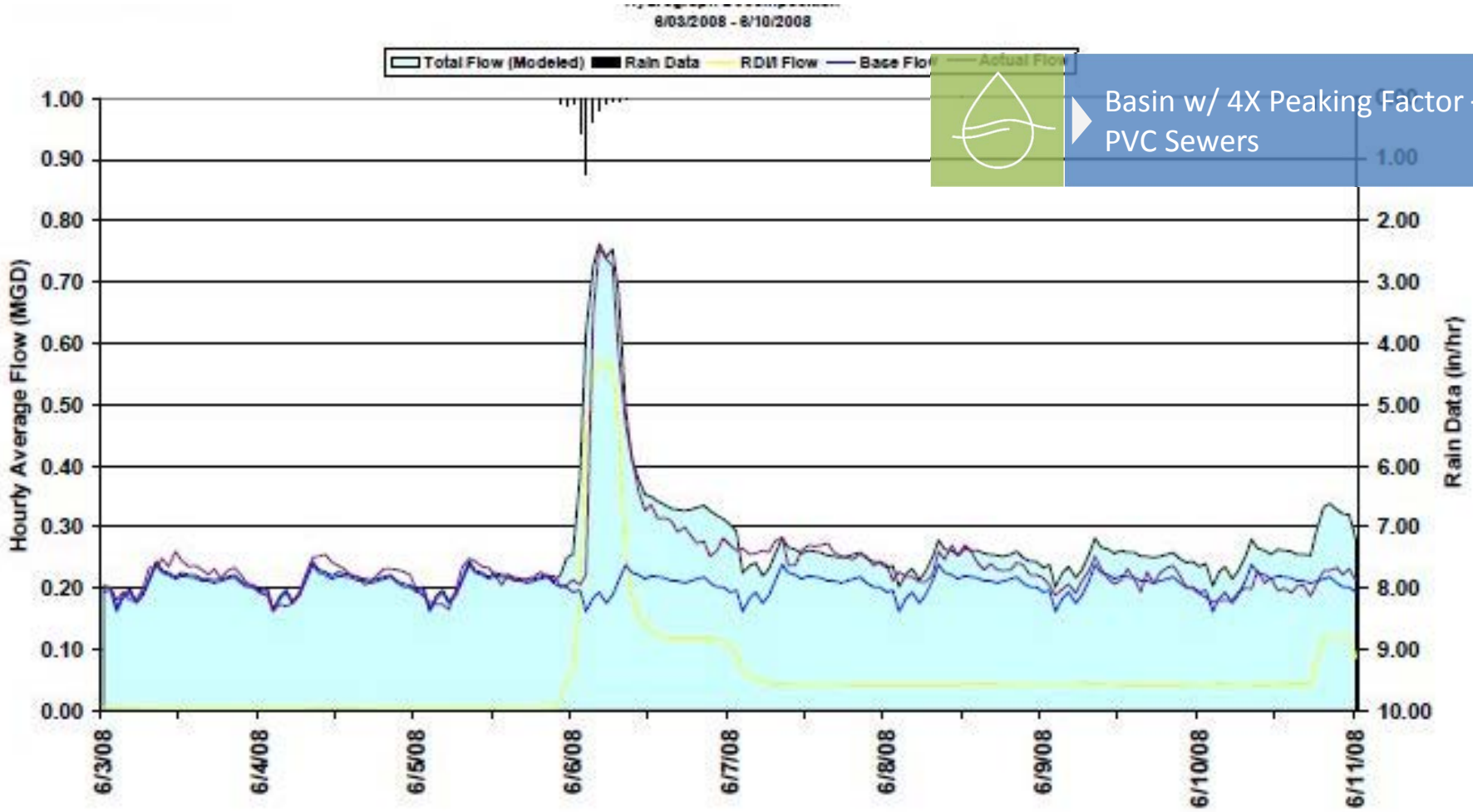


Basin w/ 10X Peaking Factor



Basin w/ 7X Peaking Factor – Subsequently Rehabilitated



Basin w/ 4X Peaking Factor – New PVC Sewers

Flow Monitoring 2015

February 2015 to Present

2015 Flow Monitoring Program

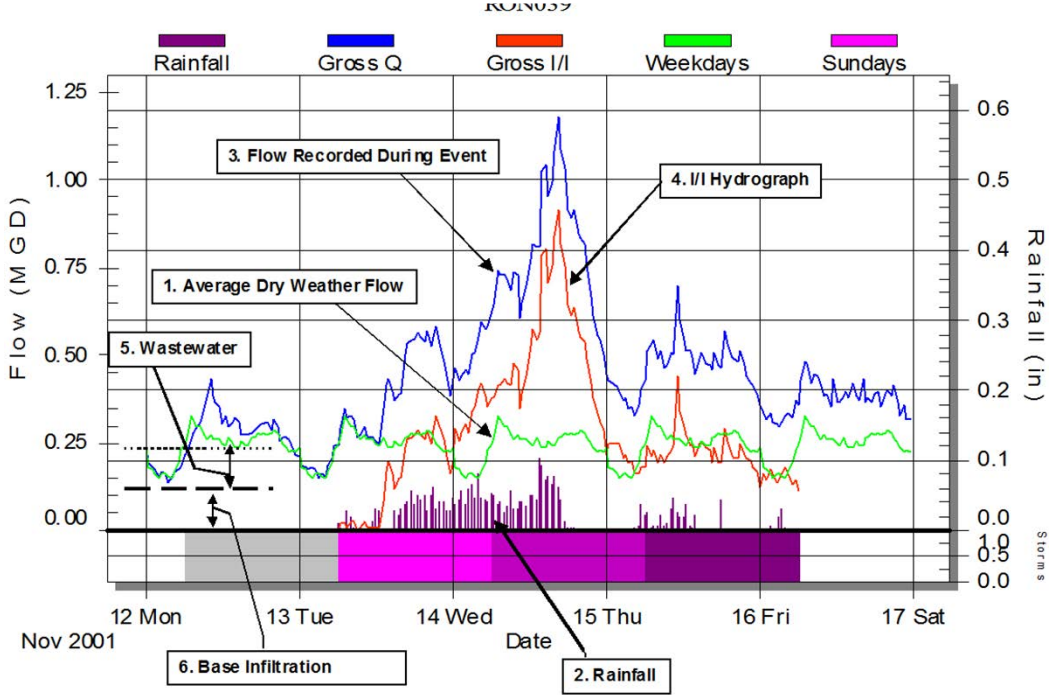
- 59 Flow Meters
  - Approximately 90% in same locations as 2008
- Additional Rain Gauges
- Cellular Data Collection and Communications
- “Long Term Program”

Improvements over 2008

- Mapping
- Split some sewersheds into smaller sub-basins
- Captured previously missed flows
- Additional rain gauge locations
- Longer term
- Web data-hosting and analysis
- Real-time access to data
- Software for data analysis

2015 Monitoring Season

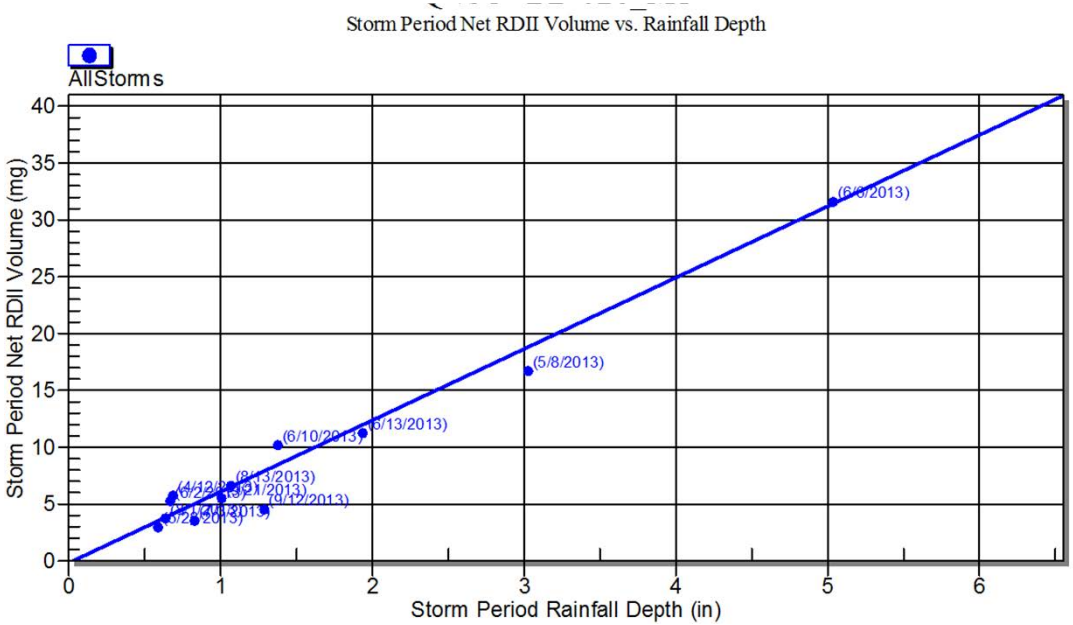
- Lack of significant rain events
- Only 4 days exceeded 1-inch
- Only one storm approached 1-year storm (1.87”)
- Difficulty drawing conclusions regarding rehabilitation effectiveness
- Anecdotal evidence of fewer and shorter duration overflows



- Dry Day Data Analysis
- Decomposes hydrograph
- Base flow, Infiltration, and Inflow
- Storm definition
- RDII per site & storm basis
- Rank Basins
- Q vs i graphs

Sliicer Data Analysis

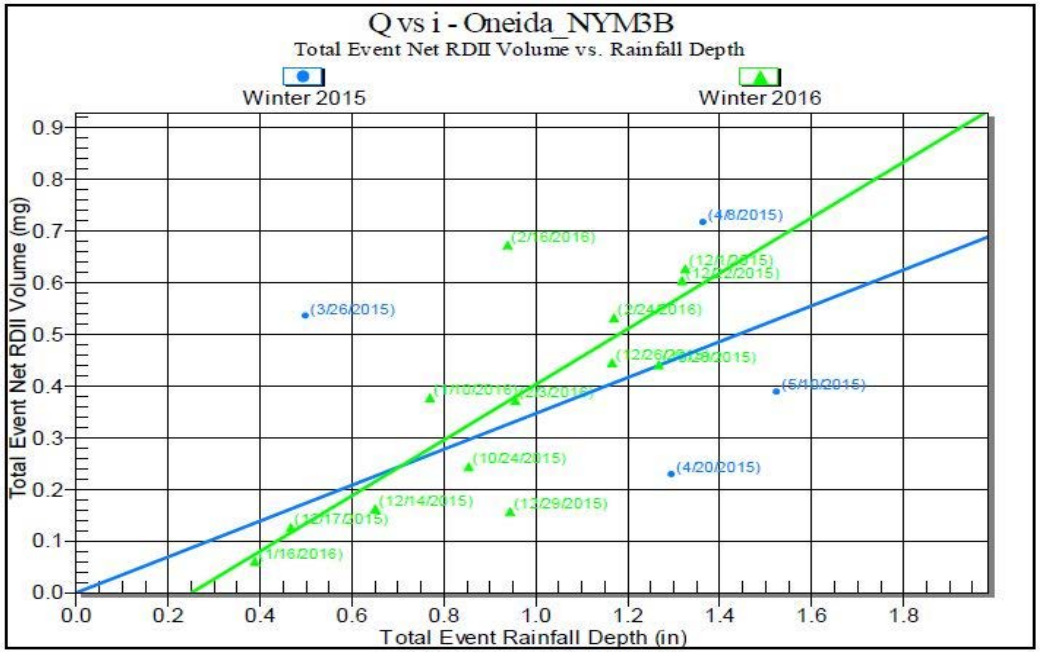
Online tool used for I/I analysis, hydrograph decomposition, RDII definition, and Q vs. i plot generation



Q vs i is a linear relationship. Poor correlation coefficients are usually due to insufficient rain data. Each data point represents a storm.

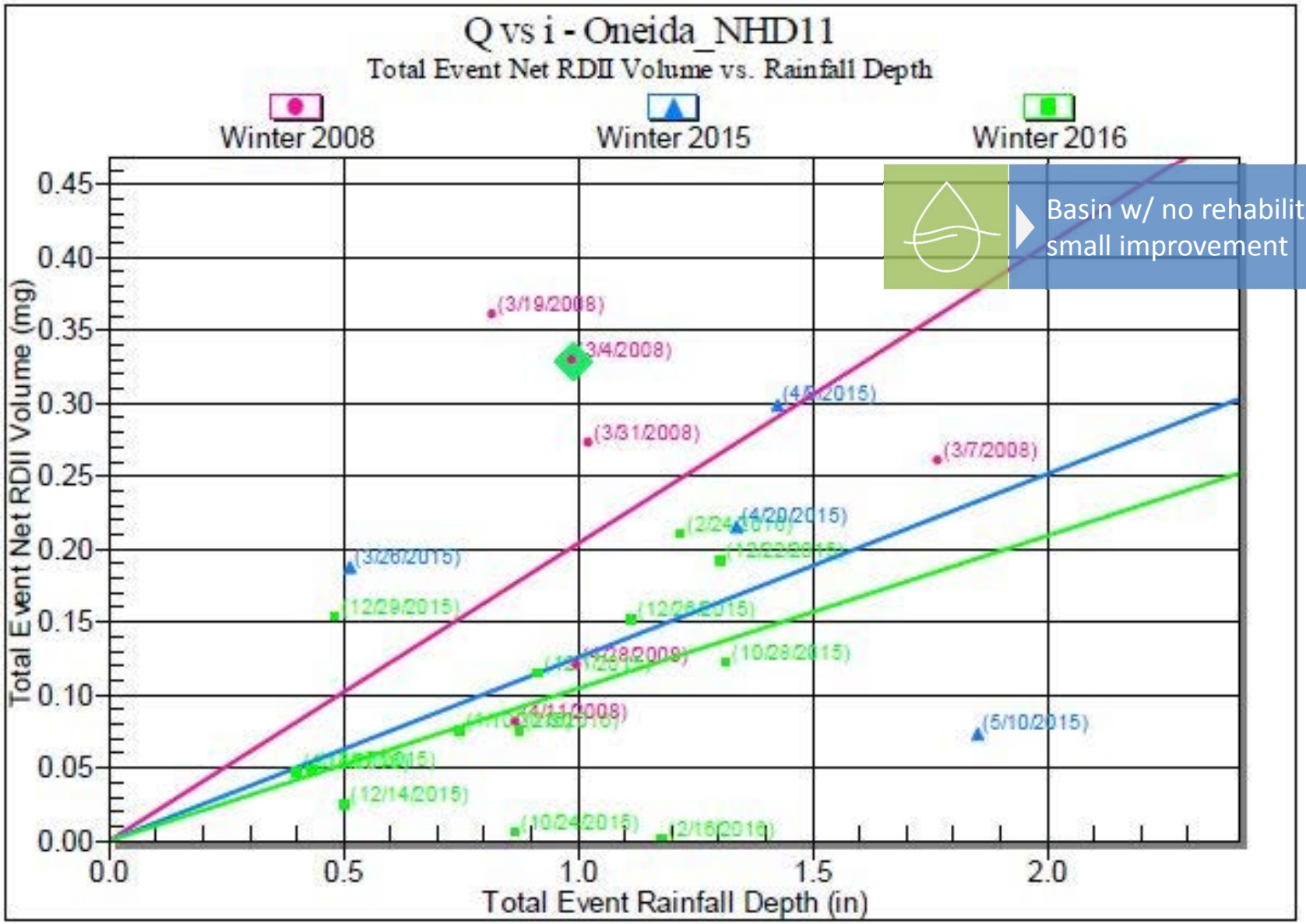
Q vs. i Plot

The Q vs i relationship demonstrates how well the rainfall and flow data fit. A good relationship like this indicates that both the rainfall and flow are valid and accurate.

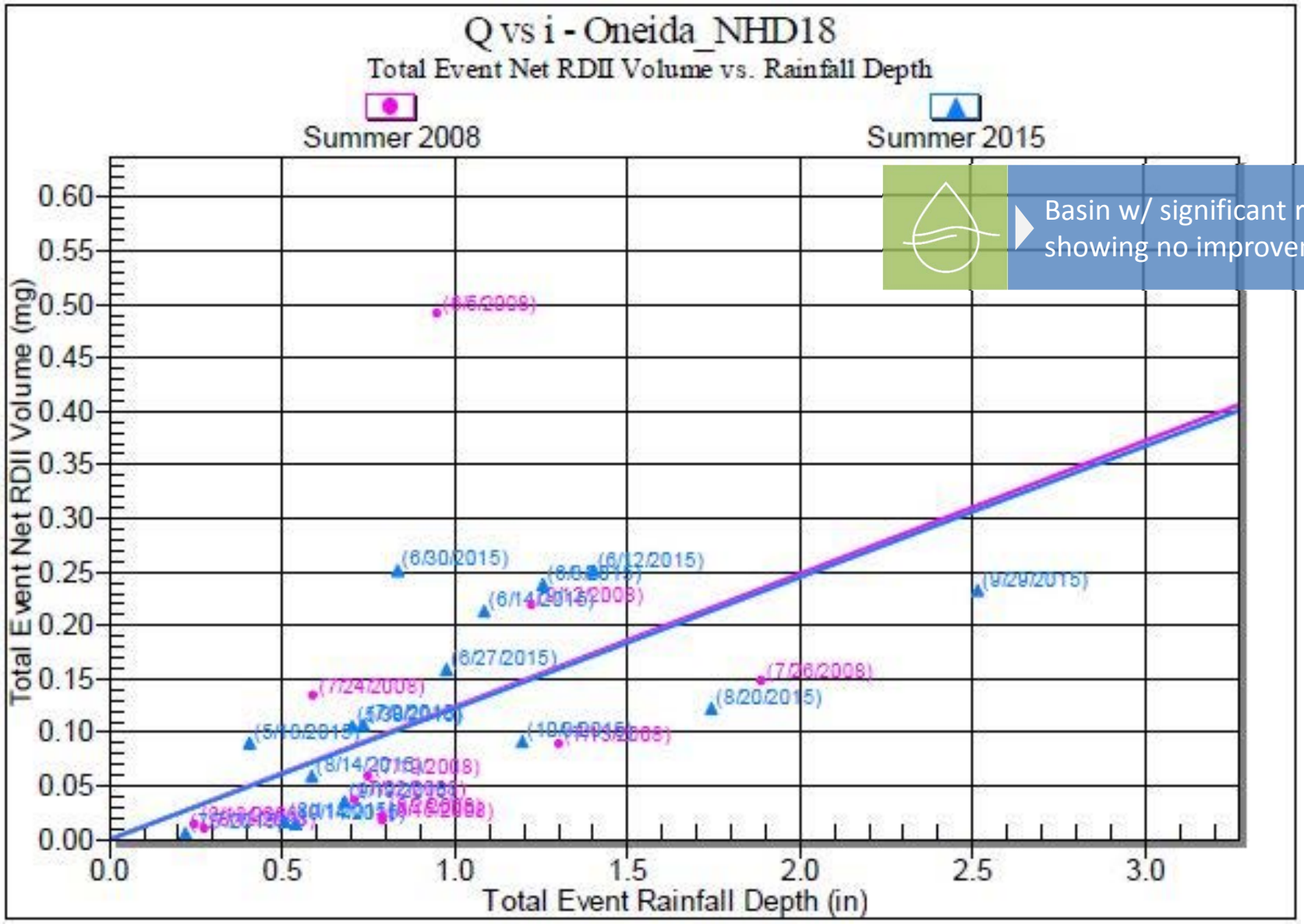


Flatter slope = Less RDII
More storm events = Better fit plot
Each data point represents a storm
Compare on a seasonal basis

Q vs. i Plot (Pre and Post Rehab of a basin)

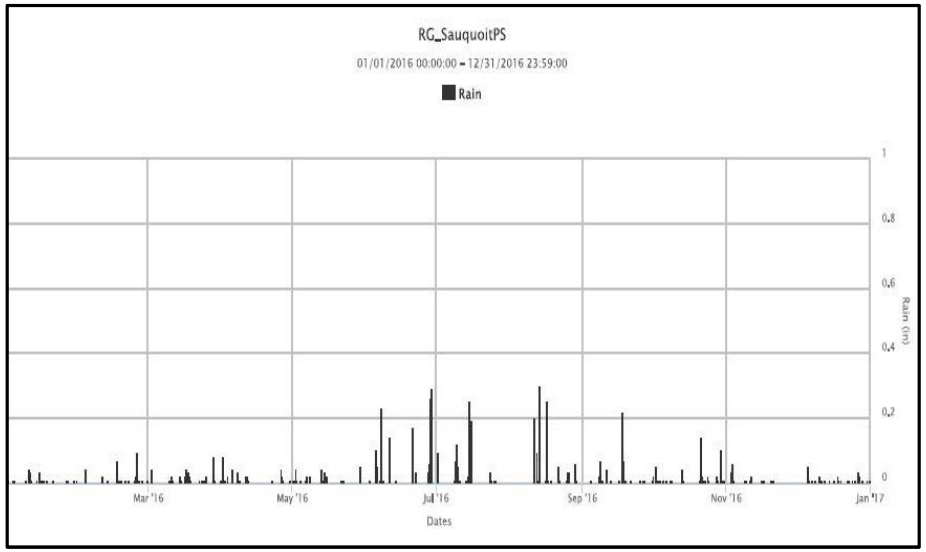


Basin w/ no rehabilitation showing small improvement

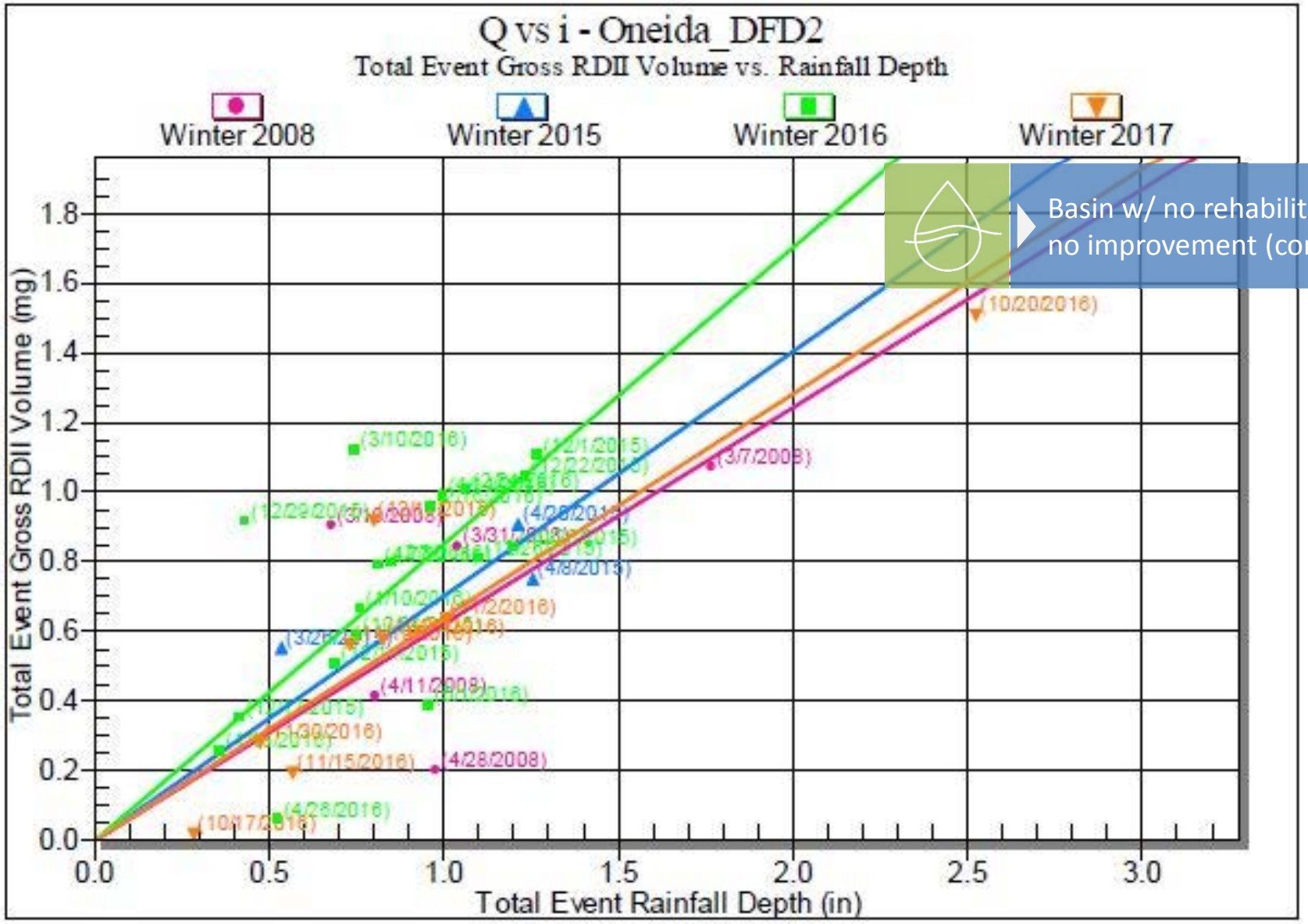


Basin w/ significant rehabilitation showing no improvement

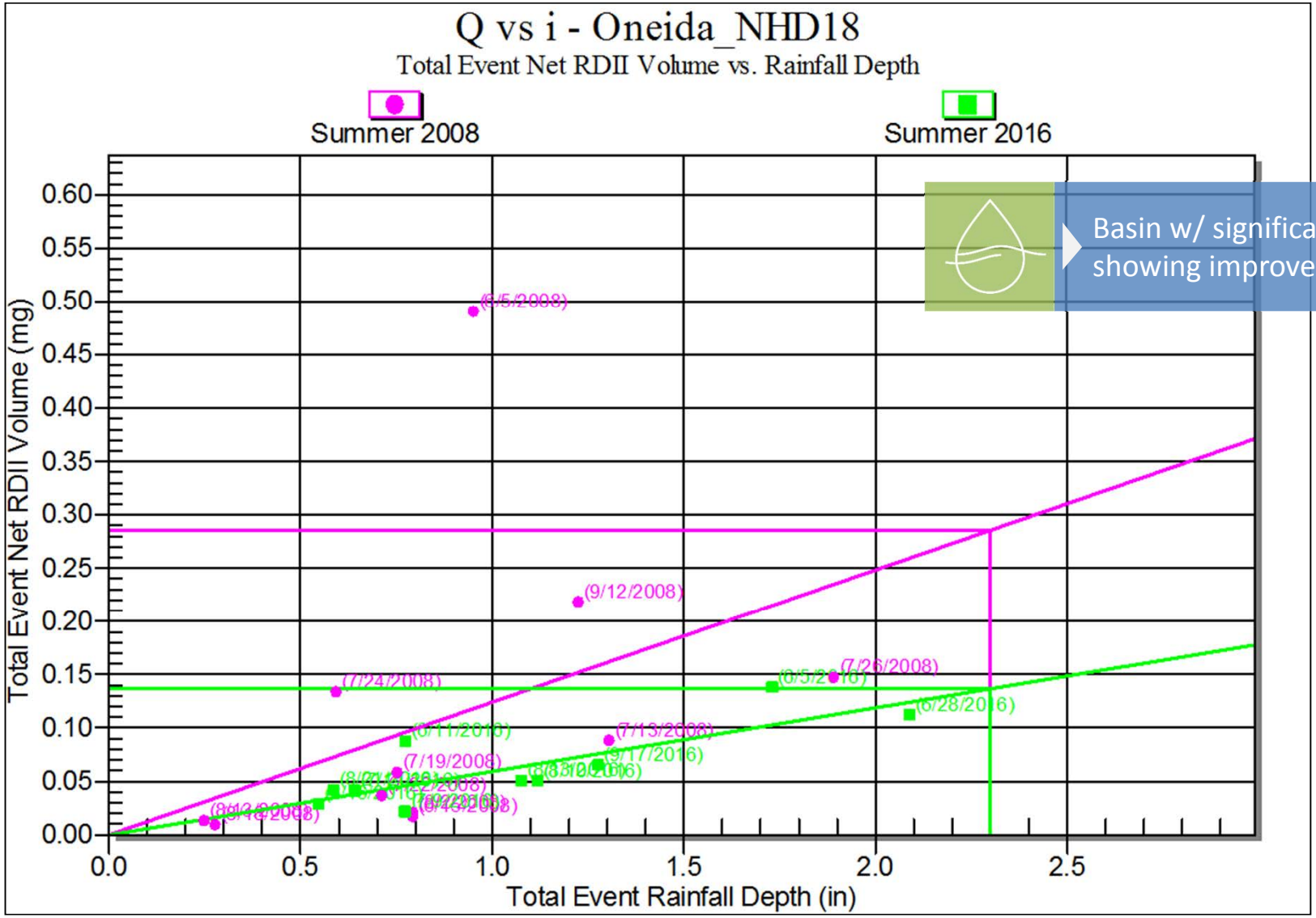
2016 Monitoring Season



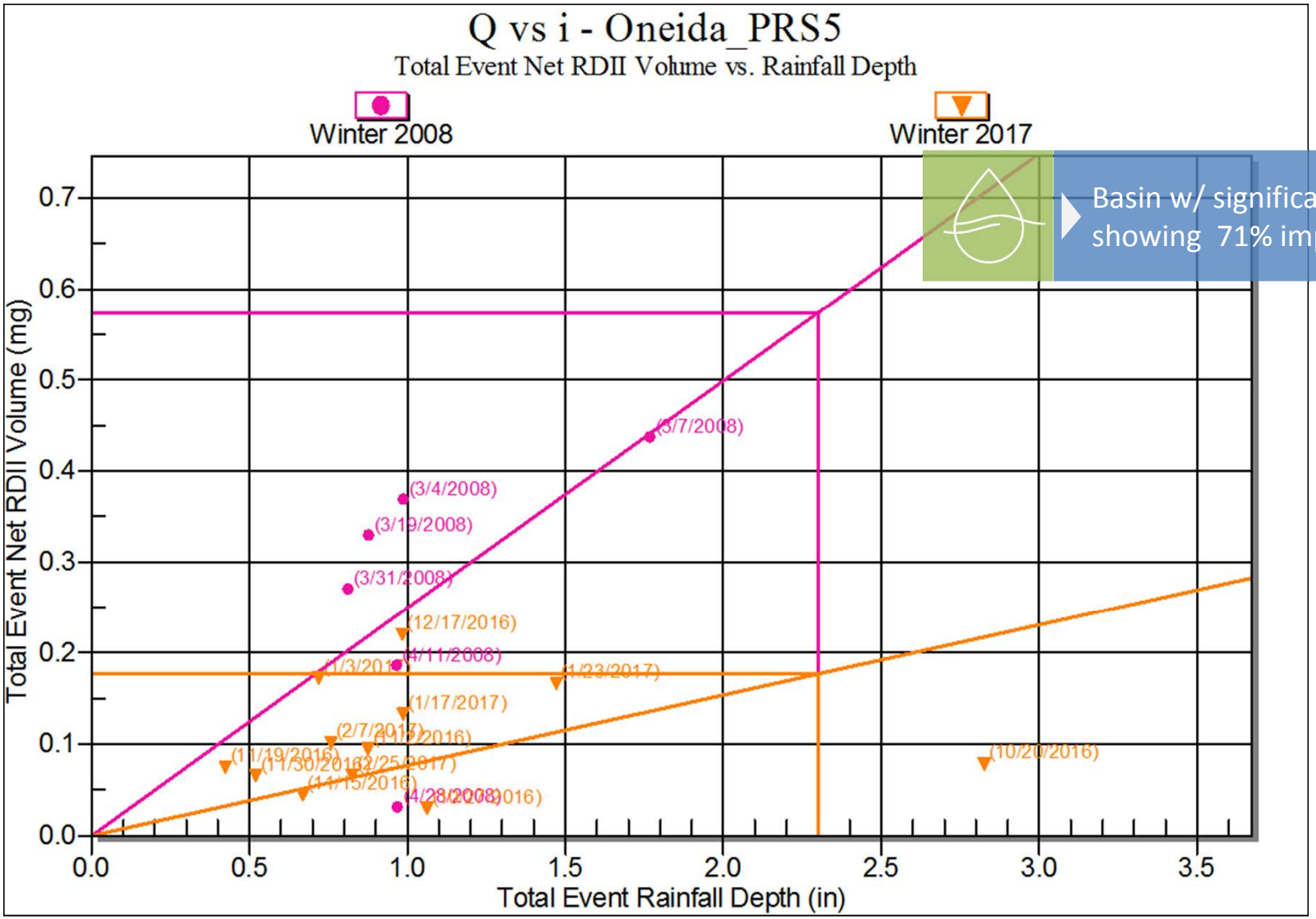
- More rain events distributed throughout year
- 7 days exceeded 1-inch rainfall
- Two storms exceeded 1-year storm (1.91”)
- Better able to draw conclusions regarding rehabilitation effectiveness
- Continued decrease in overflows



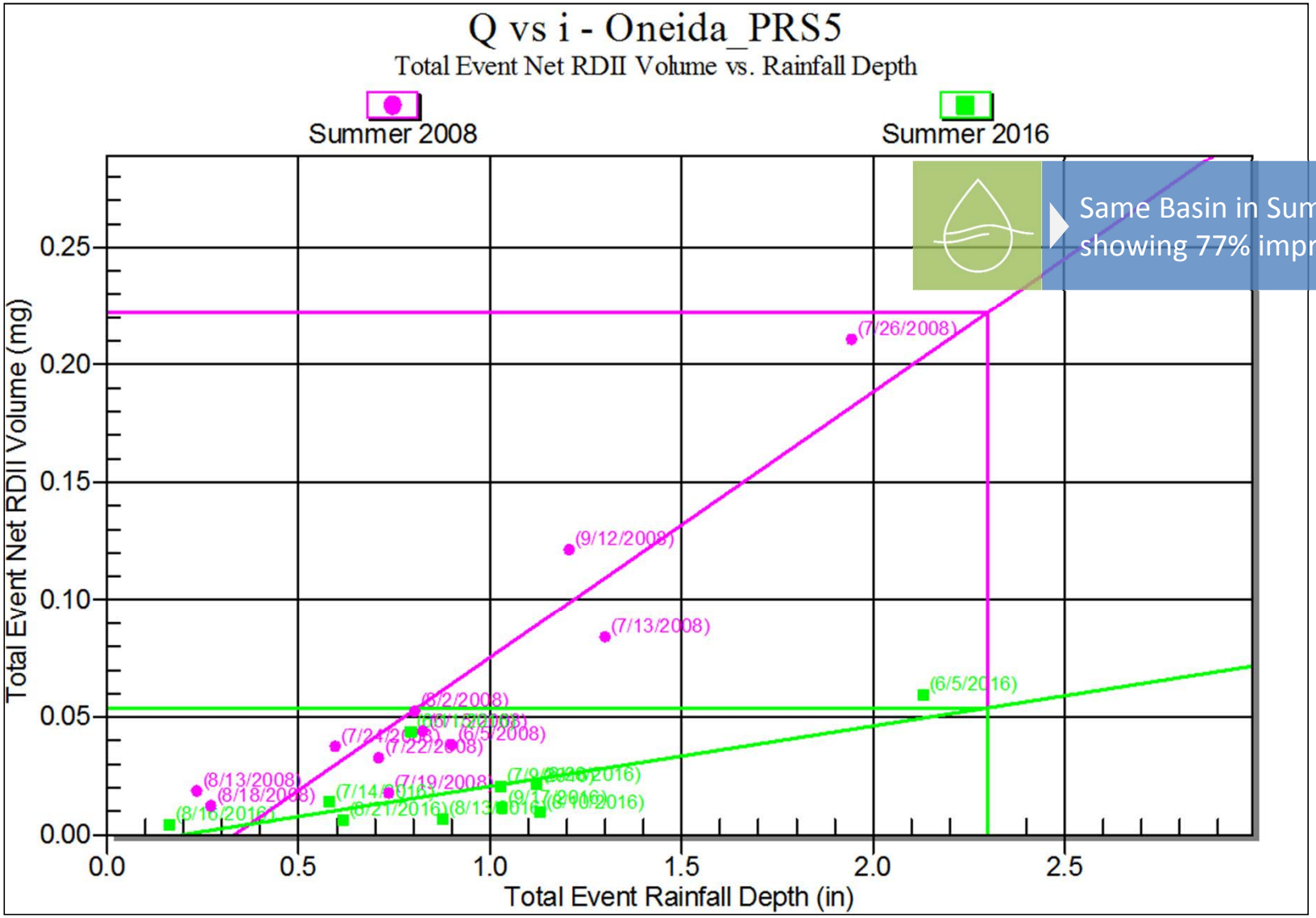
Basin w/ no rehabilitation showing no improvement (control basin)



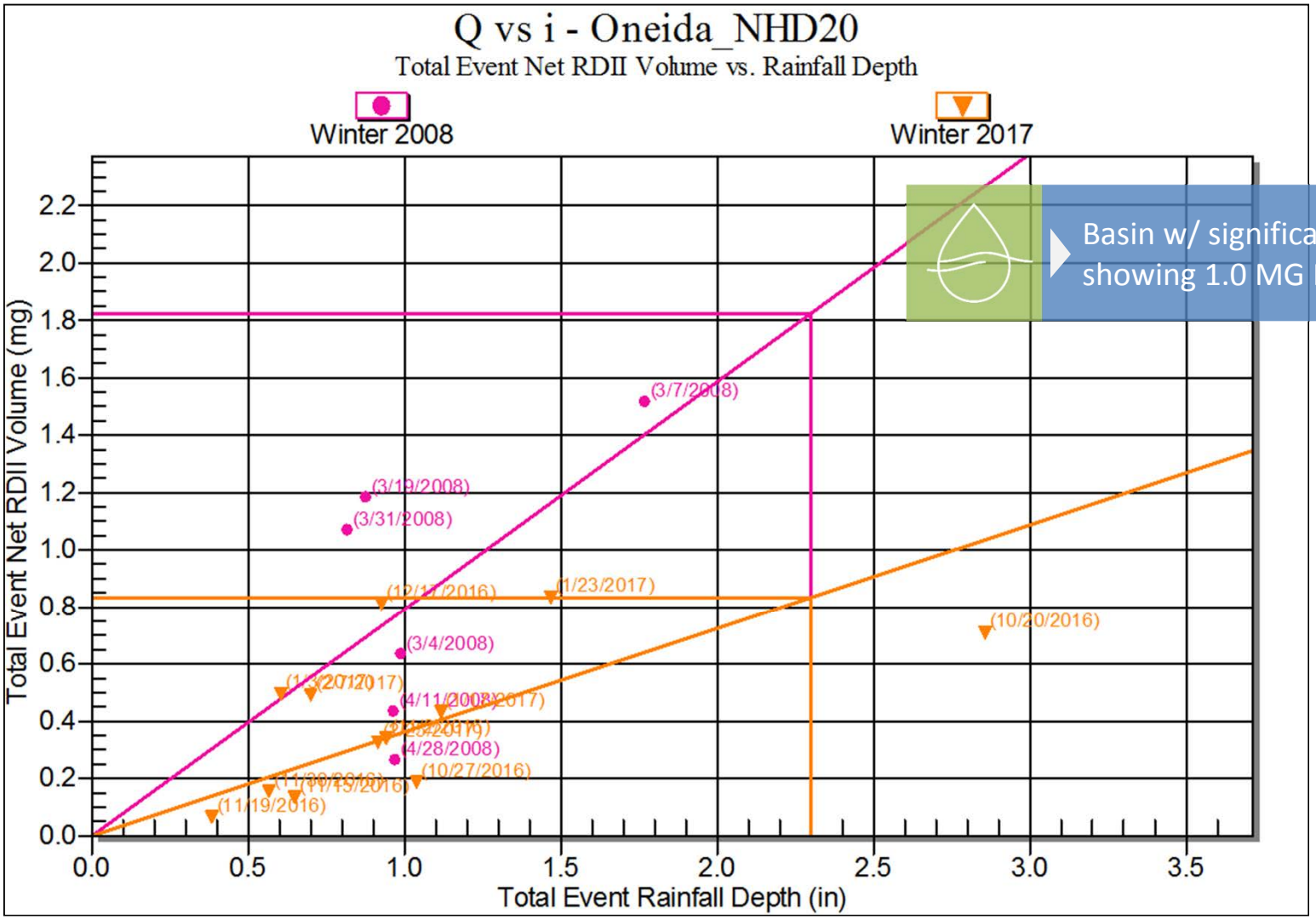
Basin w/ significant rehabilitation showing improvement



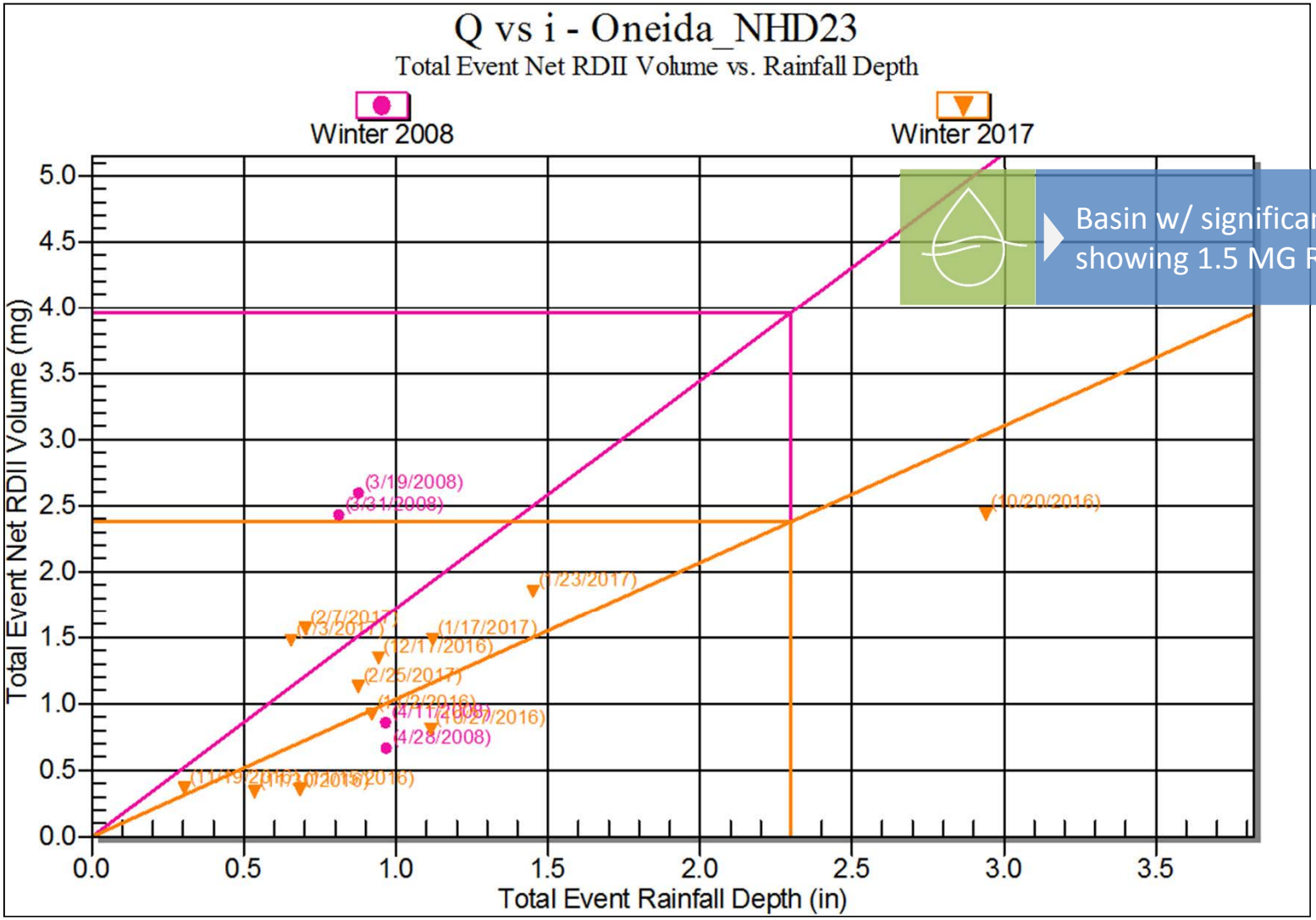
Basin w/ significant rehabilitation showing 71% improvement



Same Basin in Summer season showing 77% improvement

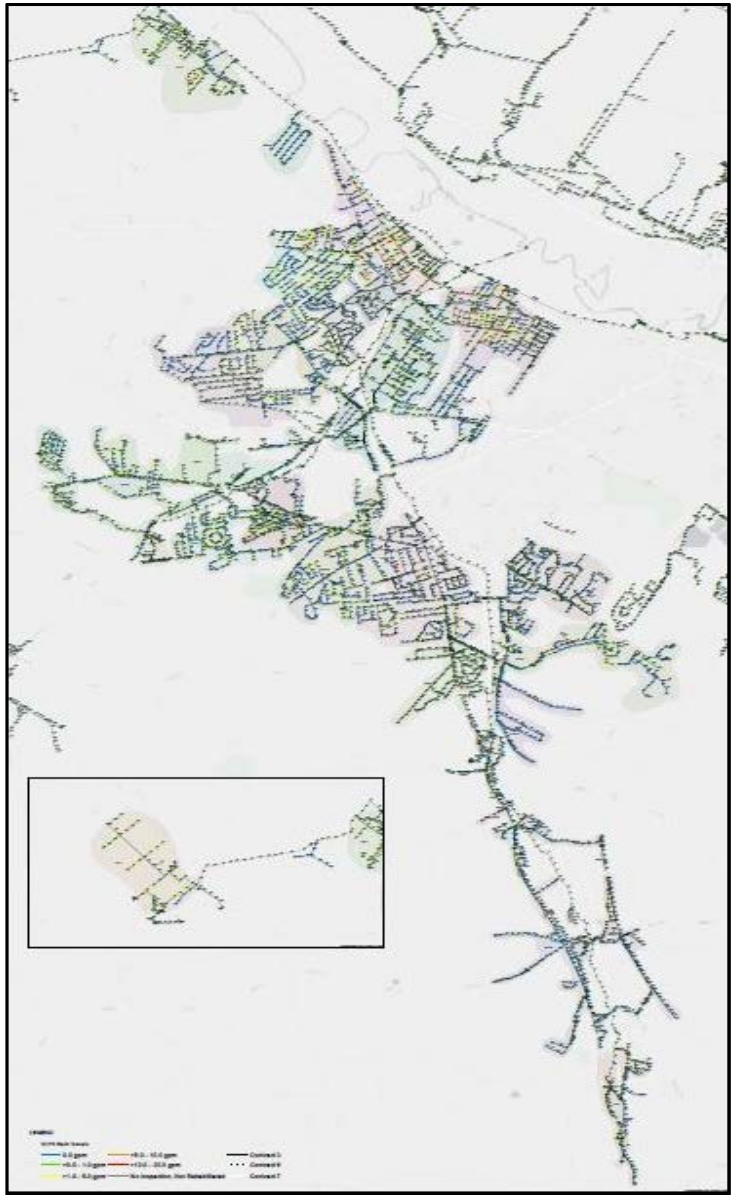


Basin w/ significant rehabilitation showing 1.0 MG RDII reduction



Basin w/ significant rehabilitation showing 1.5 MG RDII reduction

Conclusions



Recommendations for a Successful Program

- Good mapping
- Smallest practical basins
- Cellular data collection/communication
- Dense rain gauge network
- Flow data analysis
- Comprehensive Rehabilitation

Questions? Comments? Concerns?

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