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DEPARTMENT OF ENVIRONMENTAL PROTECTION

Bureau of Point and
Non Point Source Management

The Application and Utility of Continuous Instream Monitoring as Part of a Large River Assessment of the Susquehanna River, Pennsylvania

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National Water Quality Monitoring Conference

April 29th, 2014

Continuous Instream Monitoring (CIM)

3 Steps

1. Data collection

- Establish Objectives/Goals
- Site Selection
- Field Work

2. Data Management

- Corrections
- Grading
- Approval

3. Data Analysis/Reporting

- Criteria Exceedance Evaluations
- Frequency
- Duration

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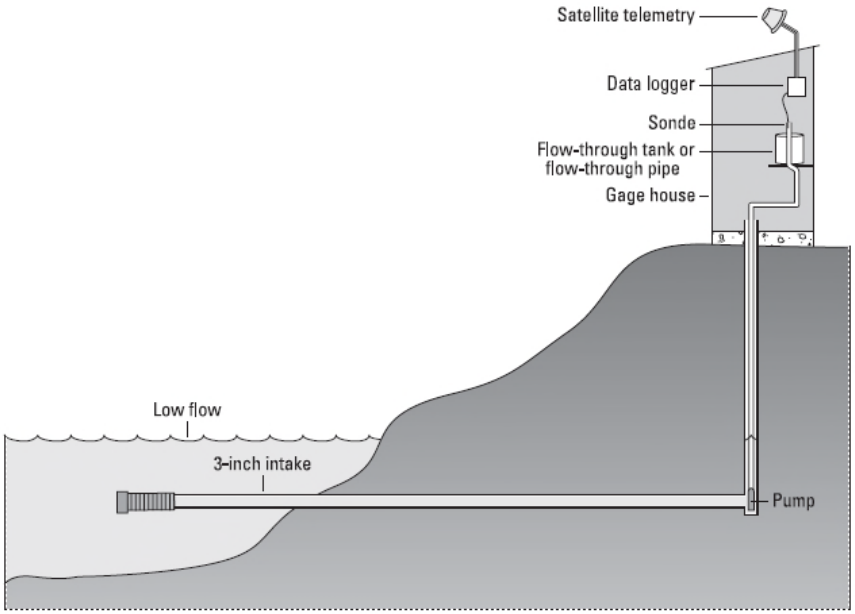
CIM (In a nutshell)

Realtime/Telemetry

Pros:
Provides data in realtime
Quickly respond to problems

Cons:
Costly
Fixed Station

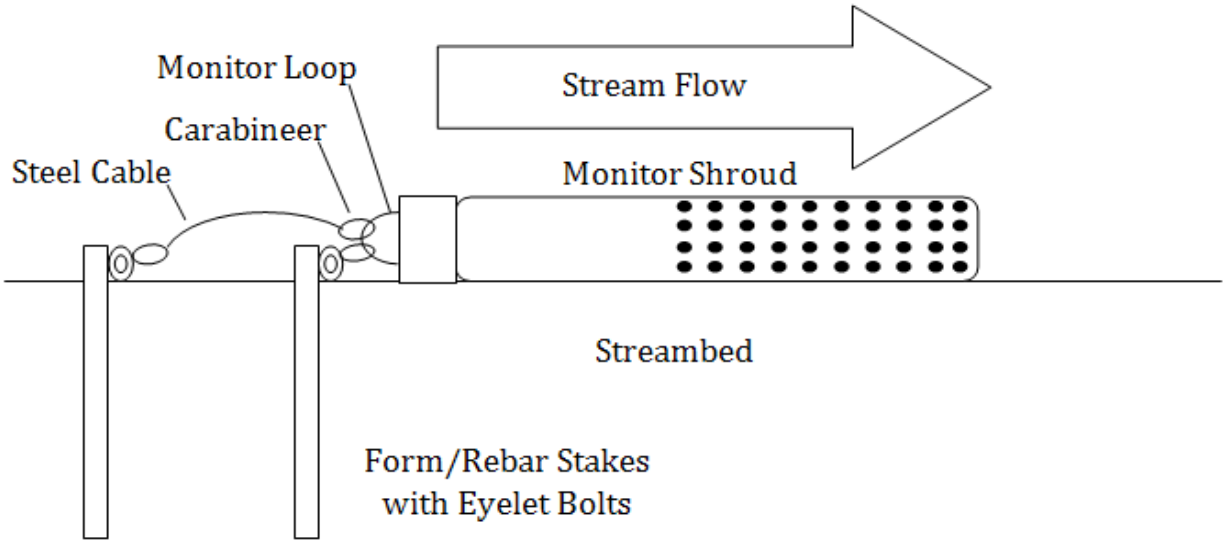


Standalone

Pros:
Reduced cost
Increased mobility

Cons:
No realtime data
Can’t respond to equipment/sensor issues

Basics of Deployment



Basics of Deployment

Site Selection

What's your study goal?

- Overall stream characterization
- Specific site description

Things to think about:

- Tributary influences
- Impoundments
- Bridges

Proper procedures:

- Office and field reconnaissance
- Transects

Site justifications:

- Cost
- Risks to Equipment
- Risks to personnel

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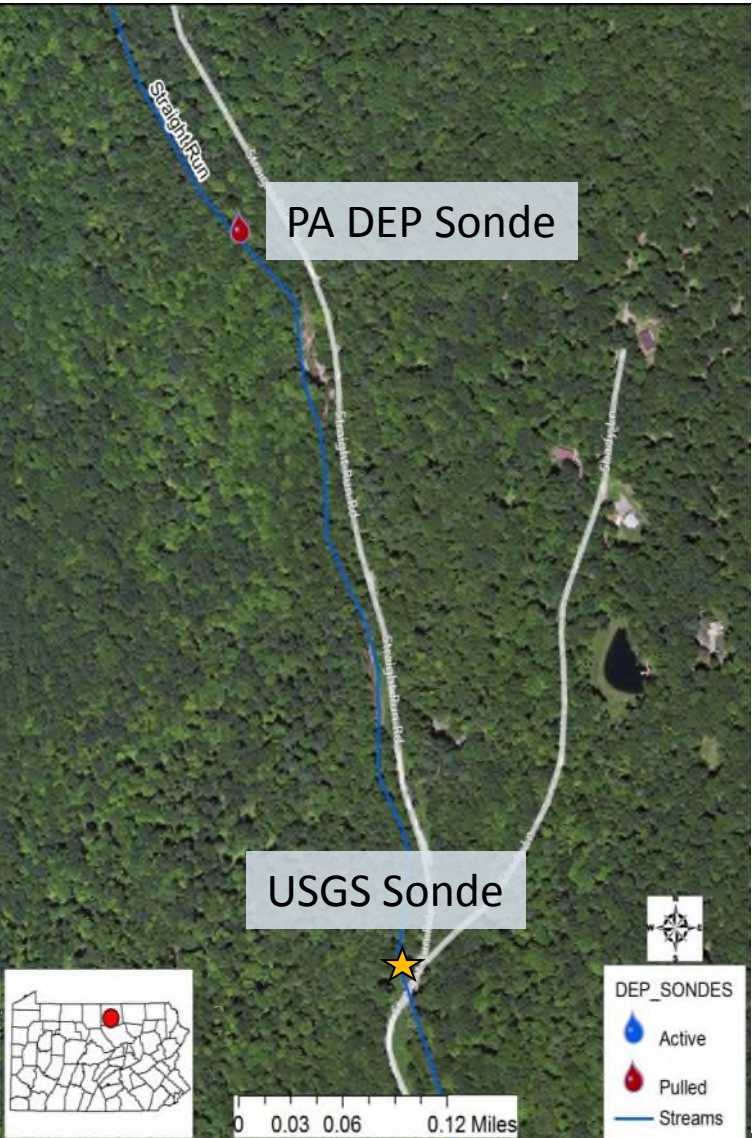
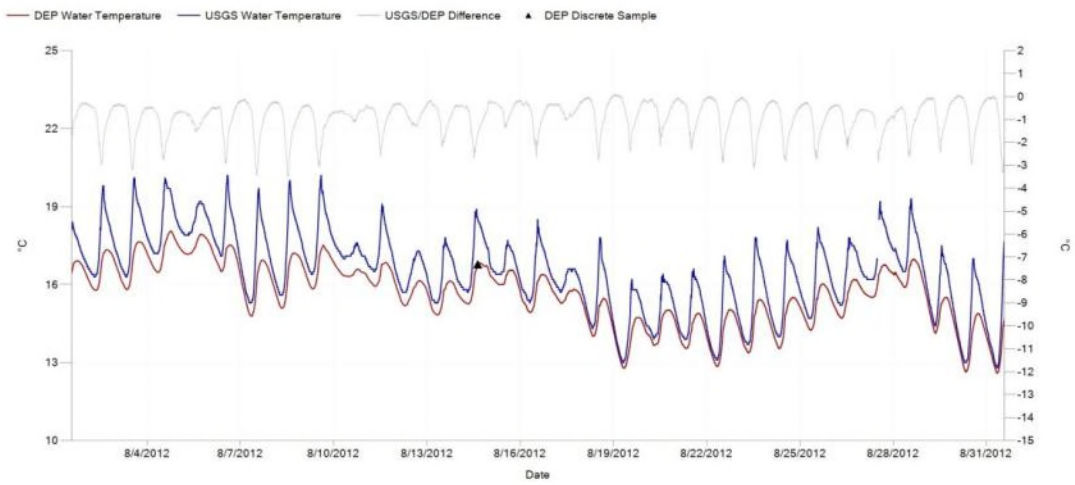
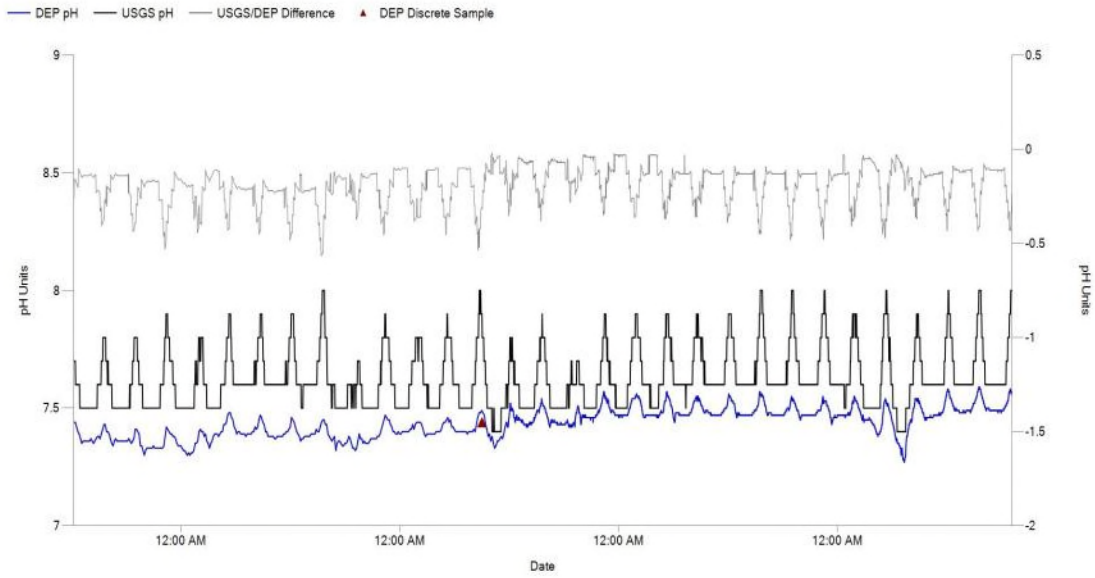
Importance of Site Selection

Site Selection Example



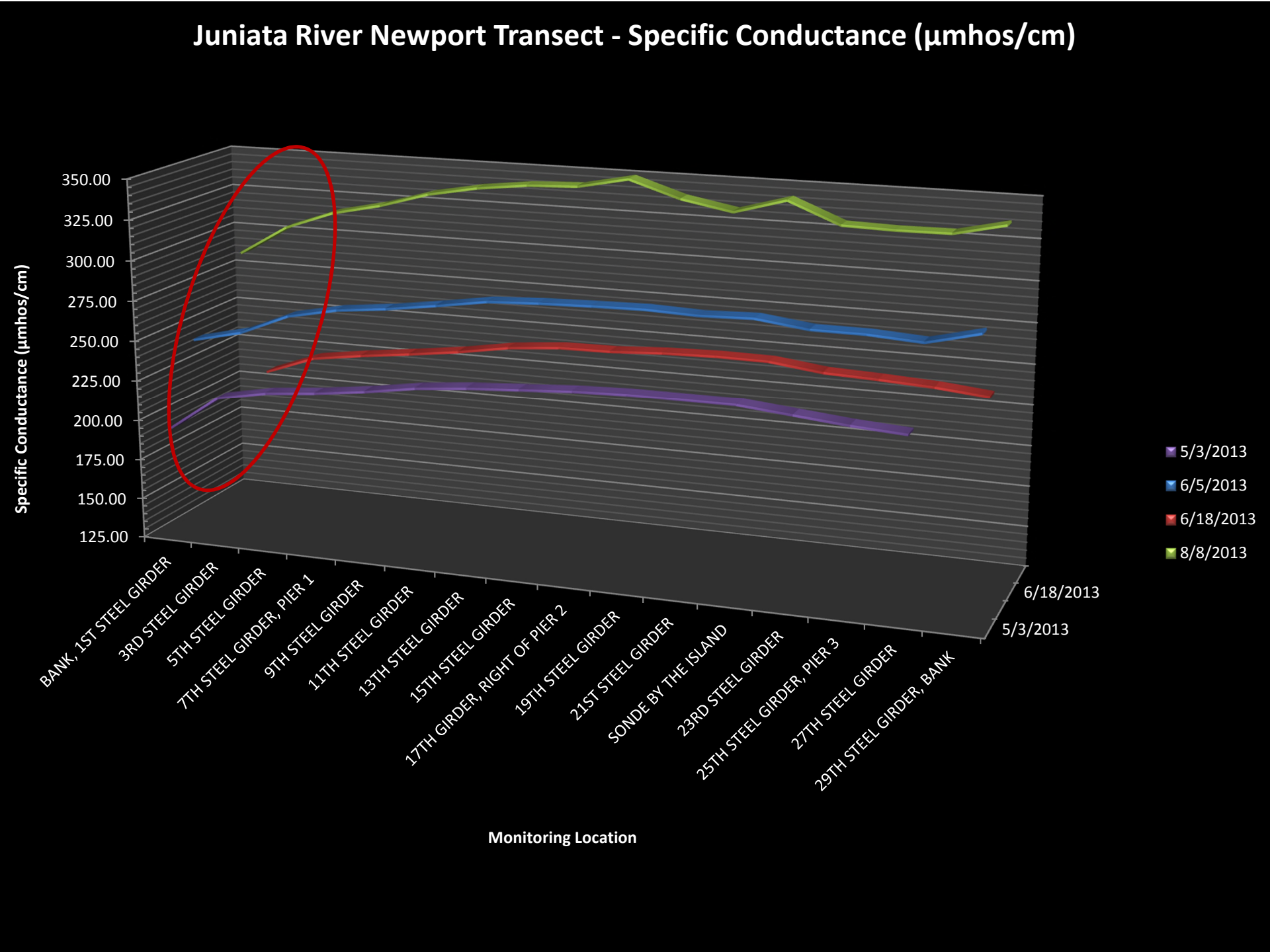




Importance of Site Selection

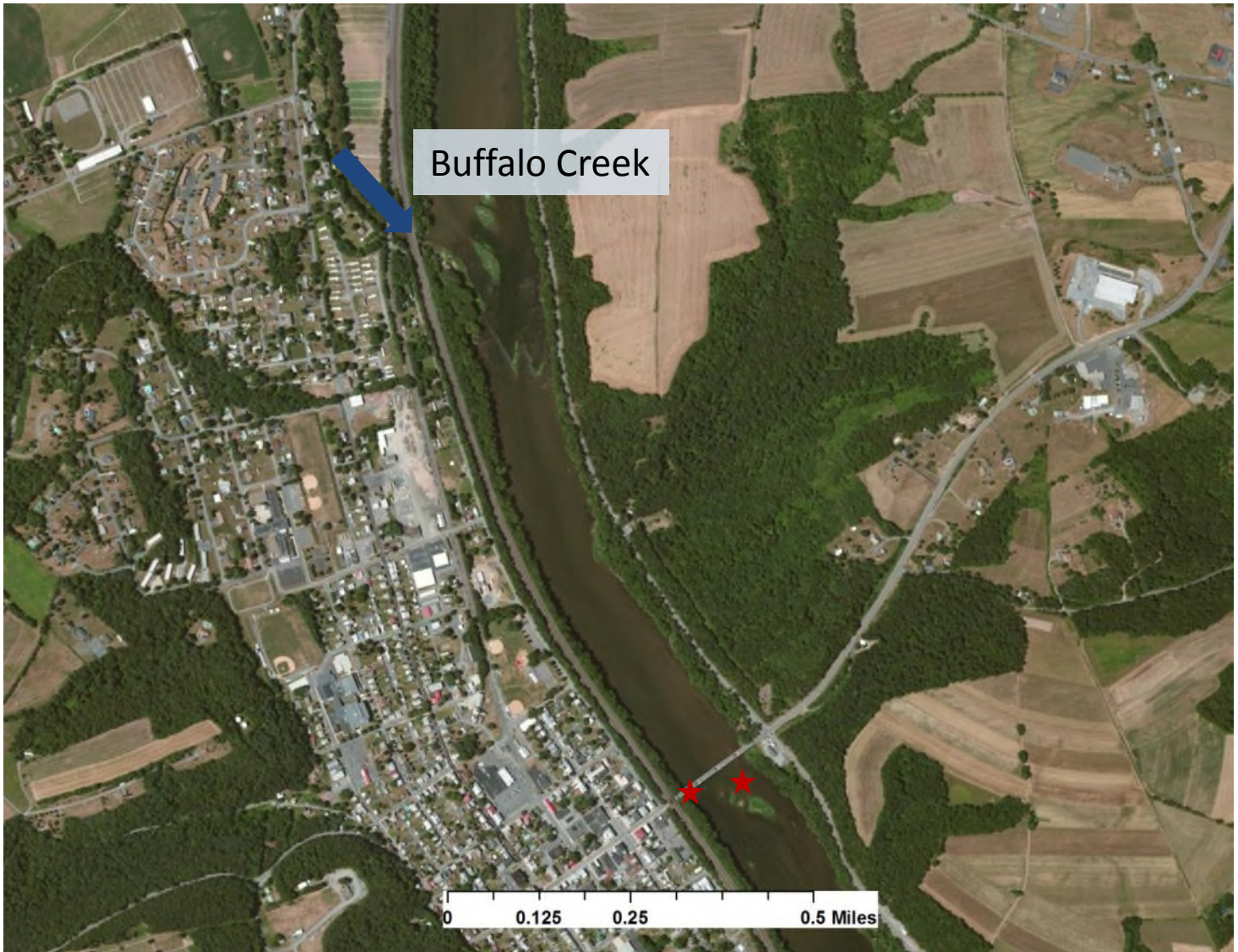
Juniata River Site

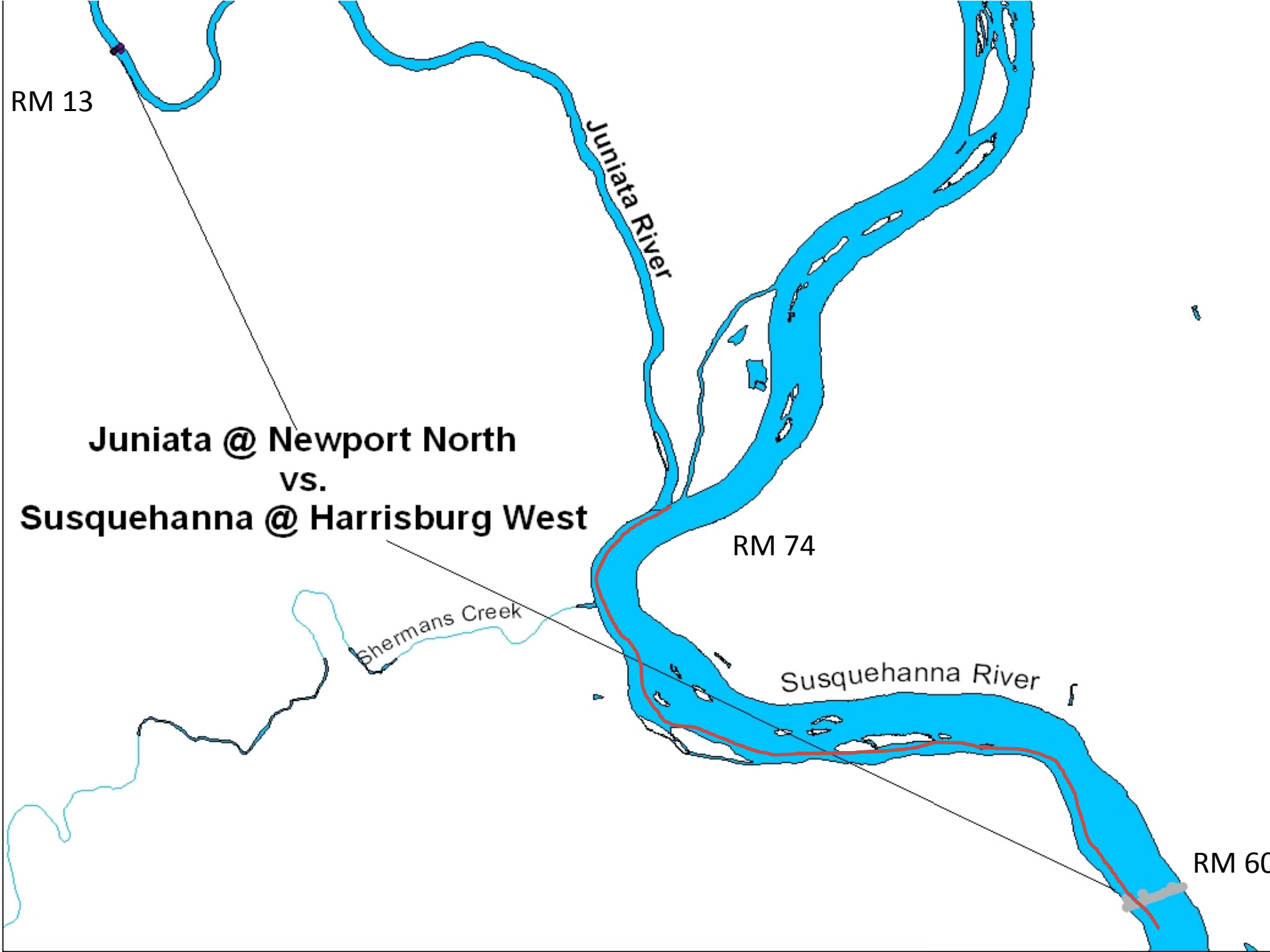
Juniata River Newport Transect - Specific Conductance (µmhos/cm)



Importance of Site Selection

Juniata River Site

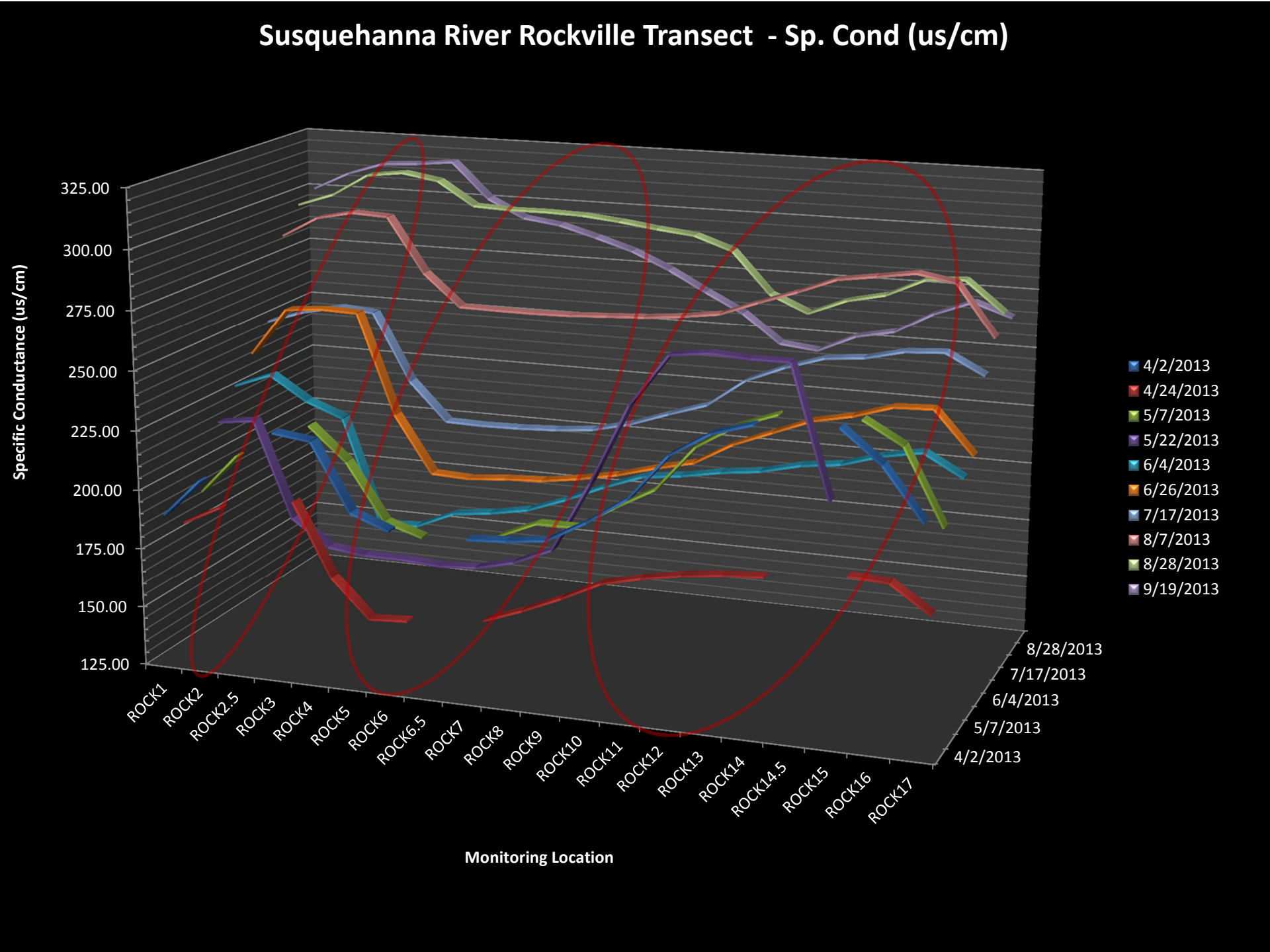



RM 13
Juniata River
Juniata @ Newport North
vs.
Susquehanna @ Harrisburg West
RM 74
Shermans Creek
Susquehanna River
RM 60

Susquehanna River

Site Selection Example

Susquehanna River Rockville Transect - Sp. Cond (us/cm)



Data Management

Calibration

Dissolved Oxygen

- Sodium Sulfite & Cobalt Chloride
- D.O. Chart

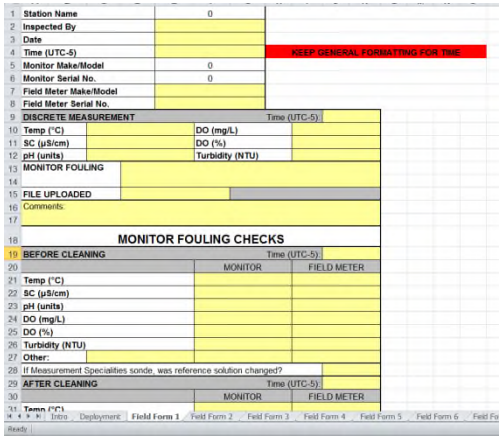
pH

- Calibrate at 7, 4 and 10

Specific Conductance

- Check at zero
- Check at 100
- Calibrate at 1000

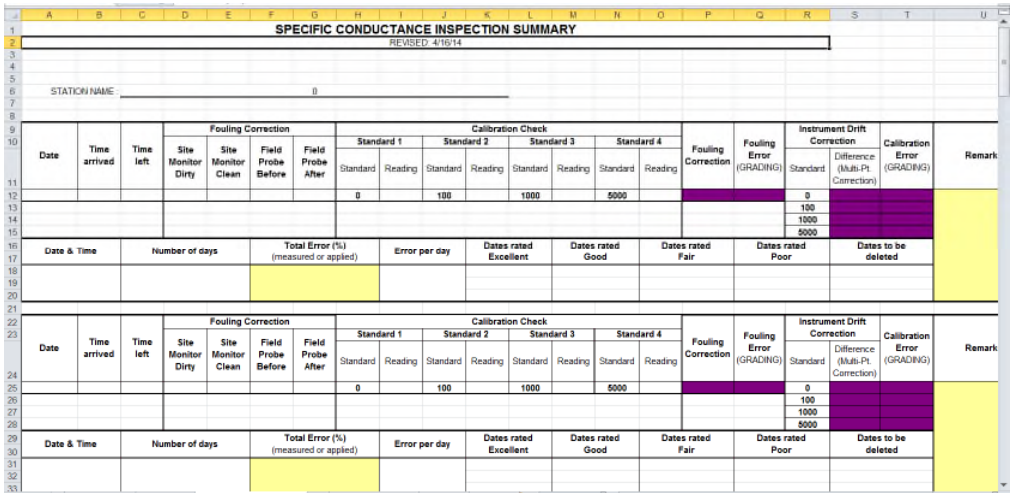
Field Forms



Station Name	0		
Inspected By			
Date			
Time (UTC-5)		KEEP GENERAL FORMATTING FOR TIME	
Monitor Make/Model	0		
Monitor Serial No.	0		
Field Meter Make/Model			
Field Meter Serial No.			
DISCRETE MEASUREMENT		Time (UTC-5)	
Temp (°C)		DO (mg/L)	
SC (µS/cm)		DO (%)	
pH (units)		Turbidity (NTU)	
MONITOR FOULING			
FILE UPLOADED			
Comments:			
MONITOR FOULING CHECKS			
BEFORE CLEANING		Time (UTC-5)	
		MONITOR	FIELD METER
Temp (°C)			
SC (µS/cm)			
pH (units)			
DO (mg/L)			
DO (%)			
Turbidity (NTU)			
Other:			
If Measurement Specialities sonde, was reference solution changed?			
AFTER CLEANING		Time (UTC-5)	
		MONITOR	FIELD METER
Temp (°C)			

Intro | Deployment | Field Form 1 | Field Form 2 | Field Form 3 | Field Form 4 | Field Form 5 | Field Form 6

Ready



SPECIFIC CONDUCTANCE INSPECTION SUMMARY

REVISED: 4/16/14

STATION NAME: 0

Date	Time arrived	Time left	Fouling Correction: Site Monitor Dirty	Site Monitor Clean	Field Probe Before	Field Probe After	Calibration Check: Standard 1	Reading	Standard 2	Reading	Standard 3	Reading	Standard 4	Reading	Fouling Correction	Fouling Error (GRADING)	Instrument Drift Correction: Standard	Difference (Multi-Pt. Correction)	Calibration Error (GRADING)	Remark
							0		100		1000		5000				0			
																	100			
																	1000			
																	5000			

Date & Time	Number of days	Total Error (%) (measured or applied)	Error per day	Dates rated Excellent	Dates rated Good	Dates rated Fair	Dates rated Poor	Dates to be deleted

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																	100			
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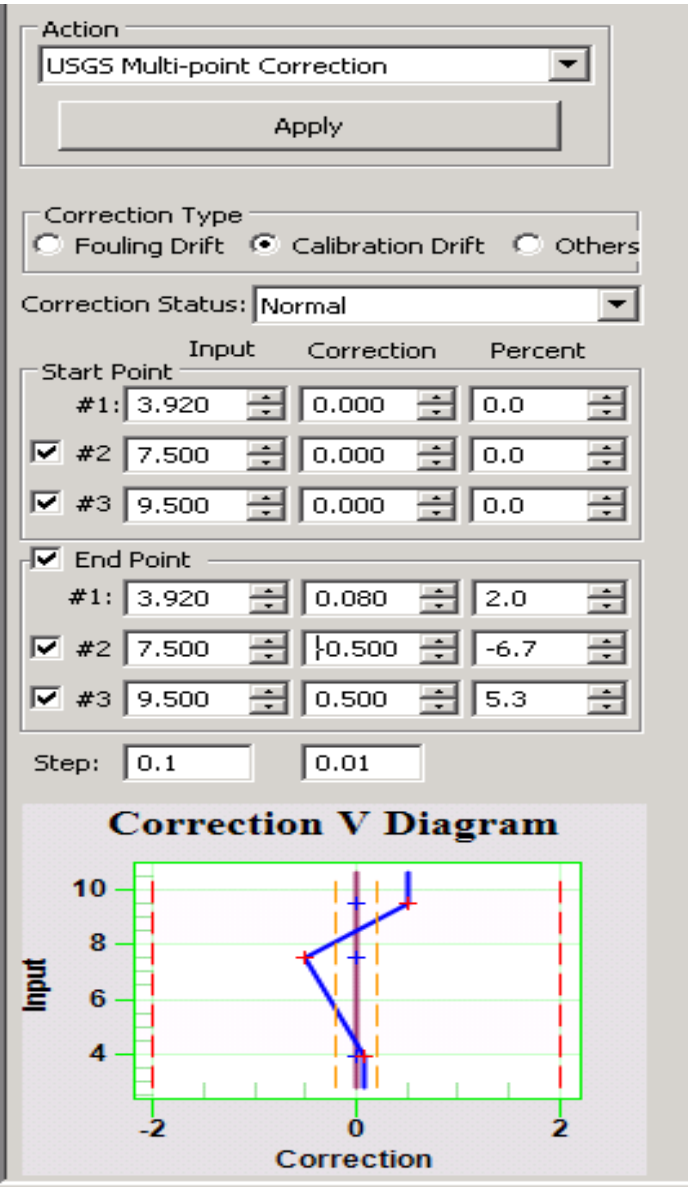
Data Management

Corrections



Multipoint Corrections

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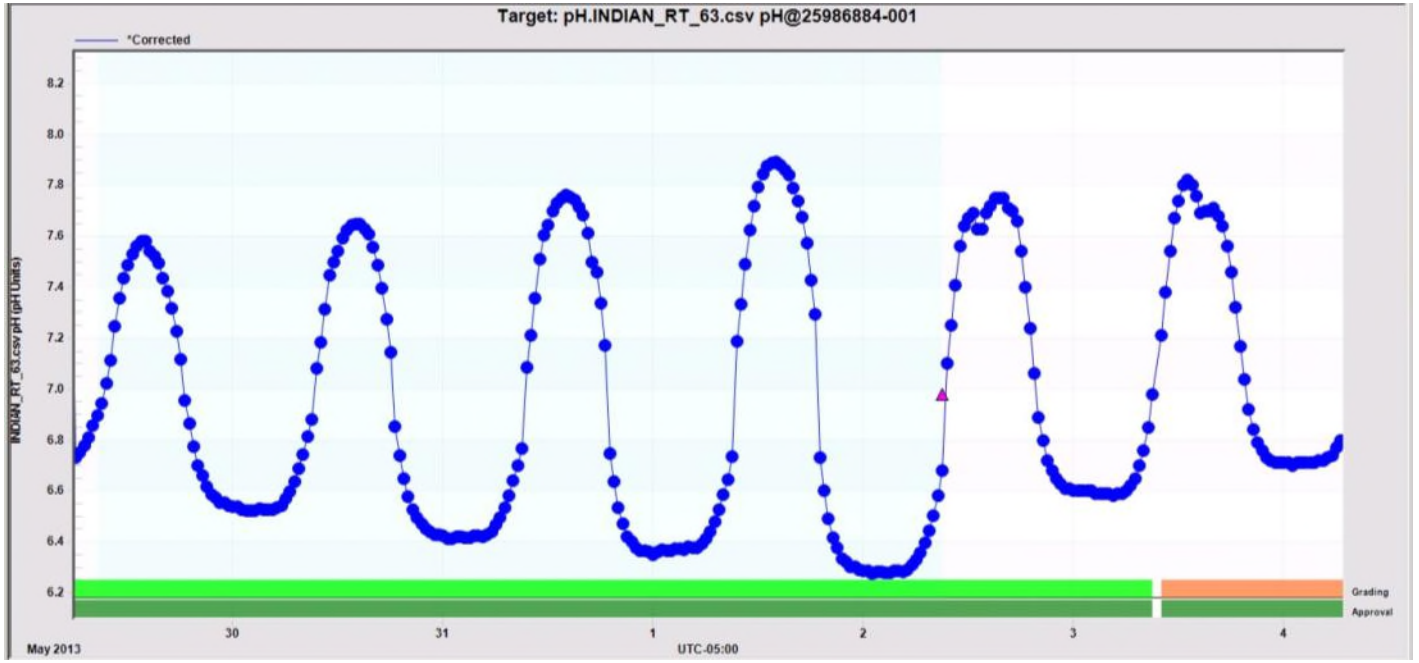
Corrections: Multipoint vs. Drift

Raw



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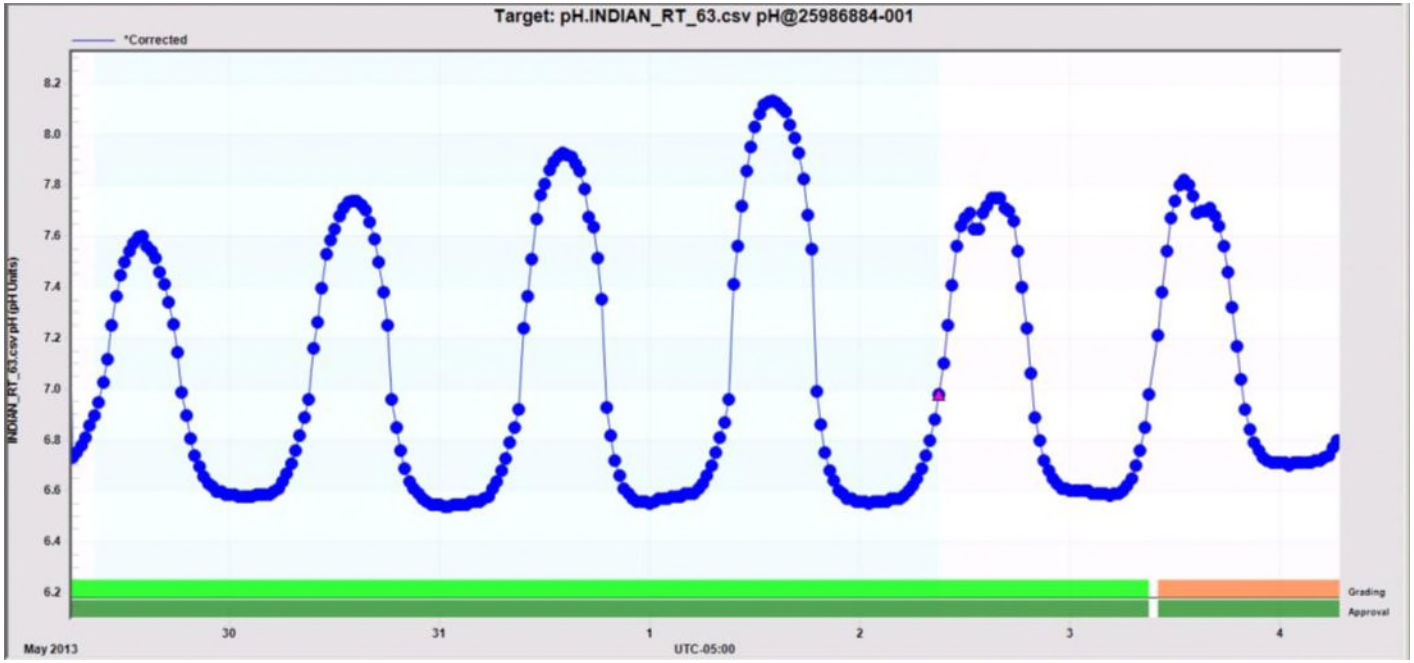
Corrections: Multipoint vs. Drift

Drift Correction



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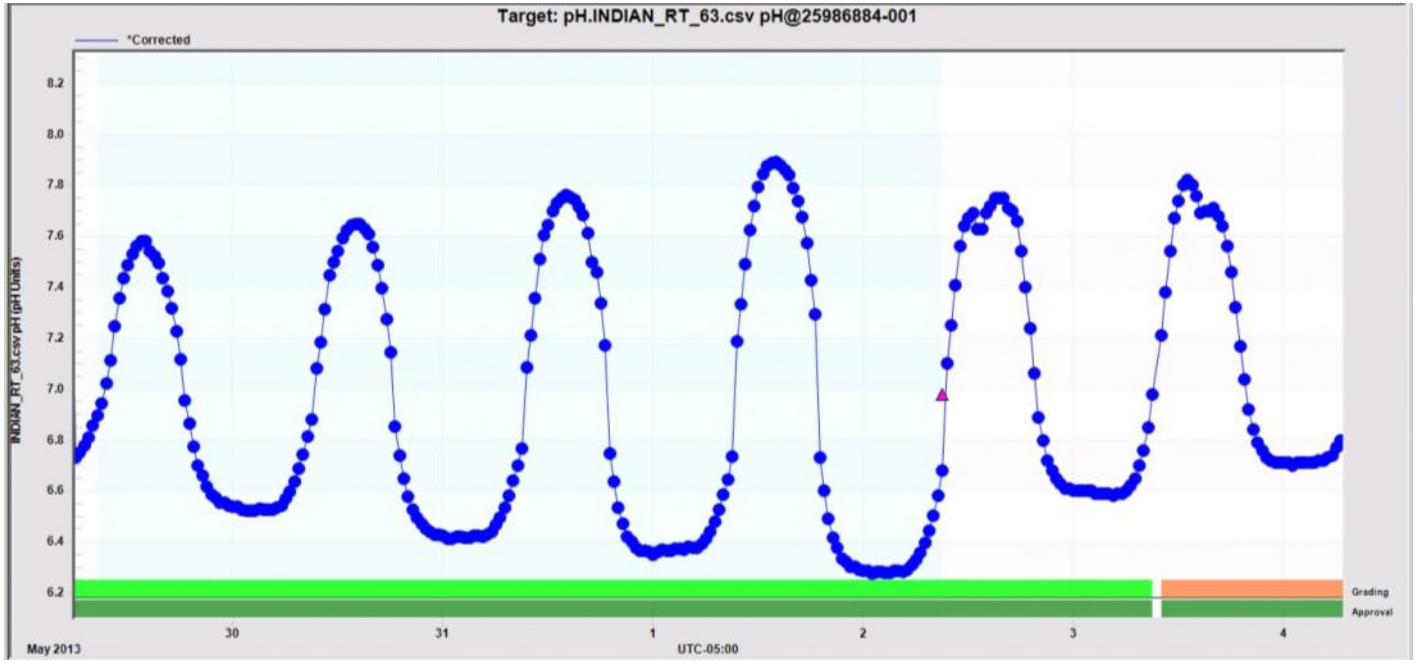
Corrections: Multipoint vs. Drift

Raw



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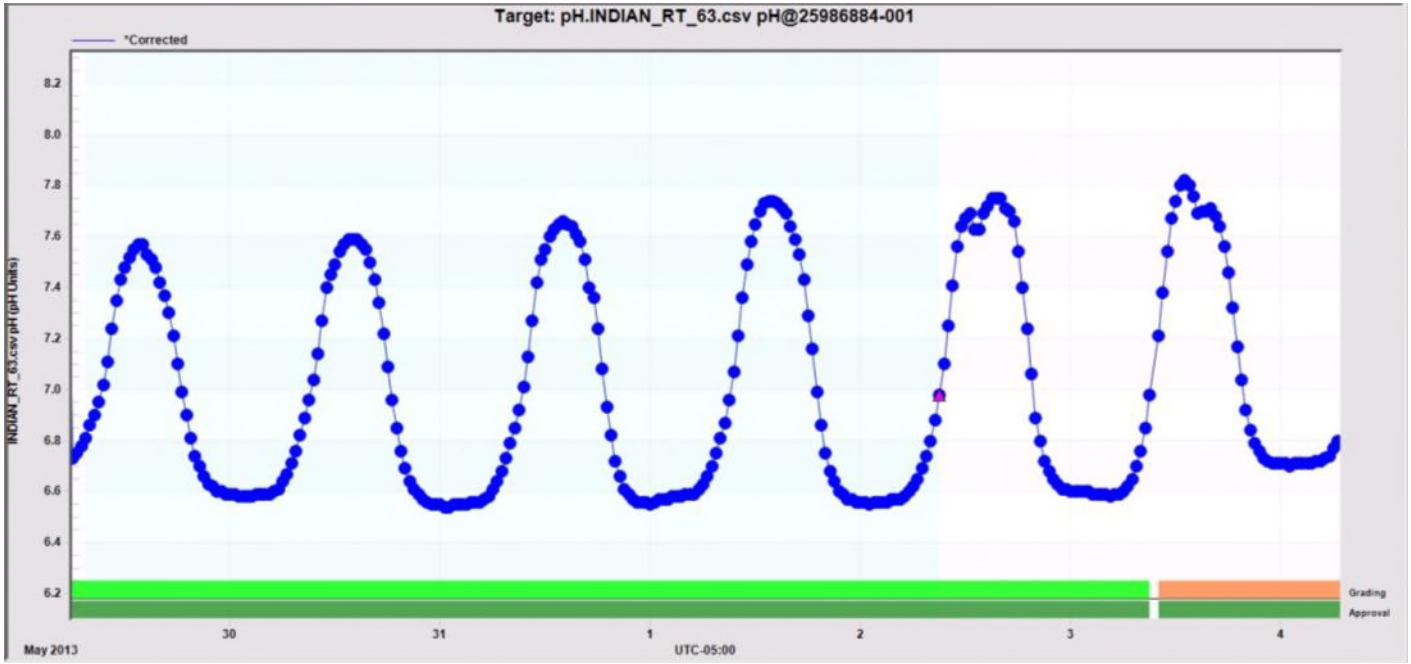
Corrections: Multipoint vs. Drift

Multipoint



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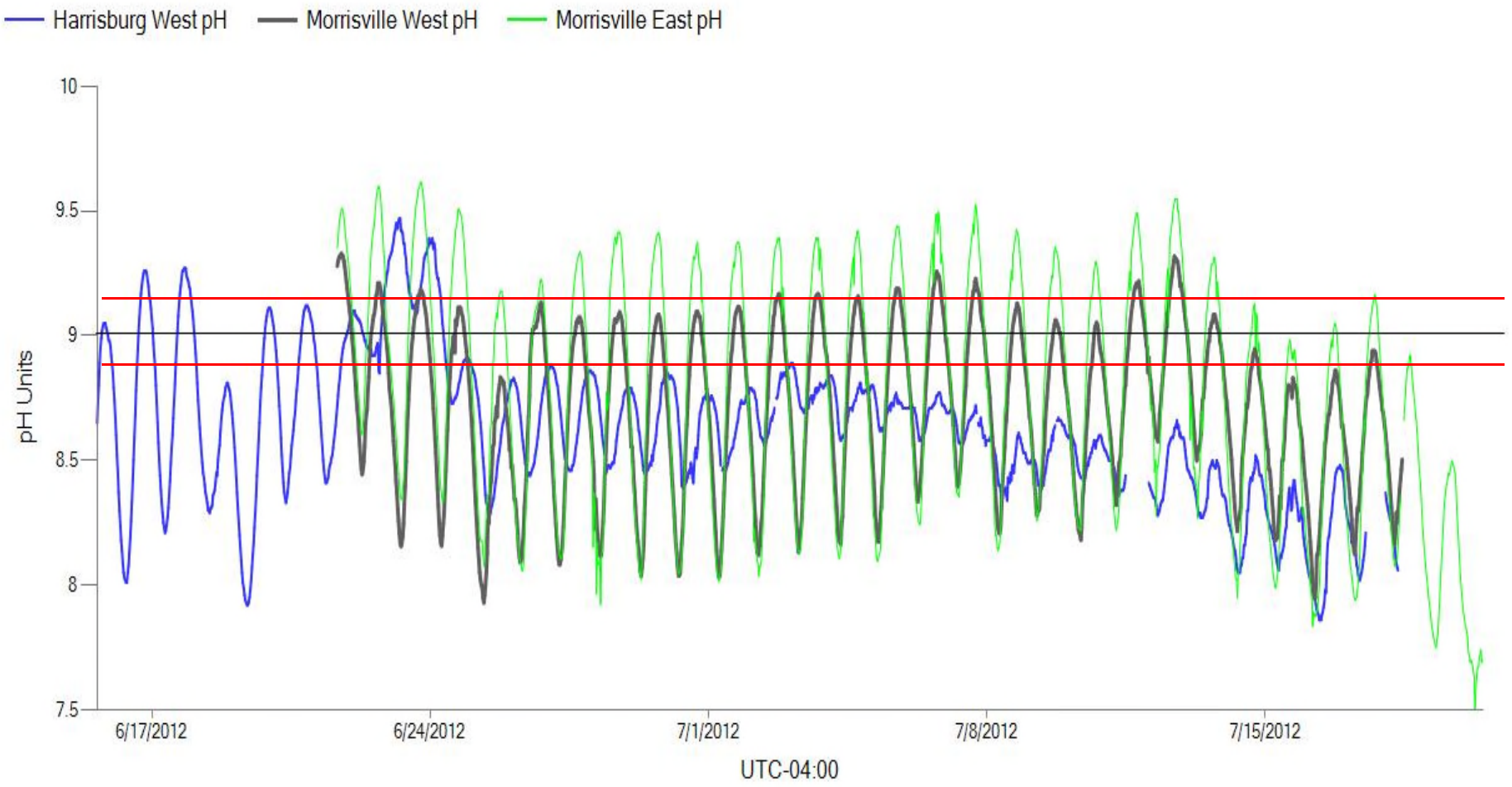
Results/Challenges

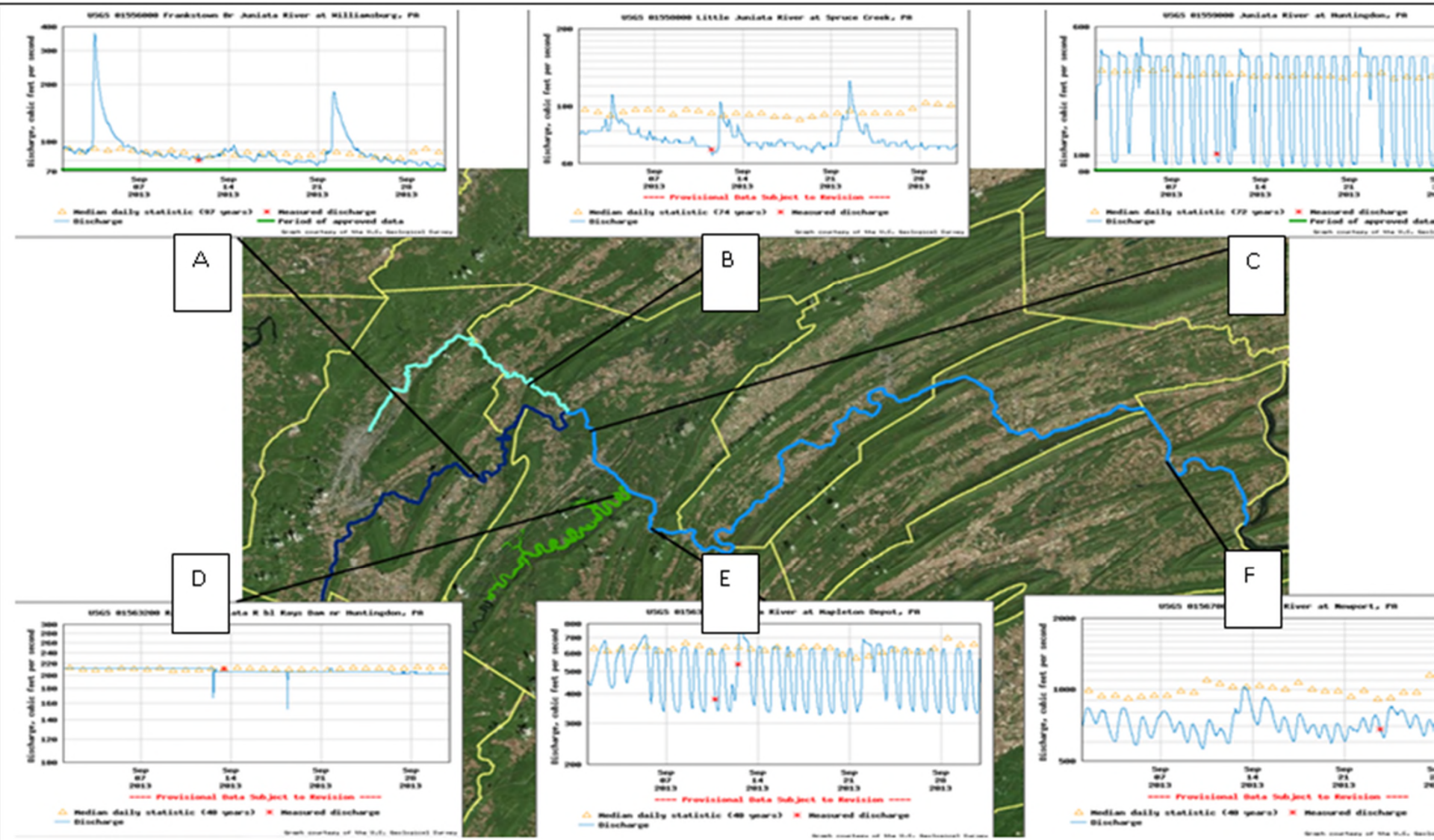
Example:

Sample Site 2012	Parameter	% Criteria Exceedance
Delaware East	pH	1.81
Delaware West	pH	0.23
Susquehanna Harrisburg West	pH	0.36

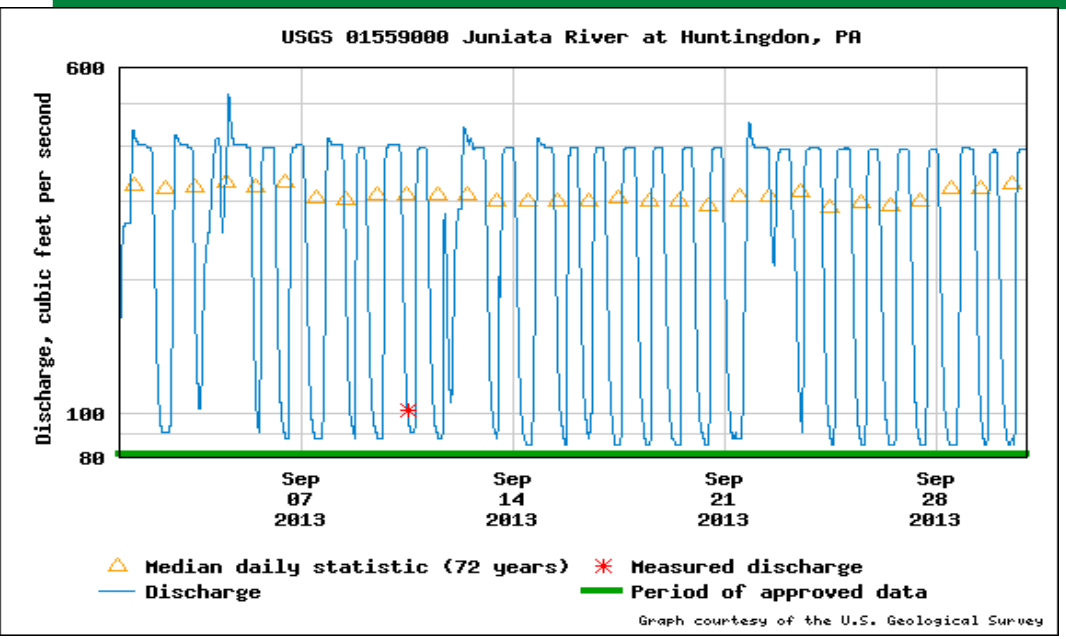


Results/Challenges

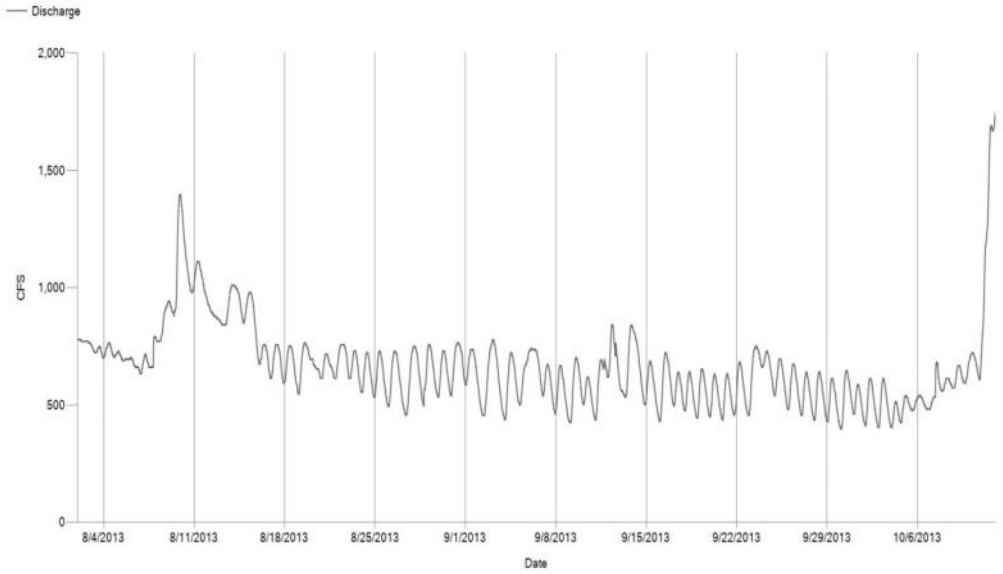
Juniata River @ Lewistown



Results/Challenges



Warrior Ridge Dam



Juniata River @ Lewistown

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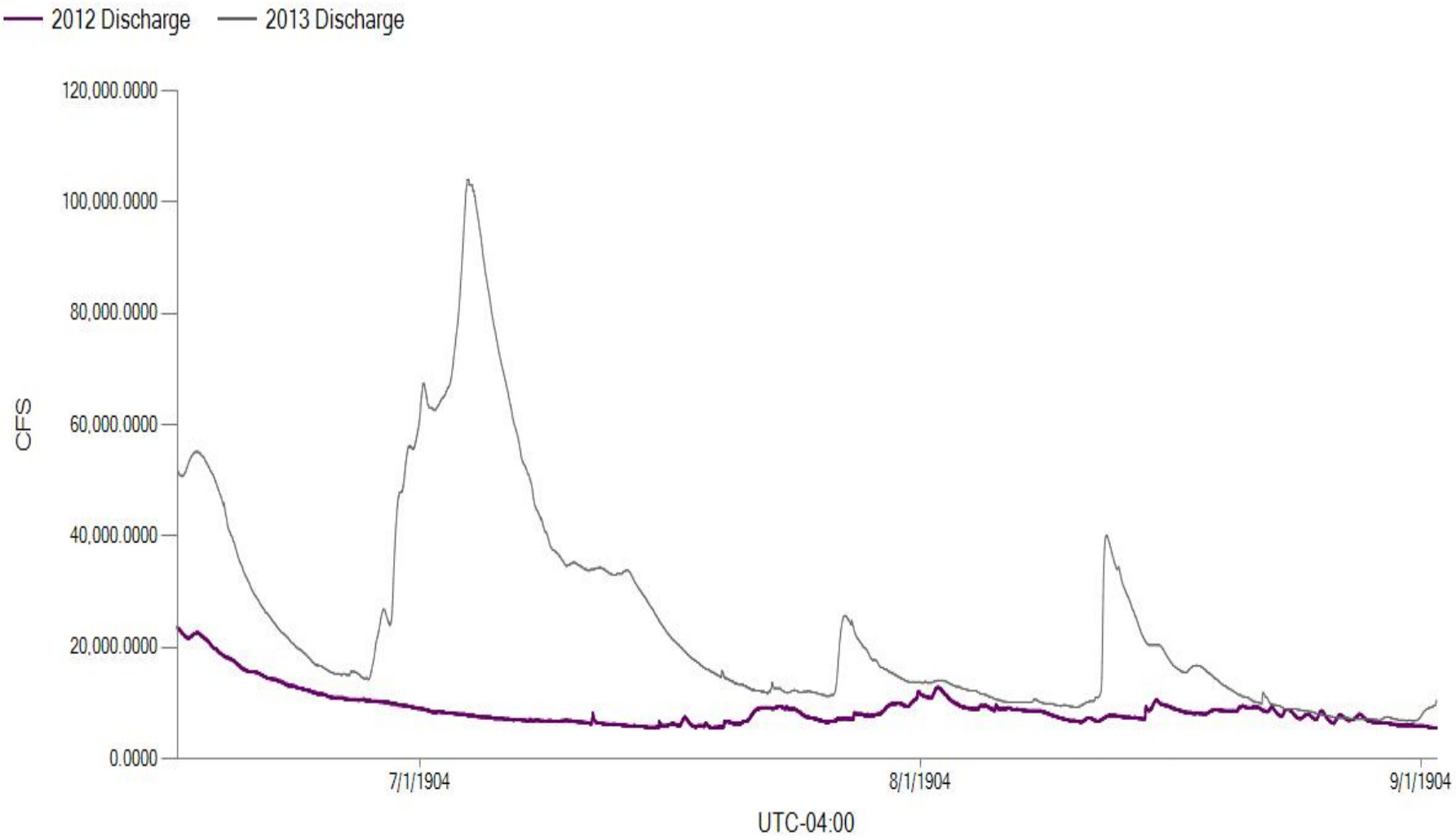
Results/Challenges

Discharge at Harrisburg 2012 vs. 2013



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Questions?