

High Frequency Monitoring and the Effects of Agricultural Water Withdrawal in the Savannah and Ogeechee River Basins

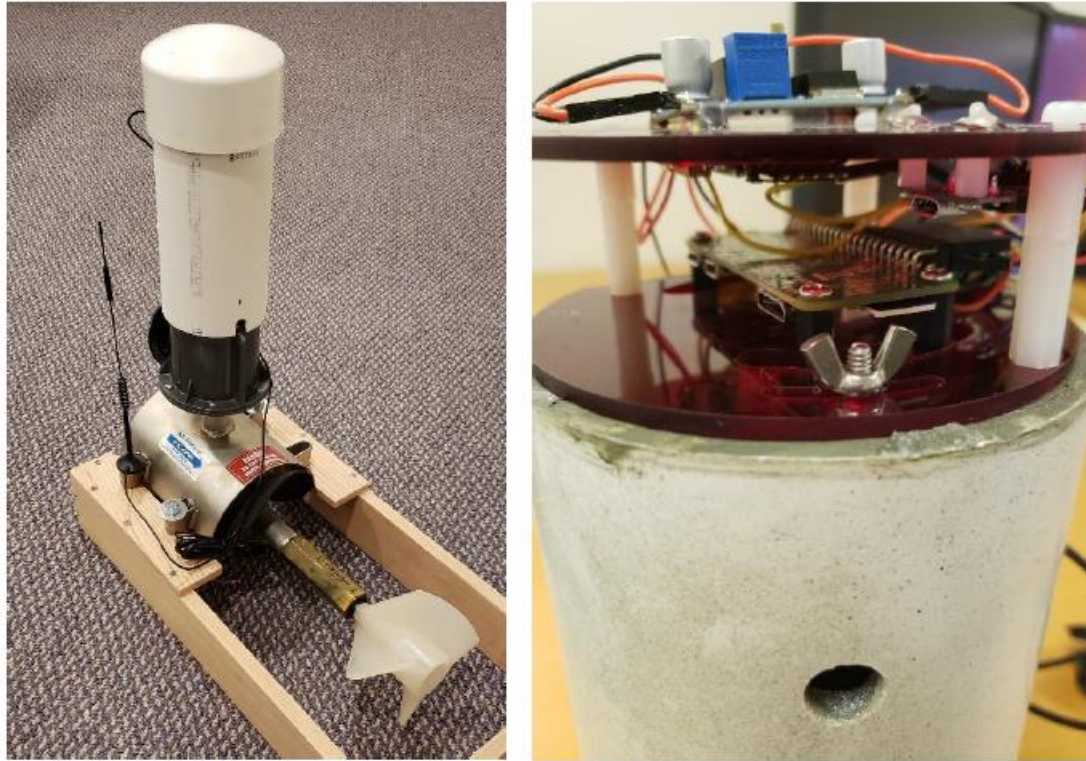


Figure 1. Janus agricultural meter reader developed by Janus Research, LLC.

Two-fold project goals

- Improve technology for reading meters
- Determine impact of pumping on groundwater/surface water systems

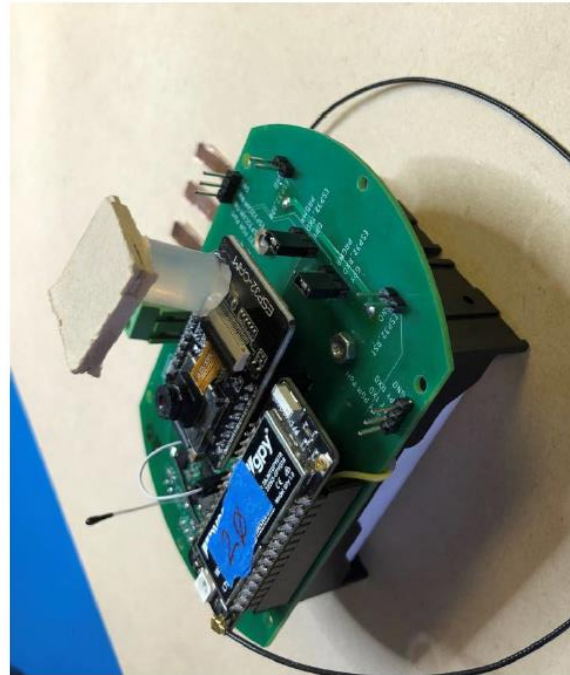


Figure 2 - Updated Antenna design

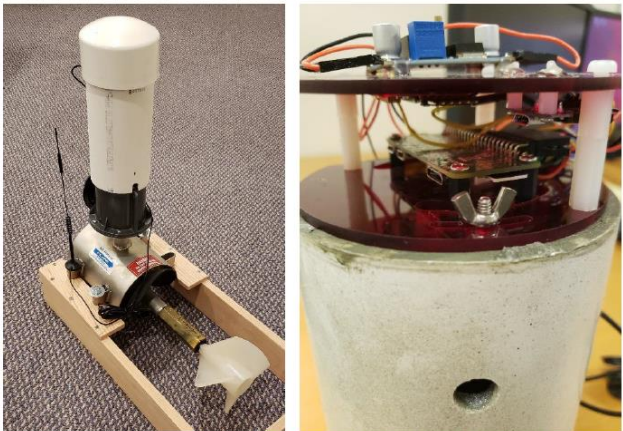


Figure 1. Janus agricultural meter reader developed by Janus Research, LLC.

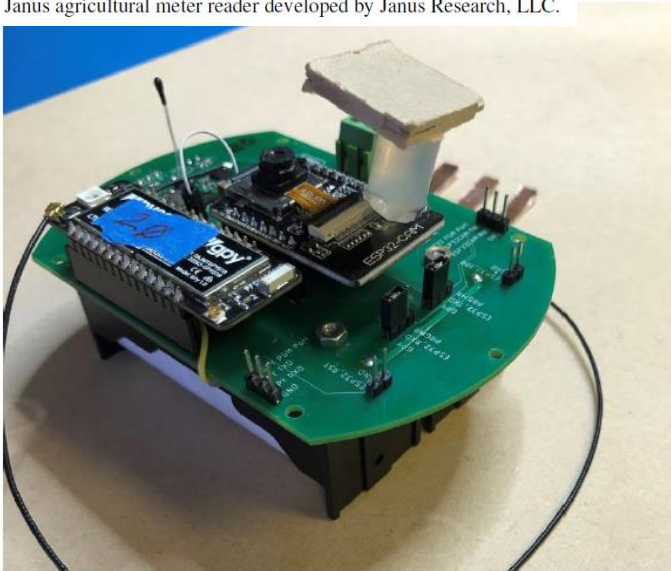


Figure 1 – Meter Imaging System v1.0 June 11th 2021

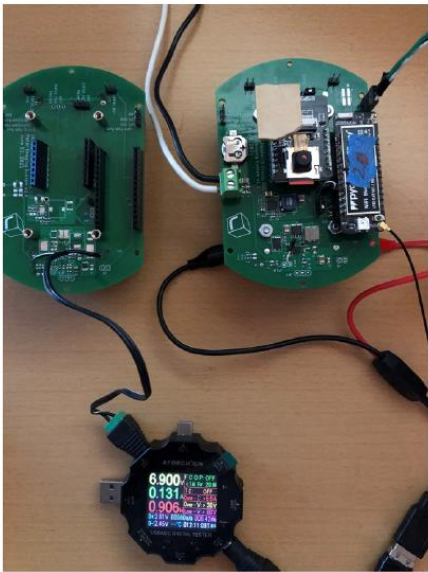


Figure 1 – Meter Imaging System Power Consumption Test



Figure 2 – Fielded Unit

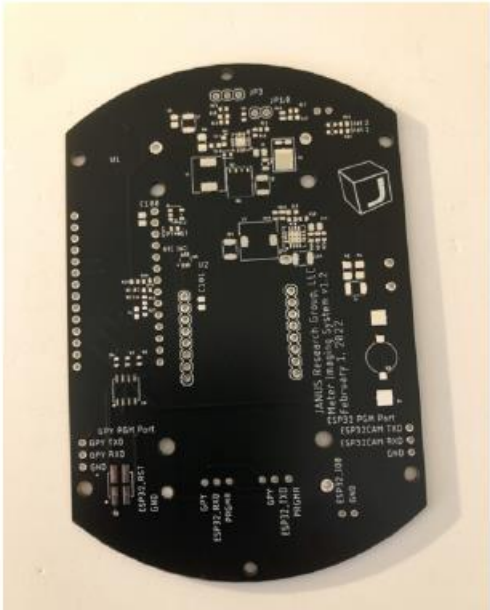


Figure 2 - Updated Antenna design

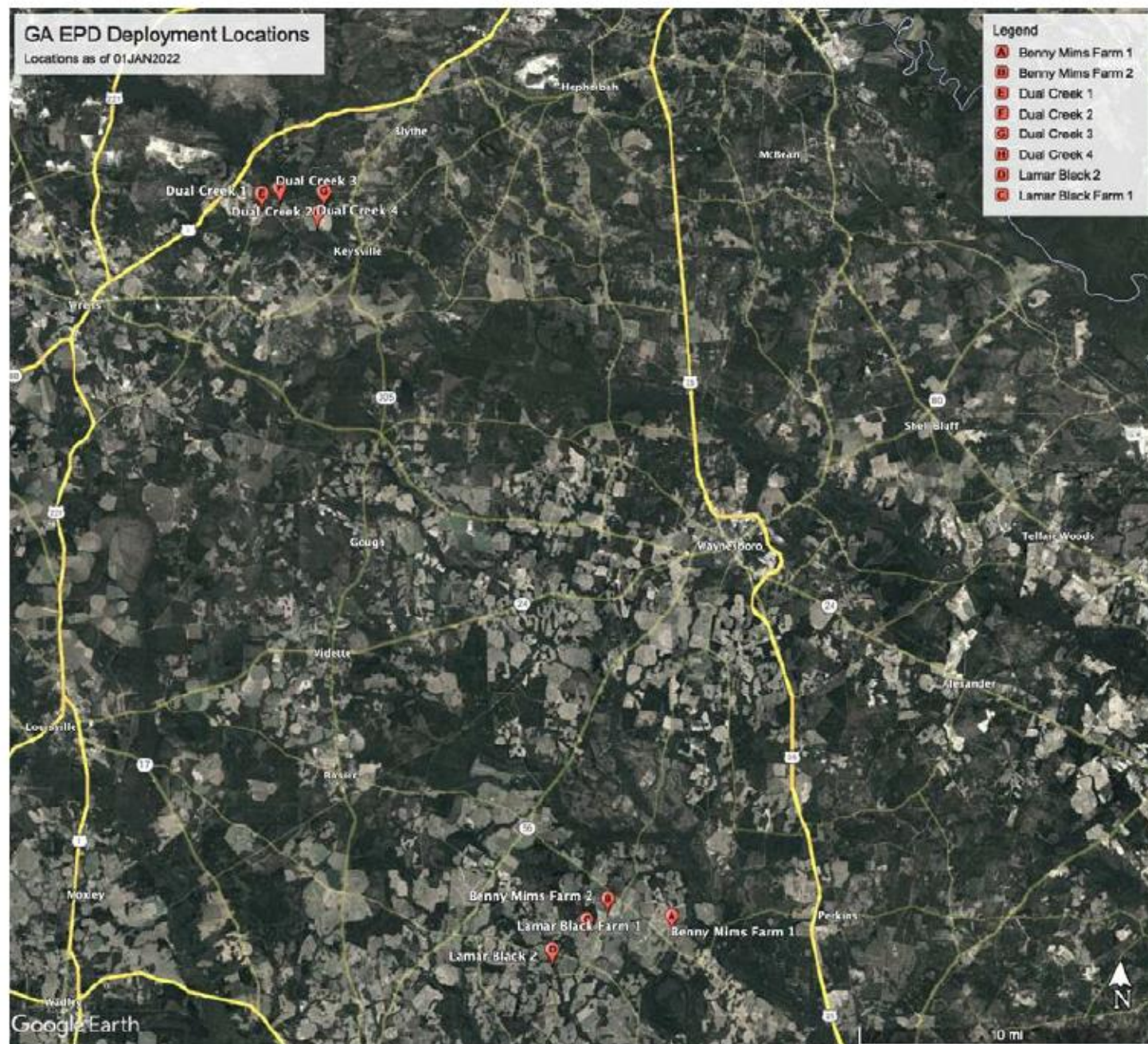


Figure 3 – Deployed unit locations



JRG-35

Installed @: Benny Mims Farm

Location: 32.899799,-82.050391



JRG-32

Installed @: Dual Creek Farm

Location: 33.252622,-82.288983



JRG-30

Installed @: Dual Creek Farm

Location: 33.253512,-82.25238



JRG-36

Installed @: Benny Mims Farm

Location: 32.908292,-82.087579



JRG-33

Installed @: Dual Creek Farm

Location: 33.255249,-82.27827

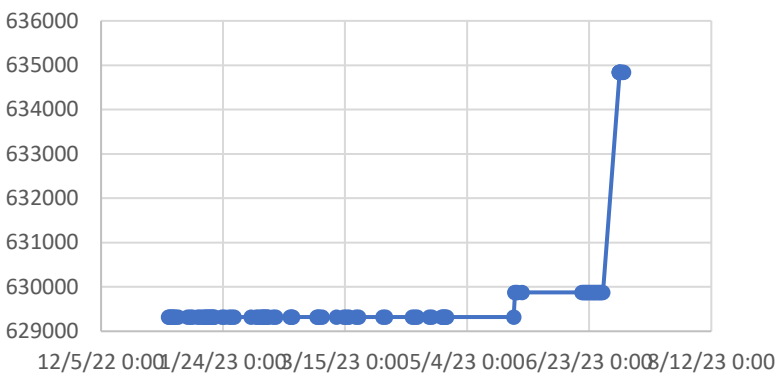


JRG-31

Installed @: Dual Creek Farm

Location: 33.243212,-82.256411

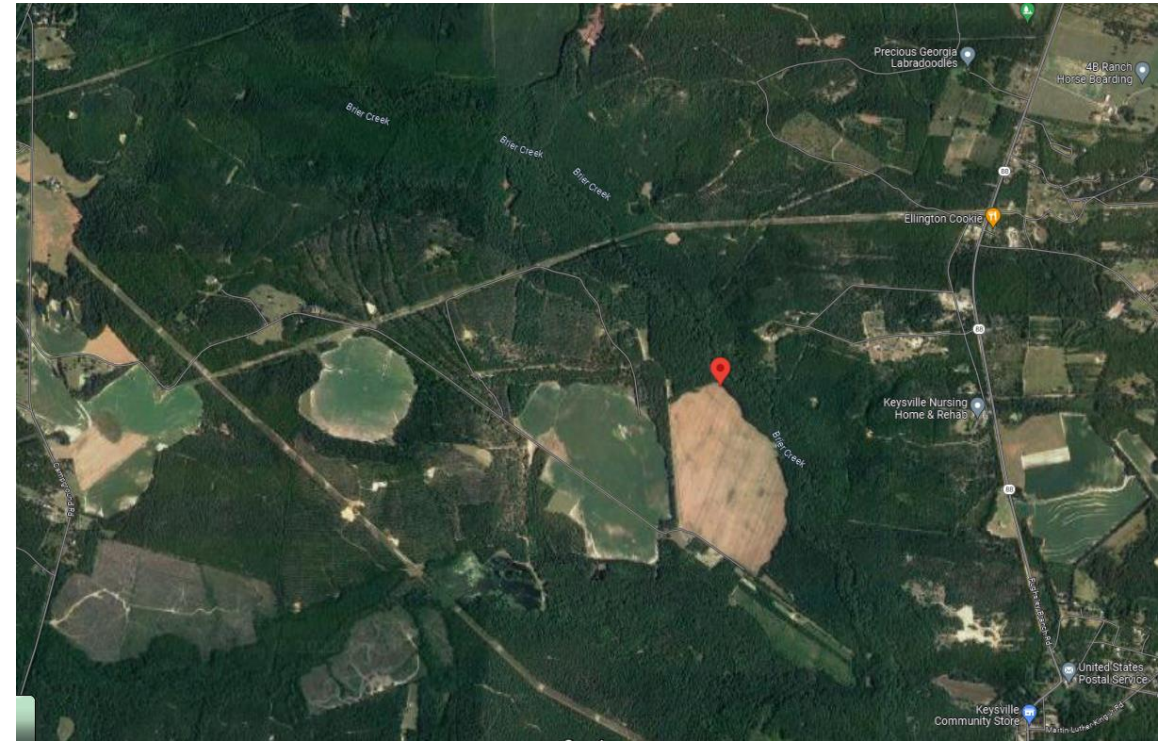
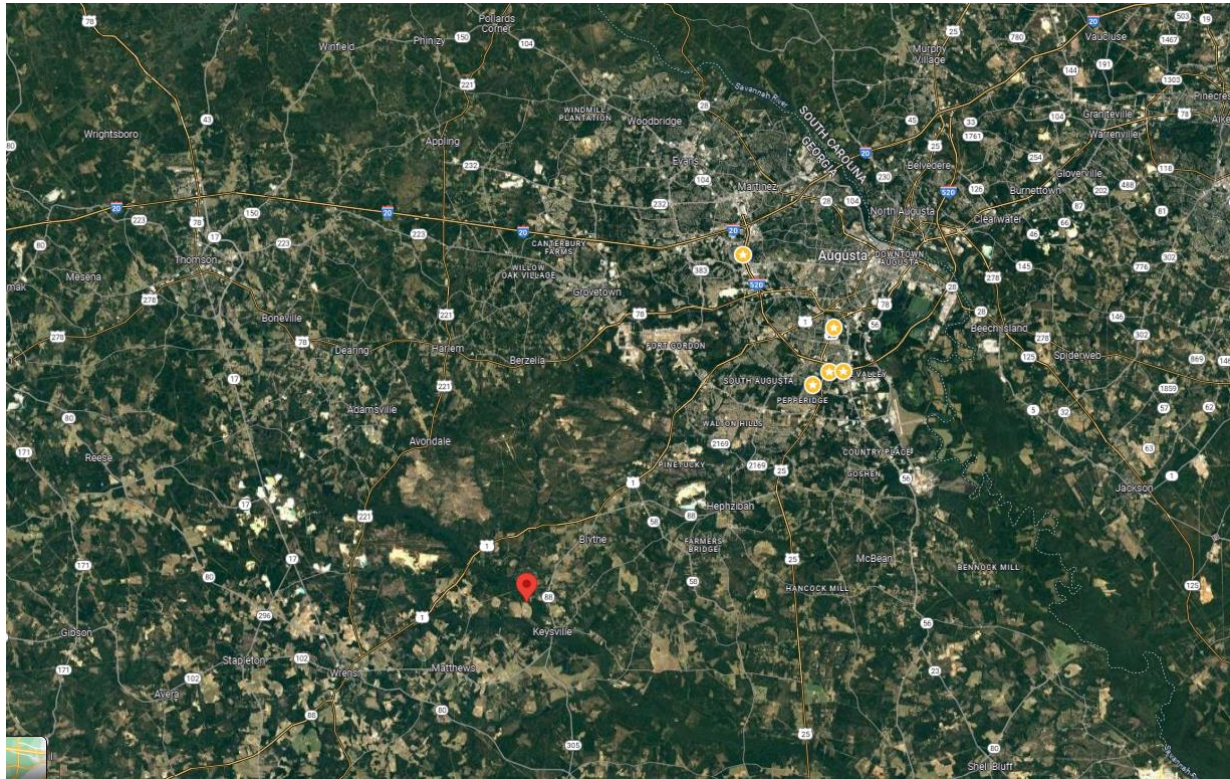
Chart Title



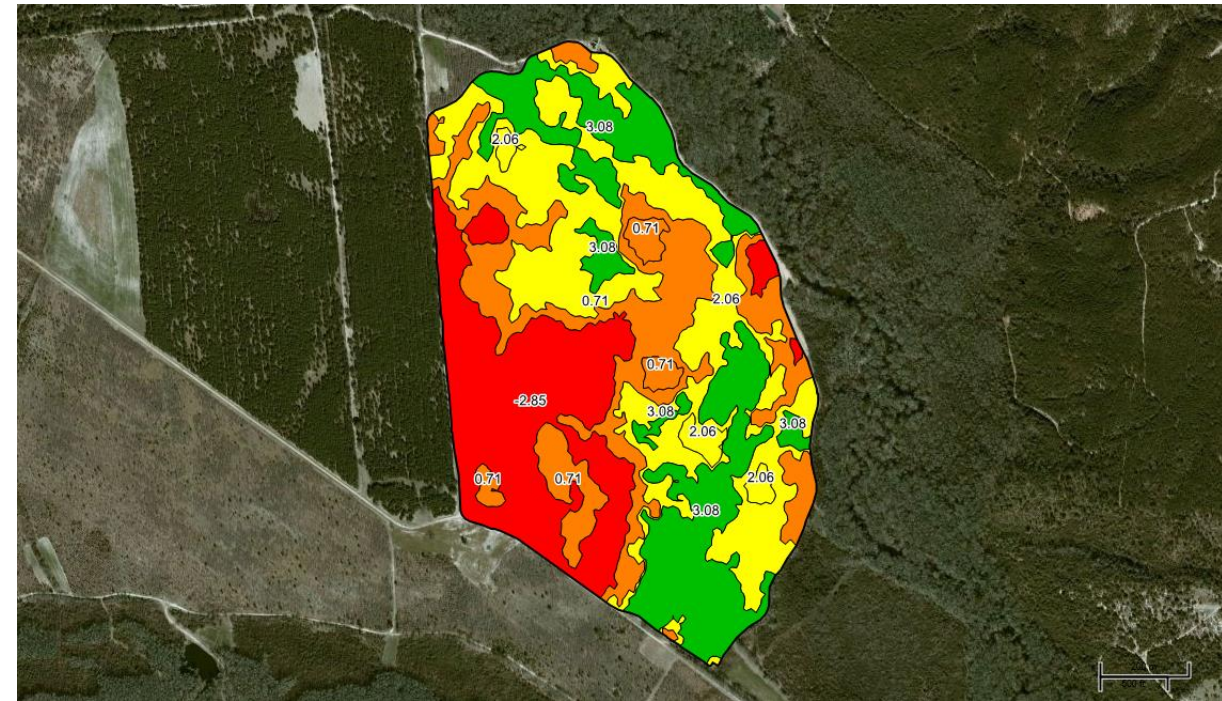
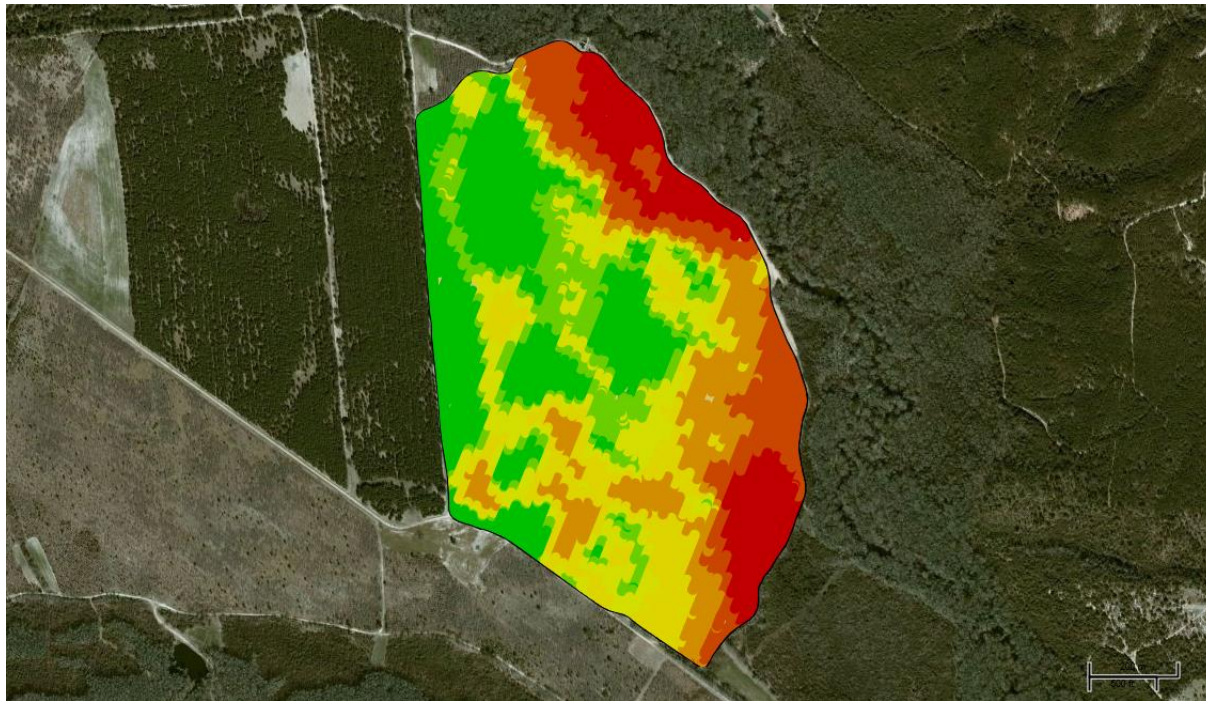
Challenges for project development

- Connectivity
 - Cell-based
 - Radio-based
- Power
- AI training
- Willing farmers

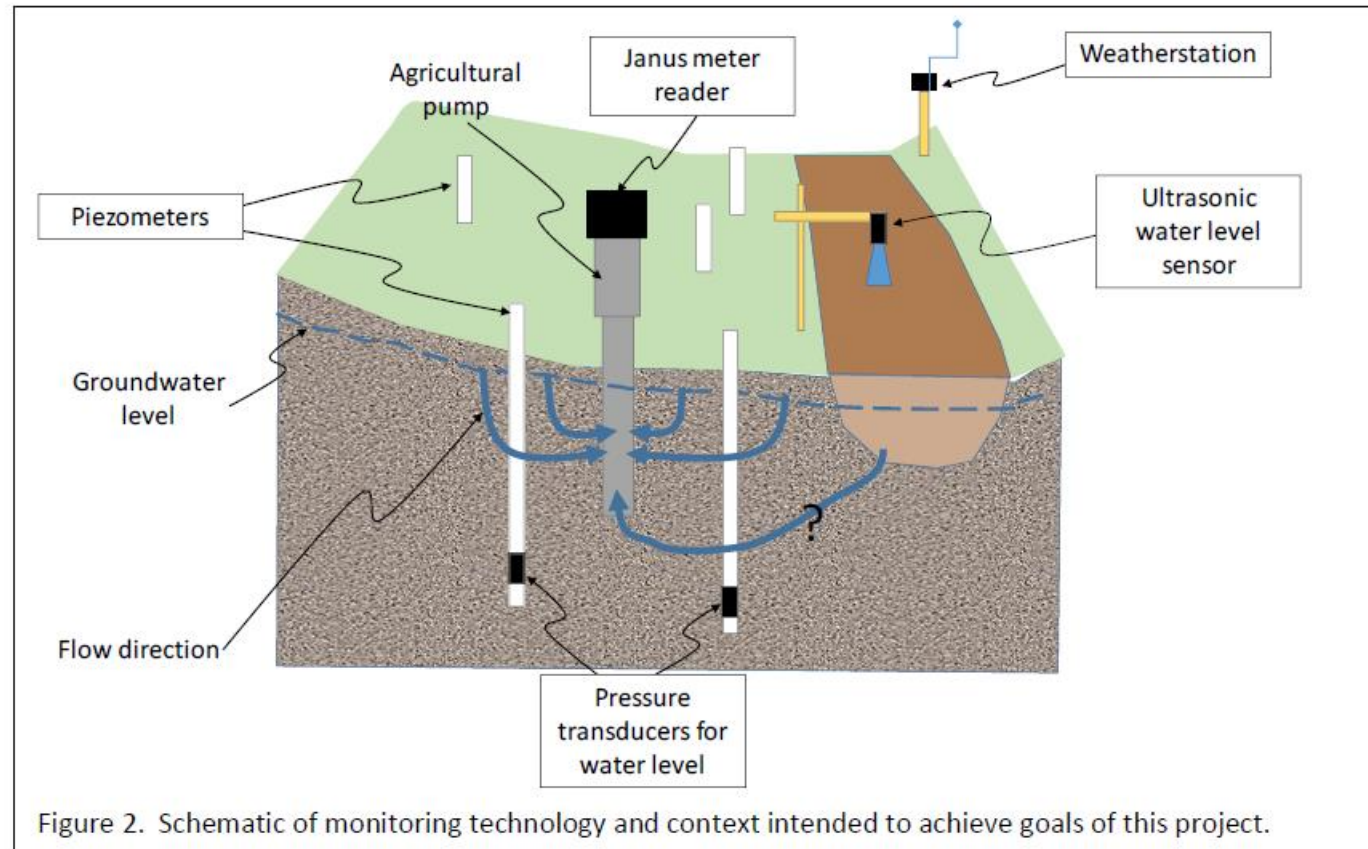
Study site in Keysville, GA

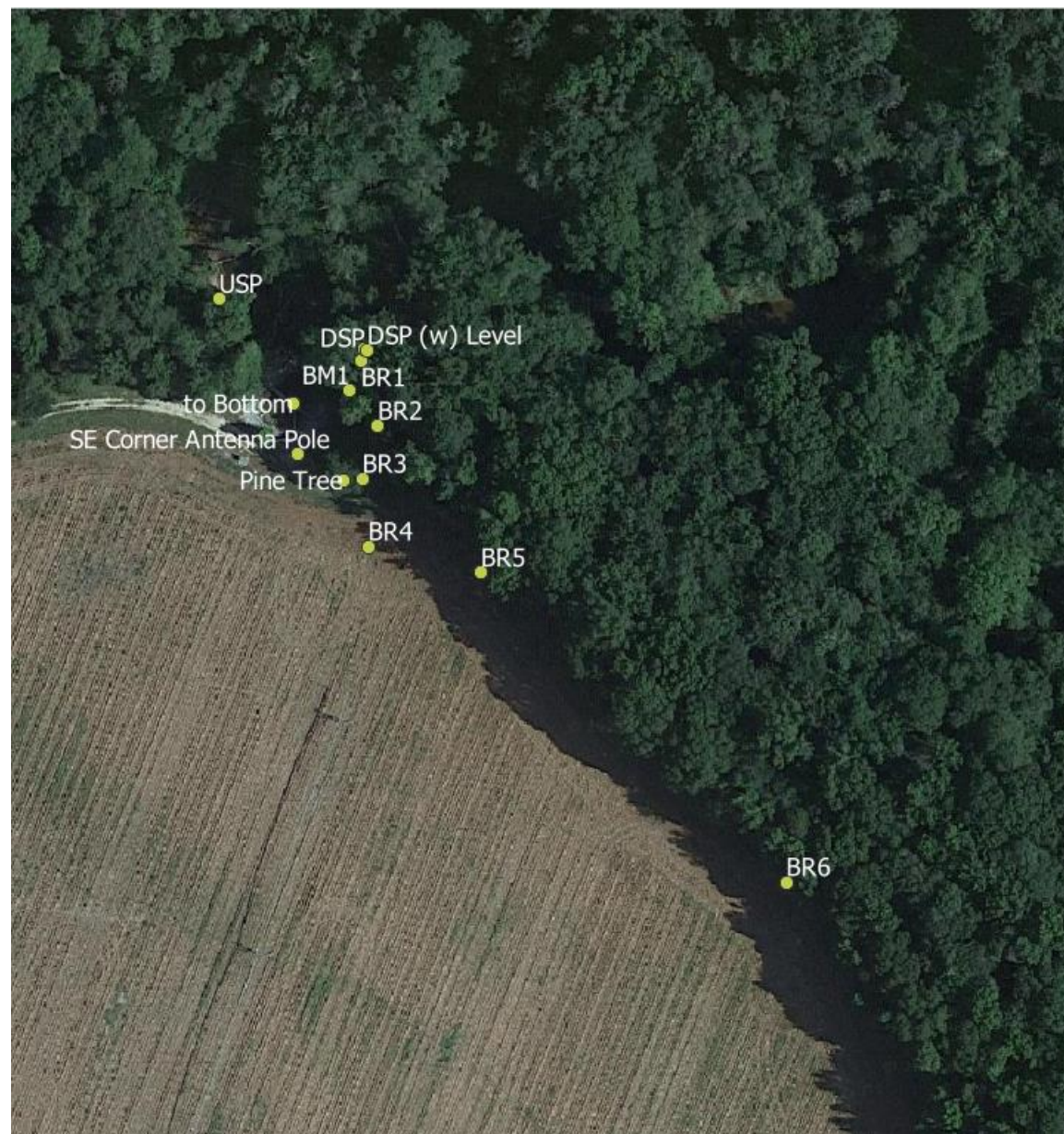


Elevation and EC mapping

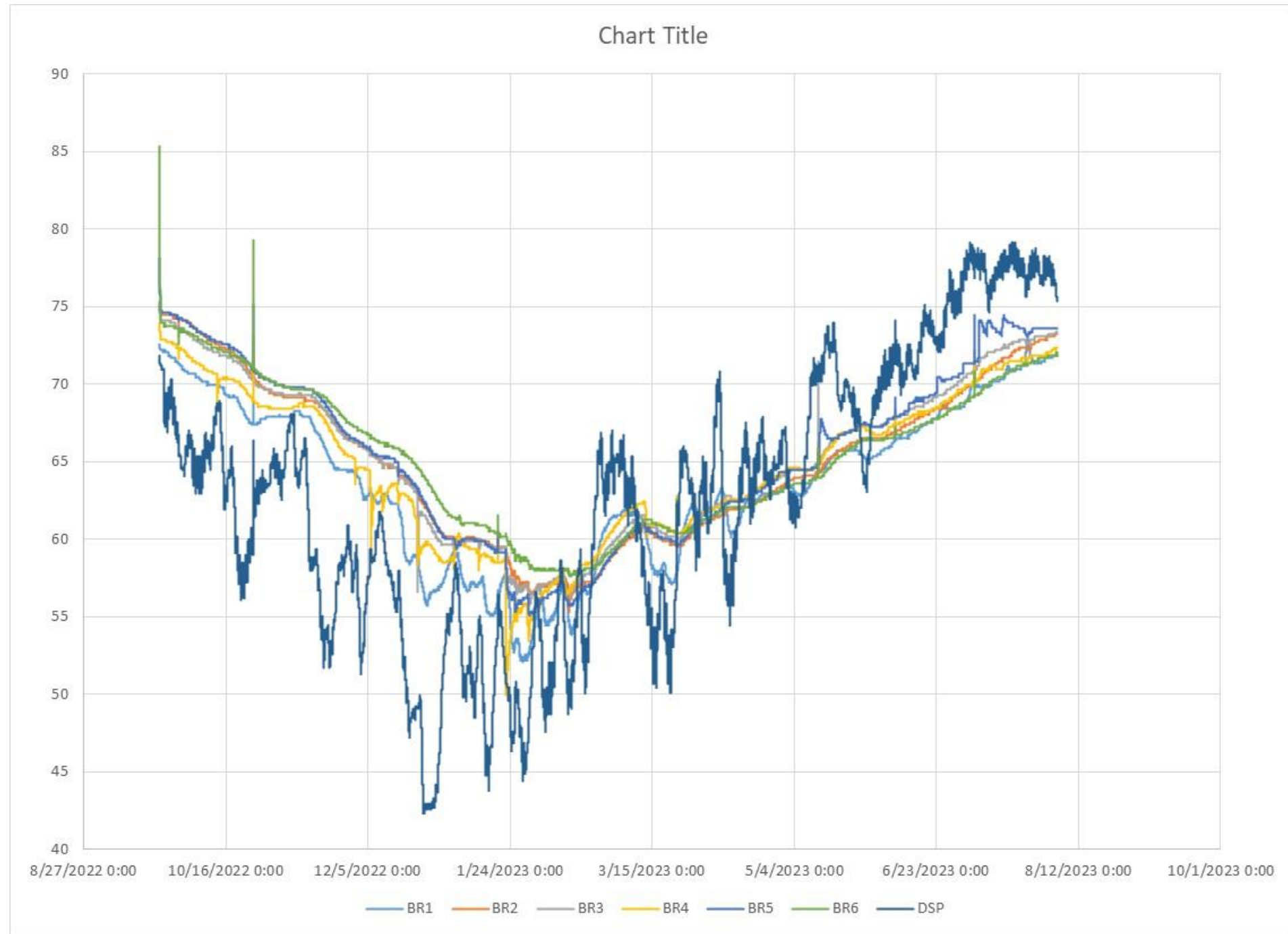


Overall project design

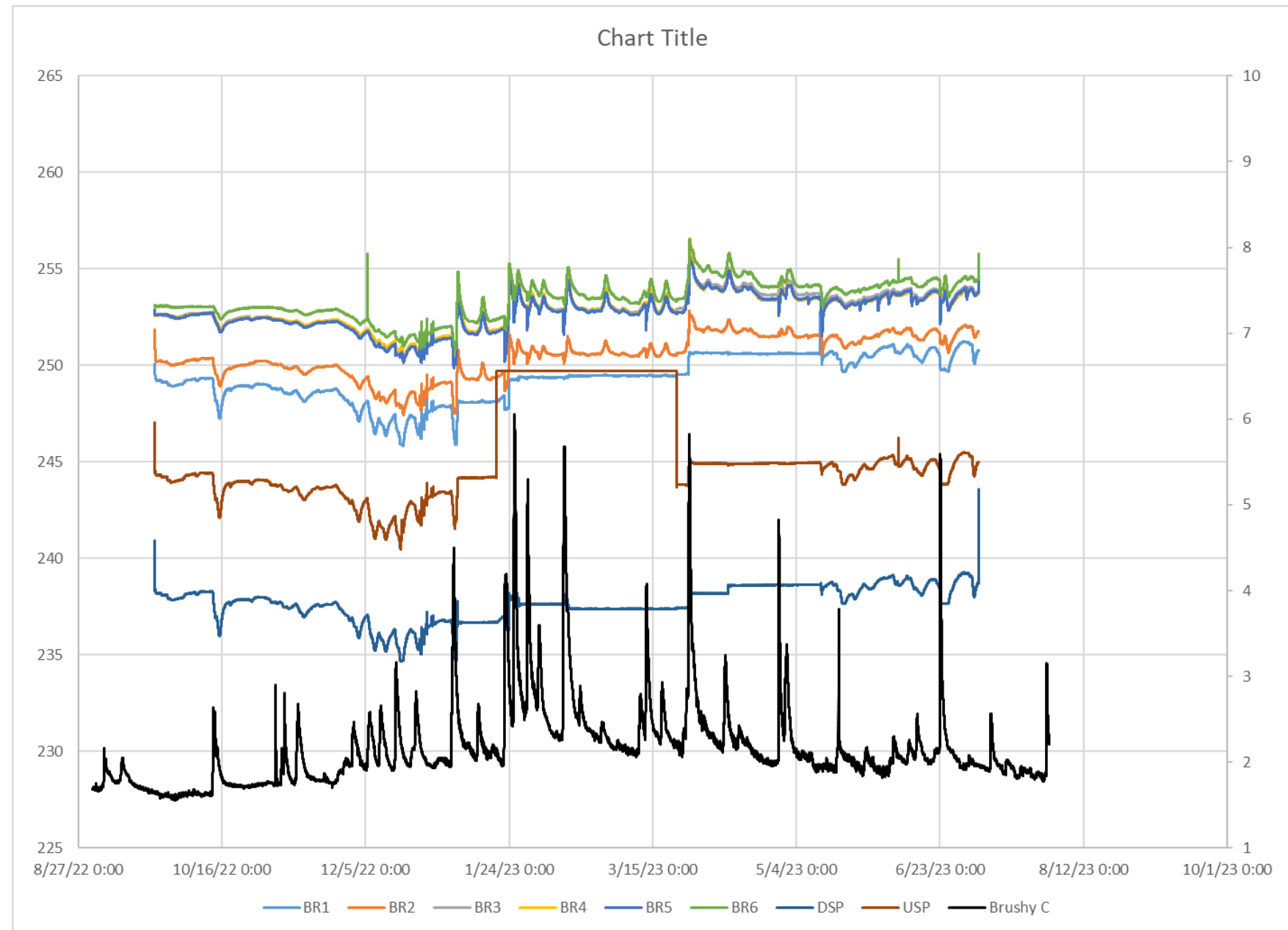


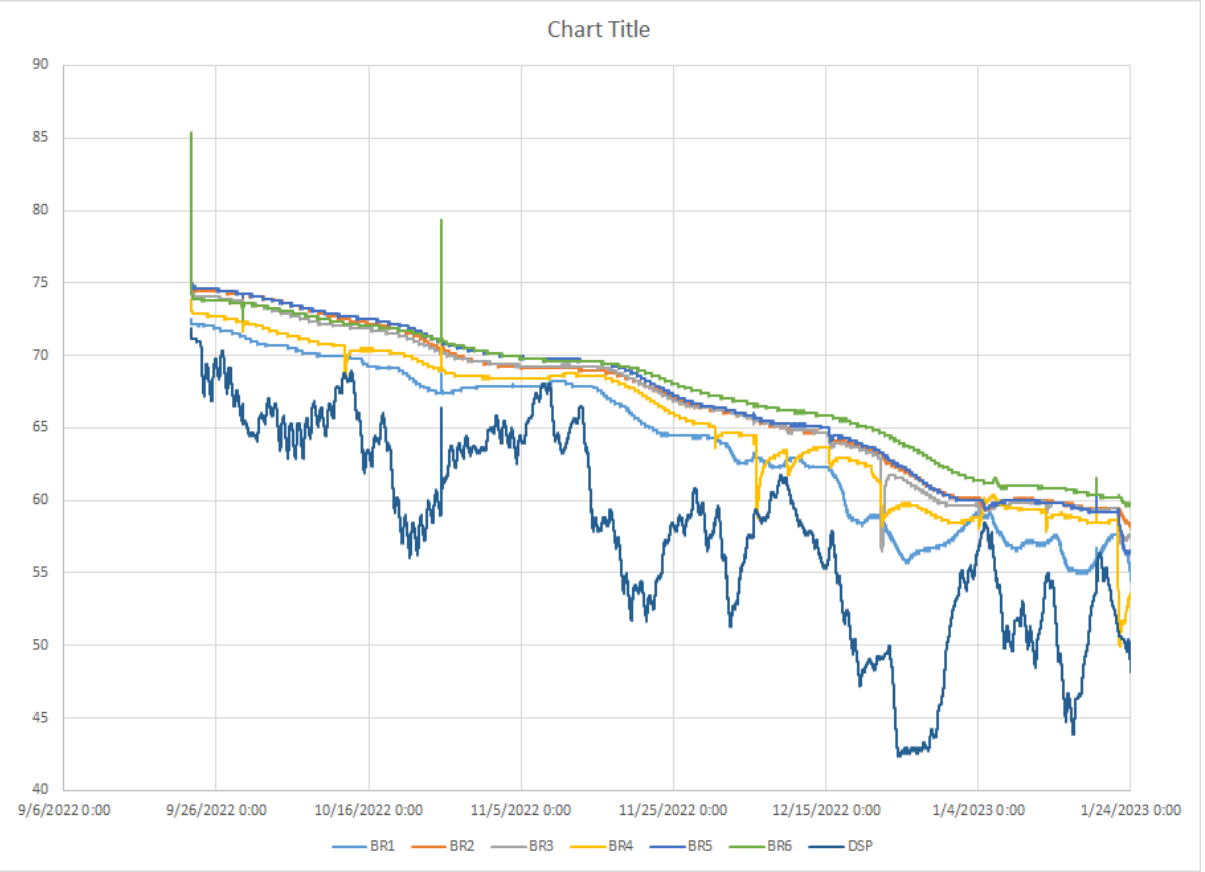
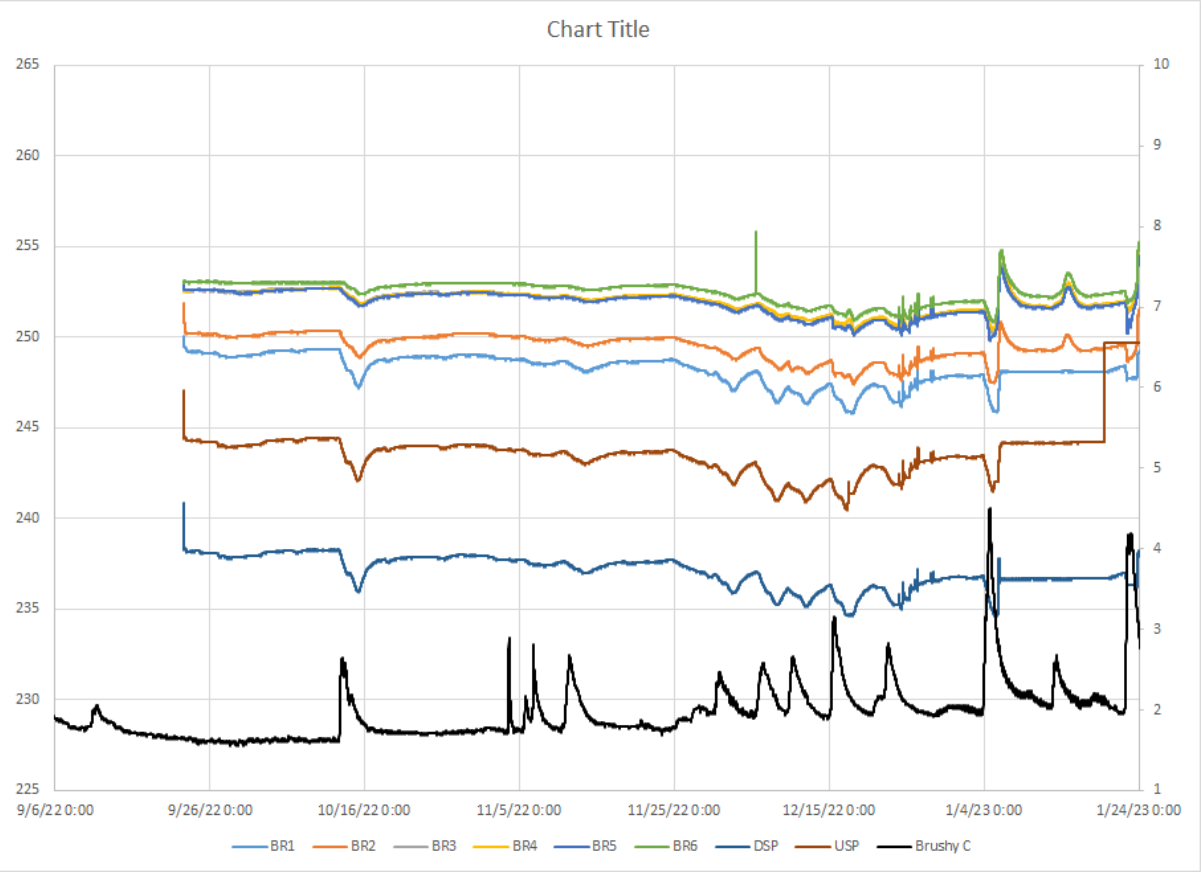


Water temp



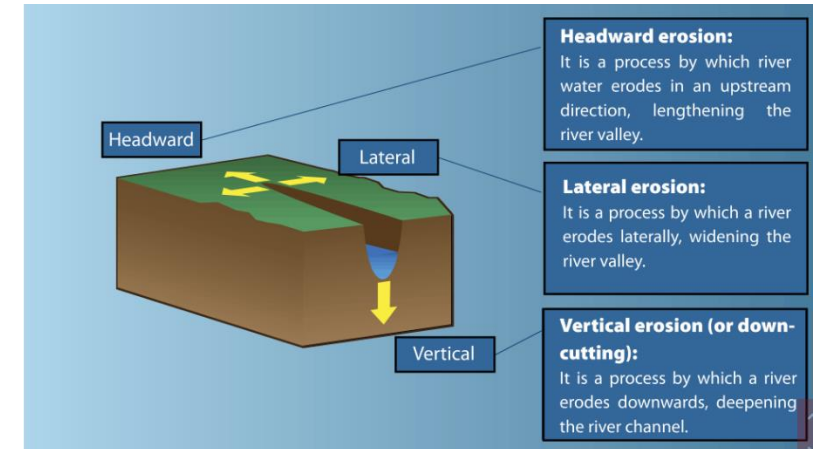
Water level





Development of a pilot study to preserve in-stream water quality and in-stream flows below an urban pond complex using a real-time control system

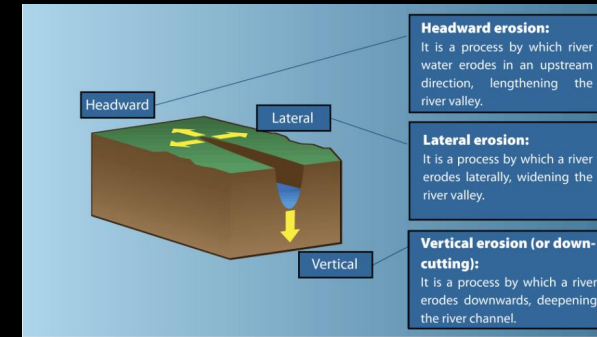
Sediment BMPs work, there is too much water in the creek!!



The basic challenge: Sediment BMPs are working, there is too much water in the creek

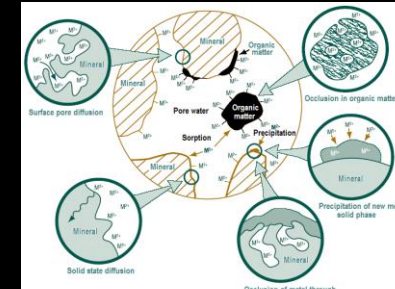
- Physical

- Downcutting
 - disconnected floodplain
 - bank failure
 - increased sedimentation
 - highly unstable
 - undermines and exposes sewer lines



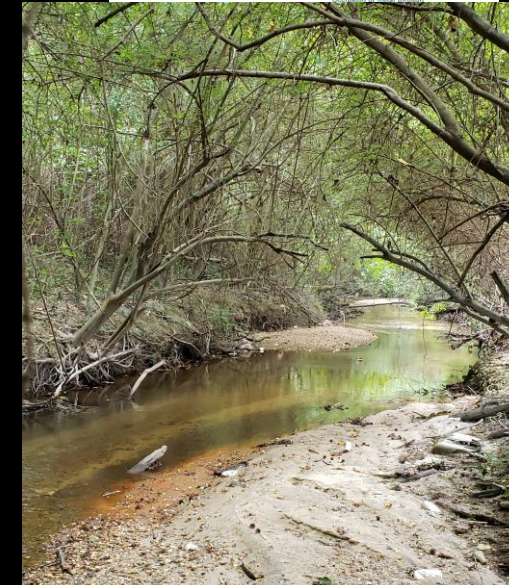
- Chemical

- Mobilizes metals and nutrients

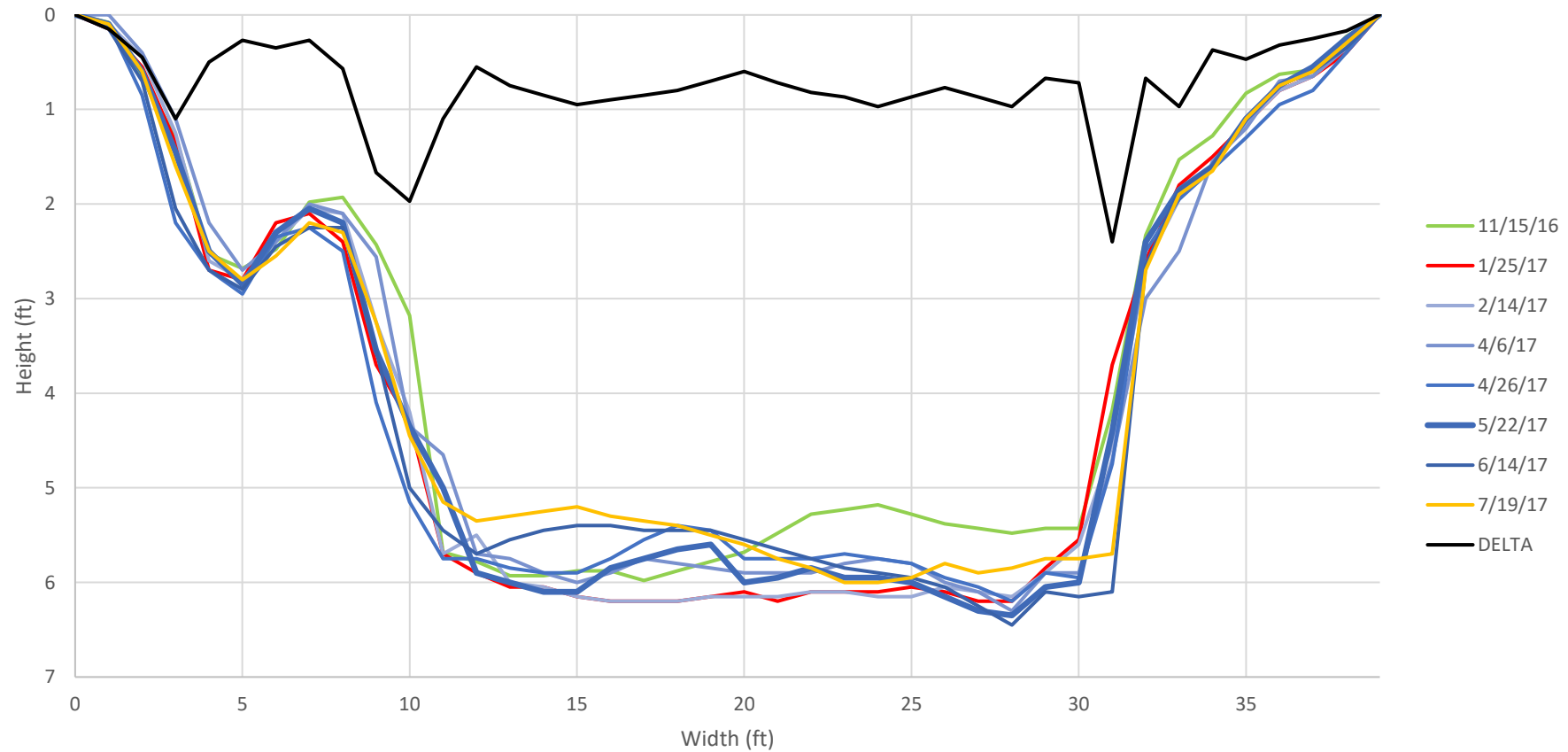


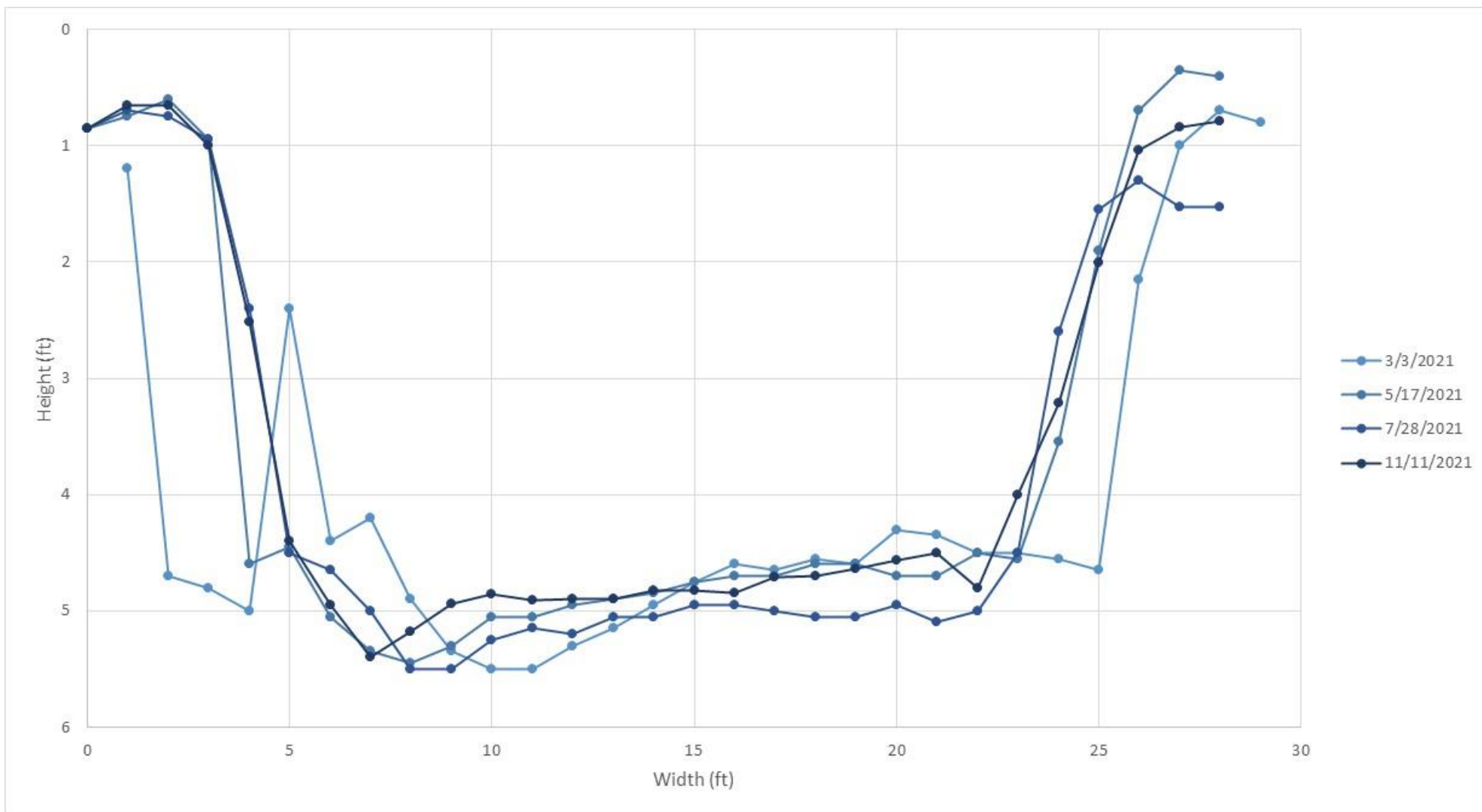
- Biological

- Impacts habitat quality and availability
 - aquatic insects unable to find stable substrate
 - homogenous bed material provides no refuge for fish
 - may leave bacteria at the top of the food web?

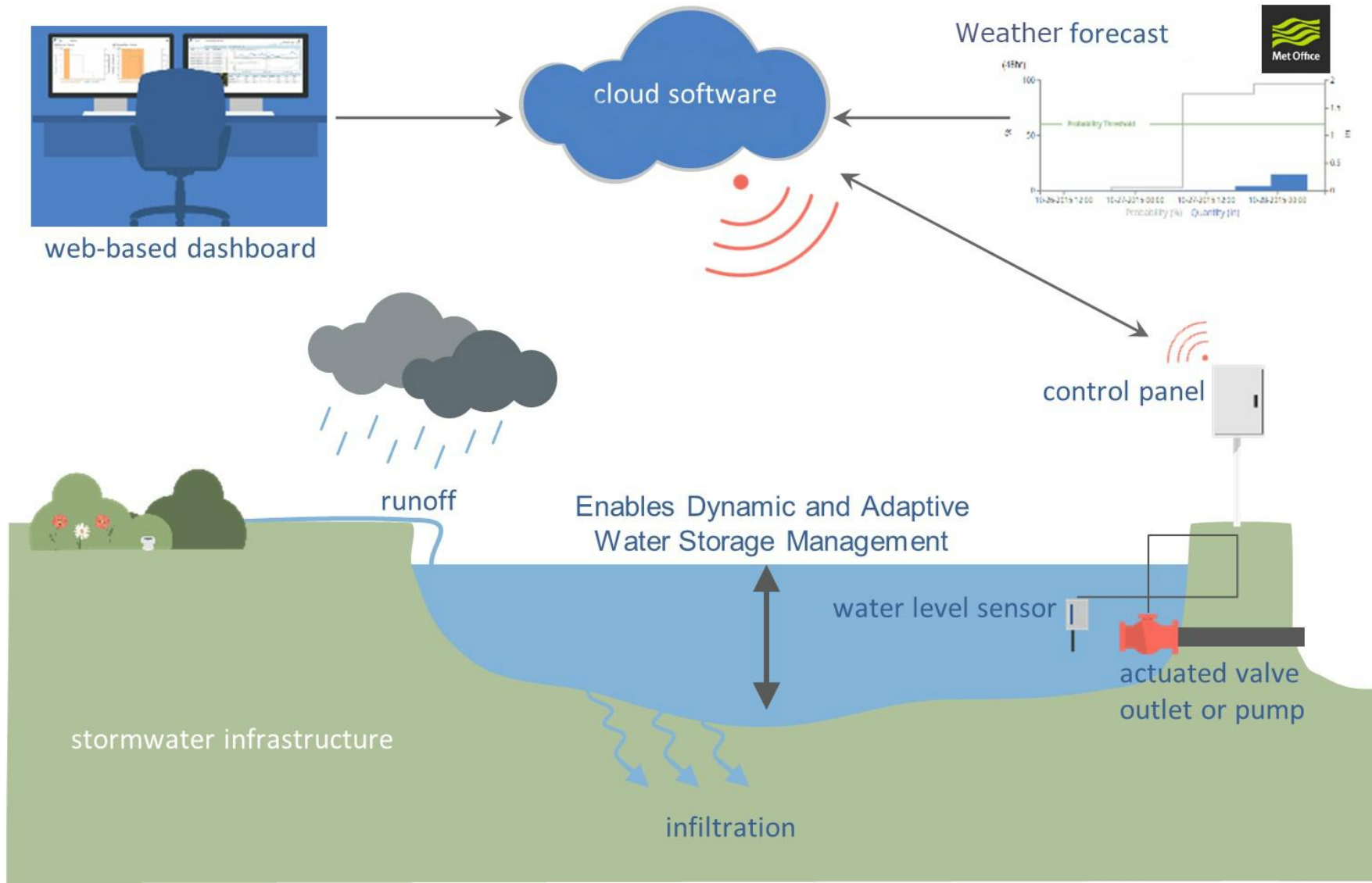


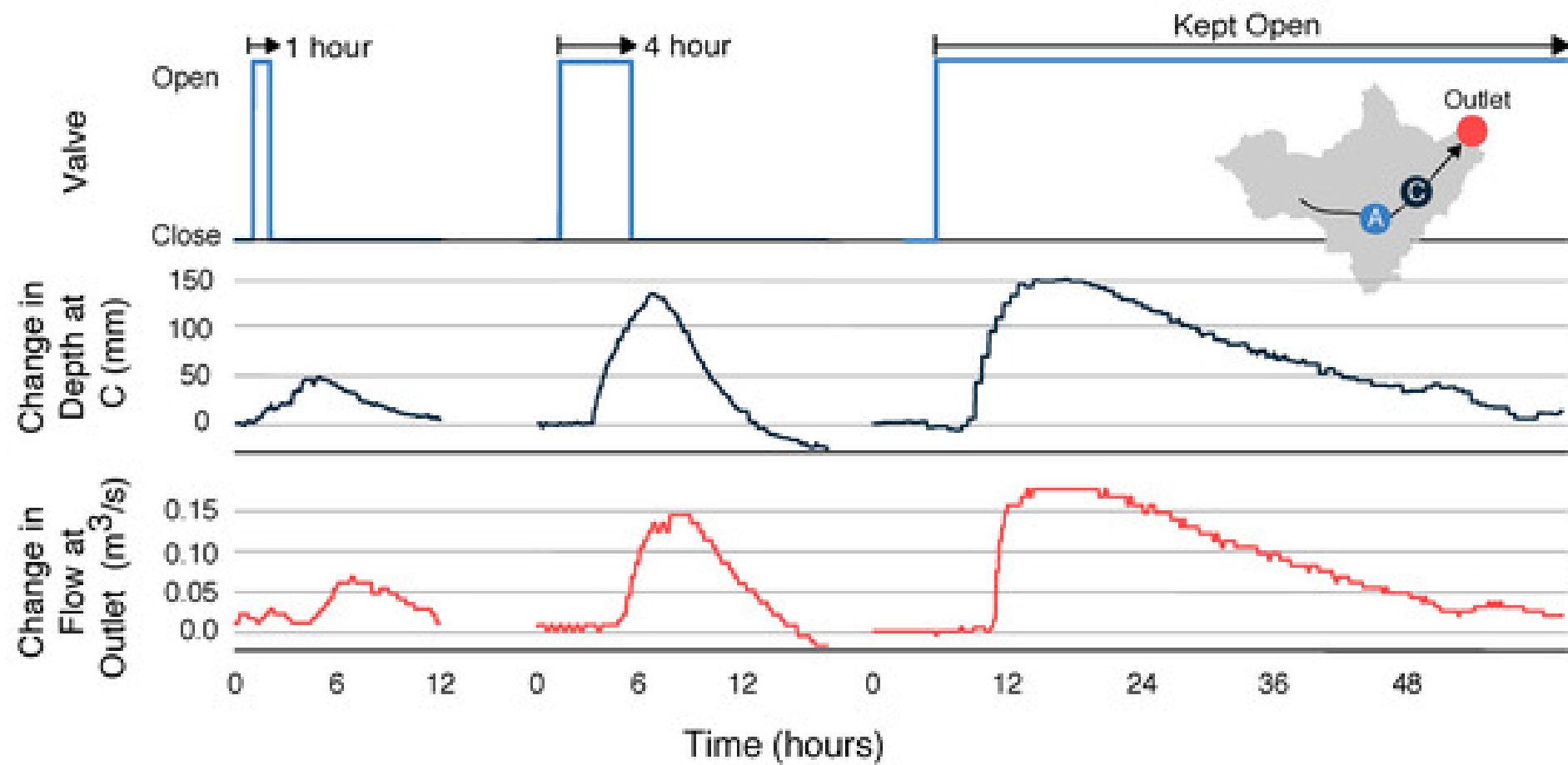
Cross section time series

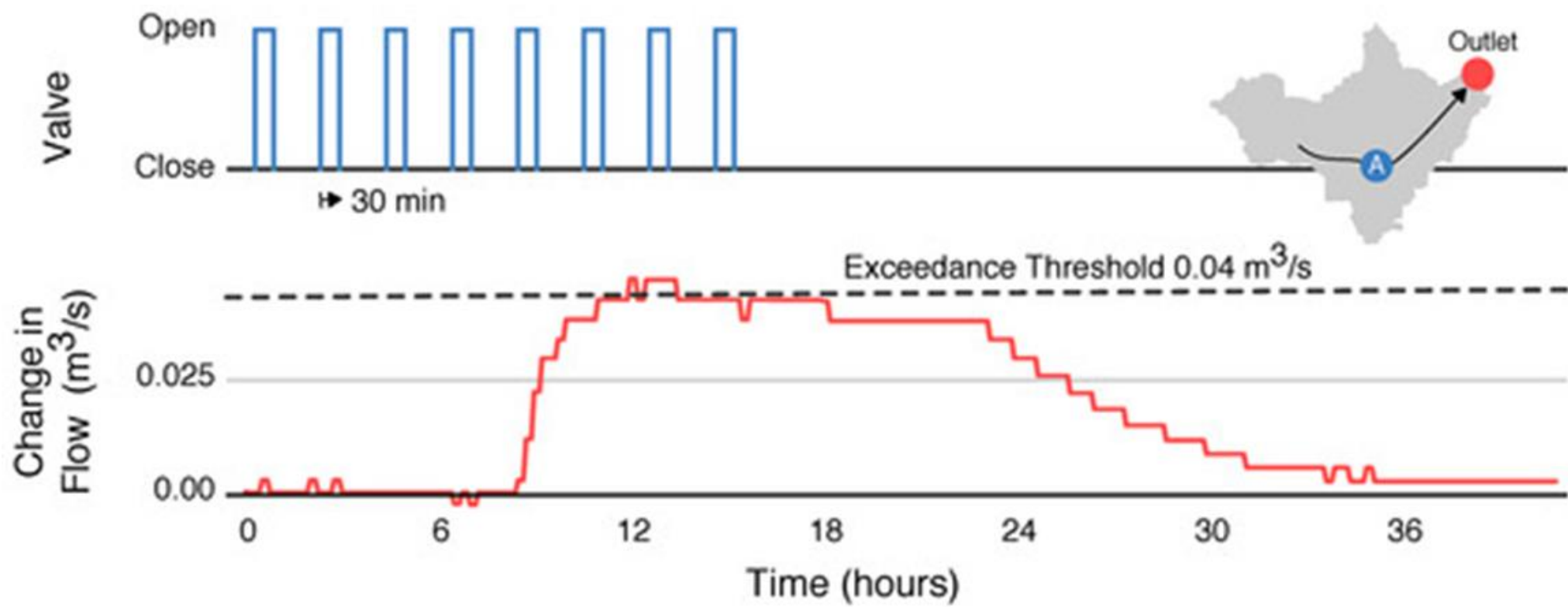




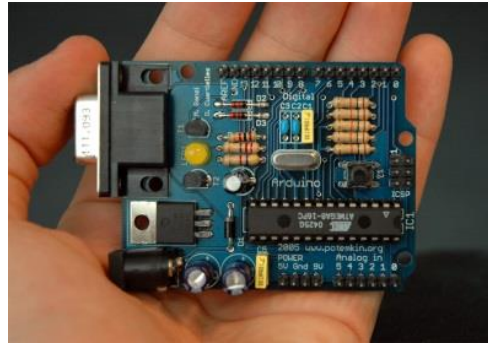
Concept



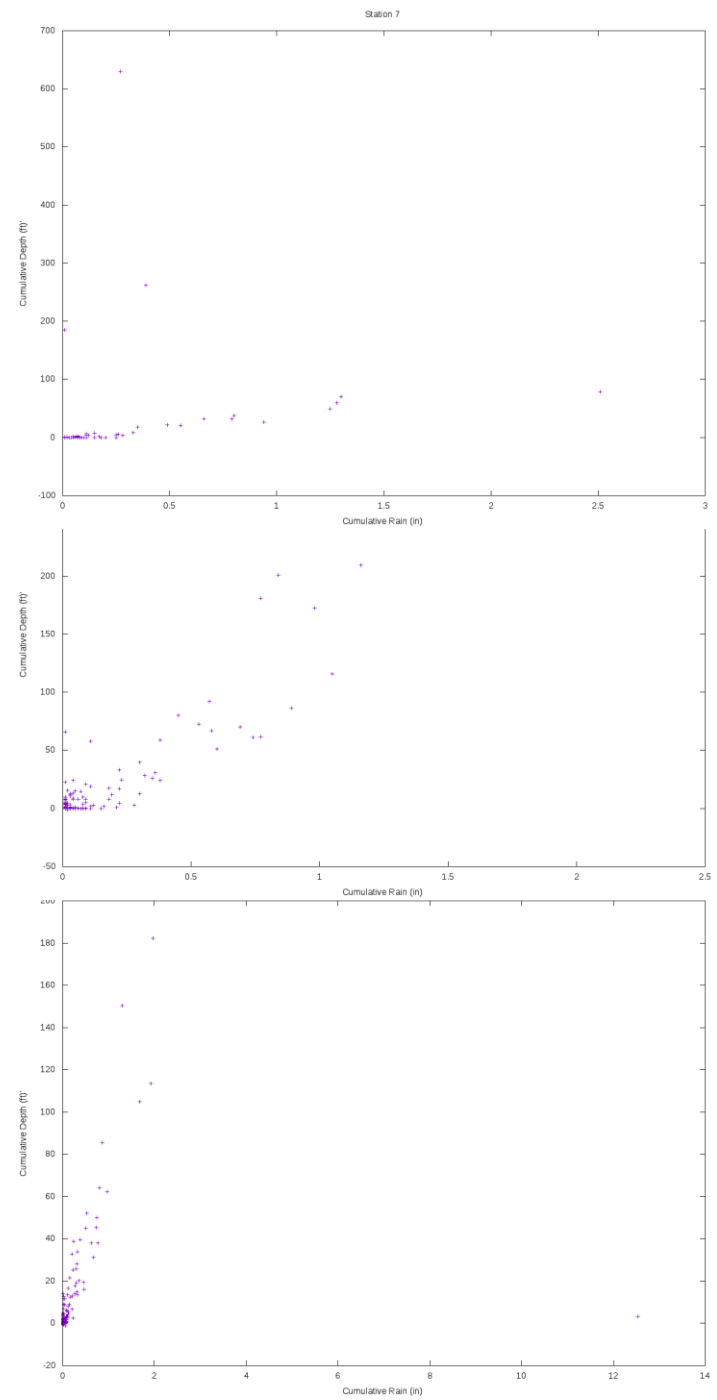
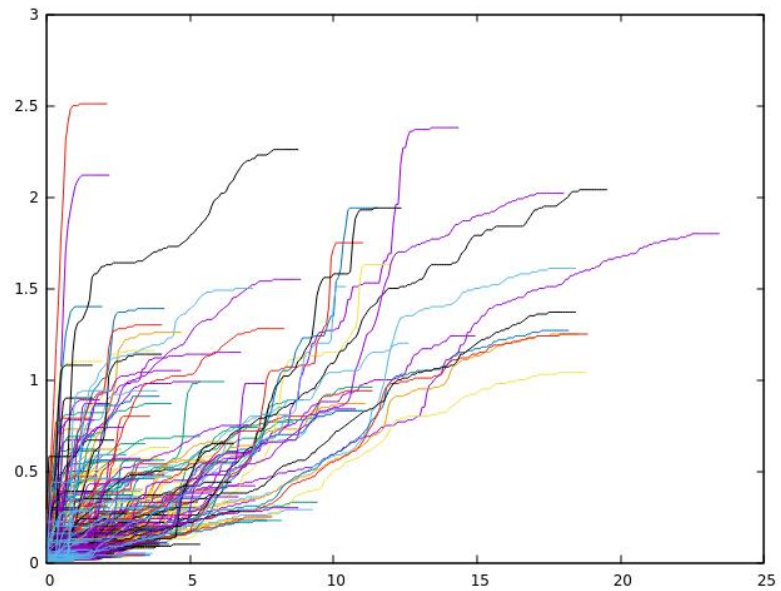
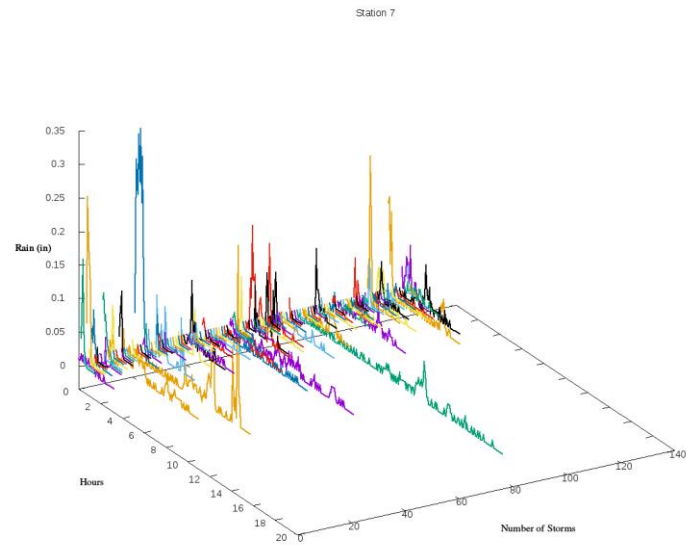




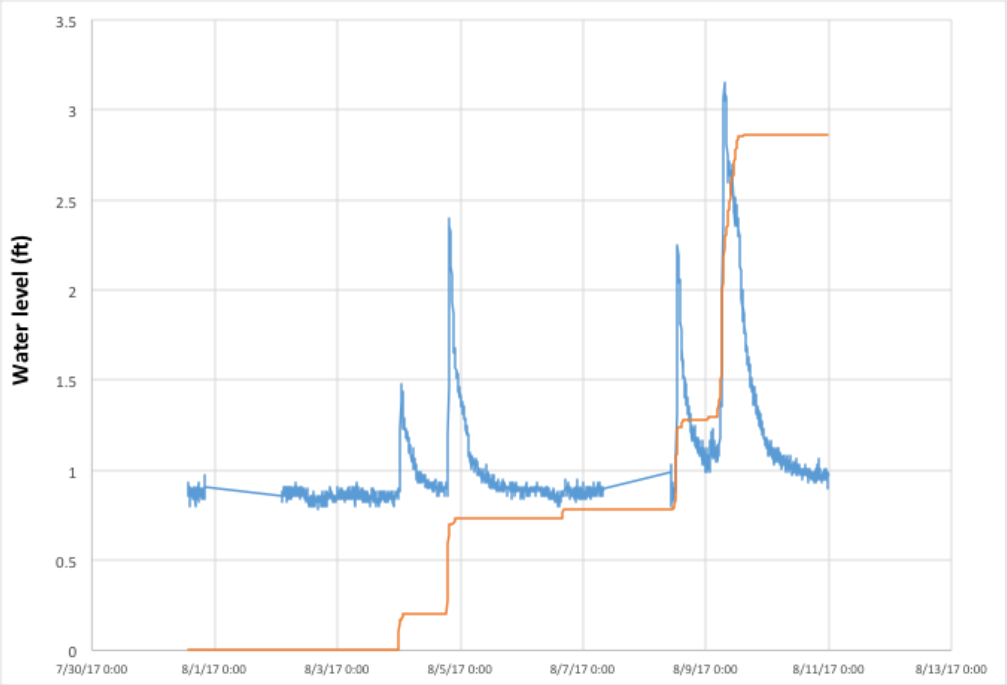
Rain gauge/water level loggers



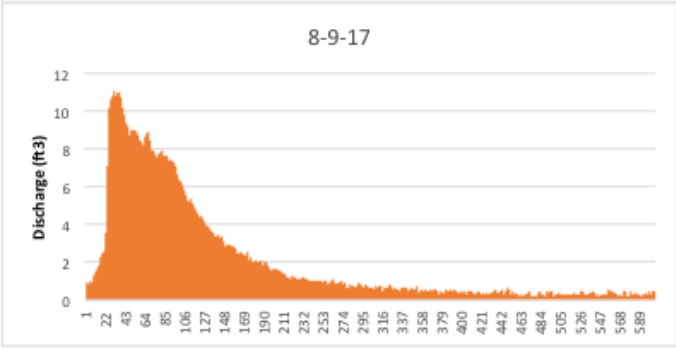
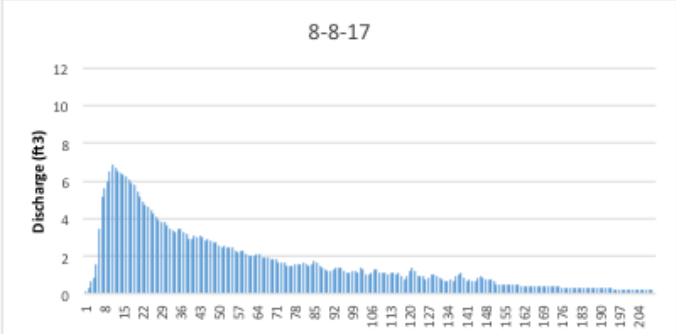
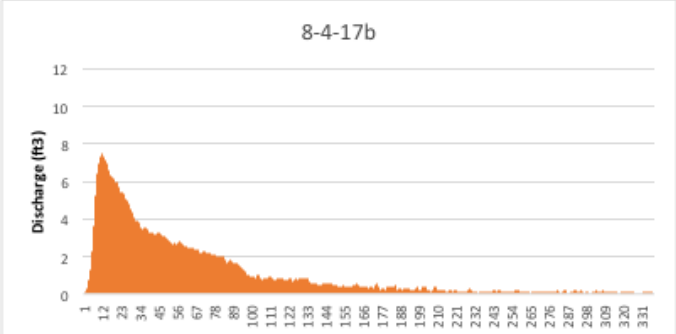
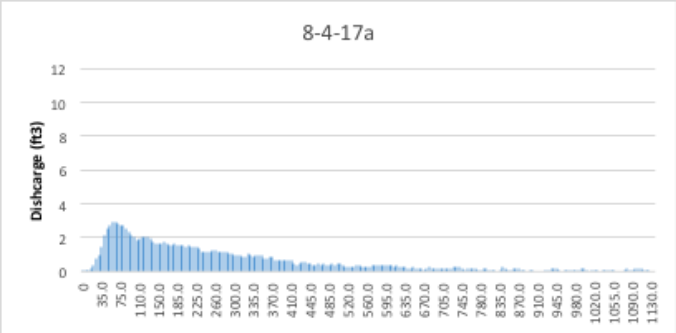
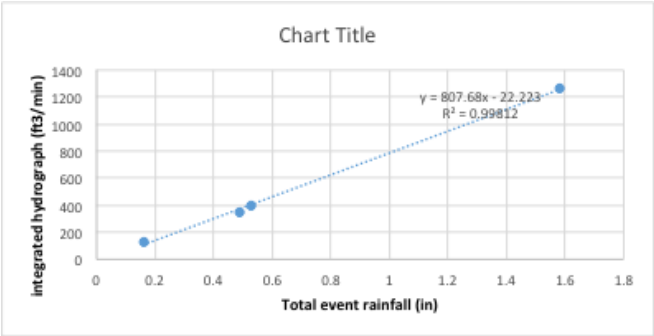
Data!!!



How much water?



	total event rainfall (in)	integrated hydrograph (ft3/min)
8-4-17a event	0.16	133.45
8-4-17b event	0.53	390.6
8-8-17 event	0.49	353.776
8-9-17 event	1.58	1262.475

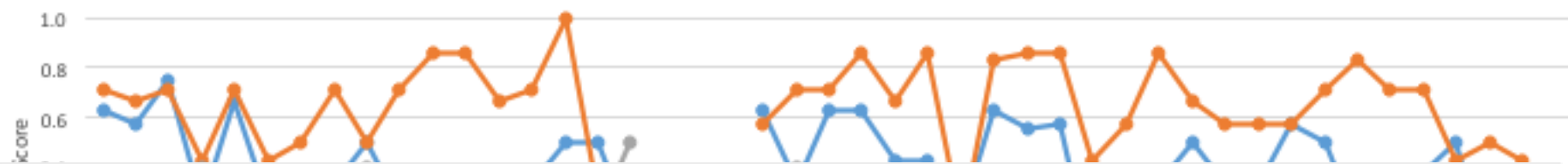


Elapsed time (min)

Oates Creek



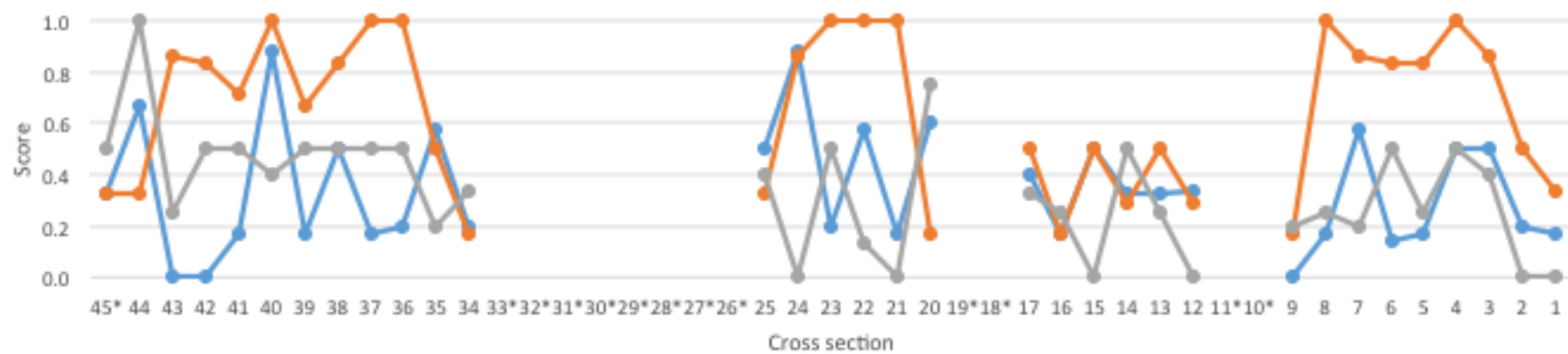
Spirit Creek



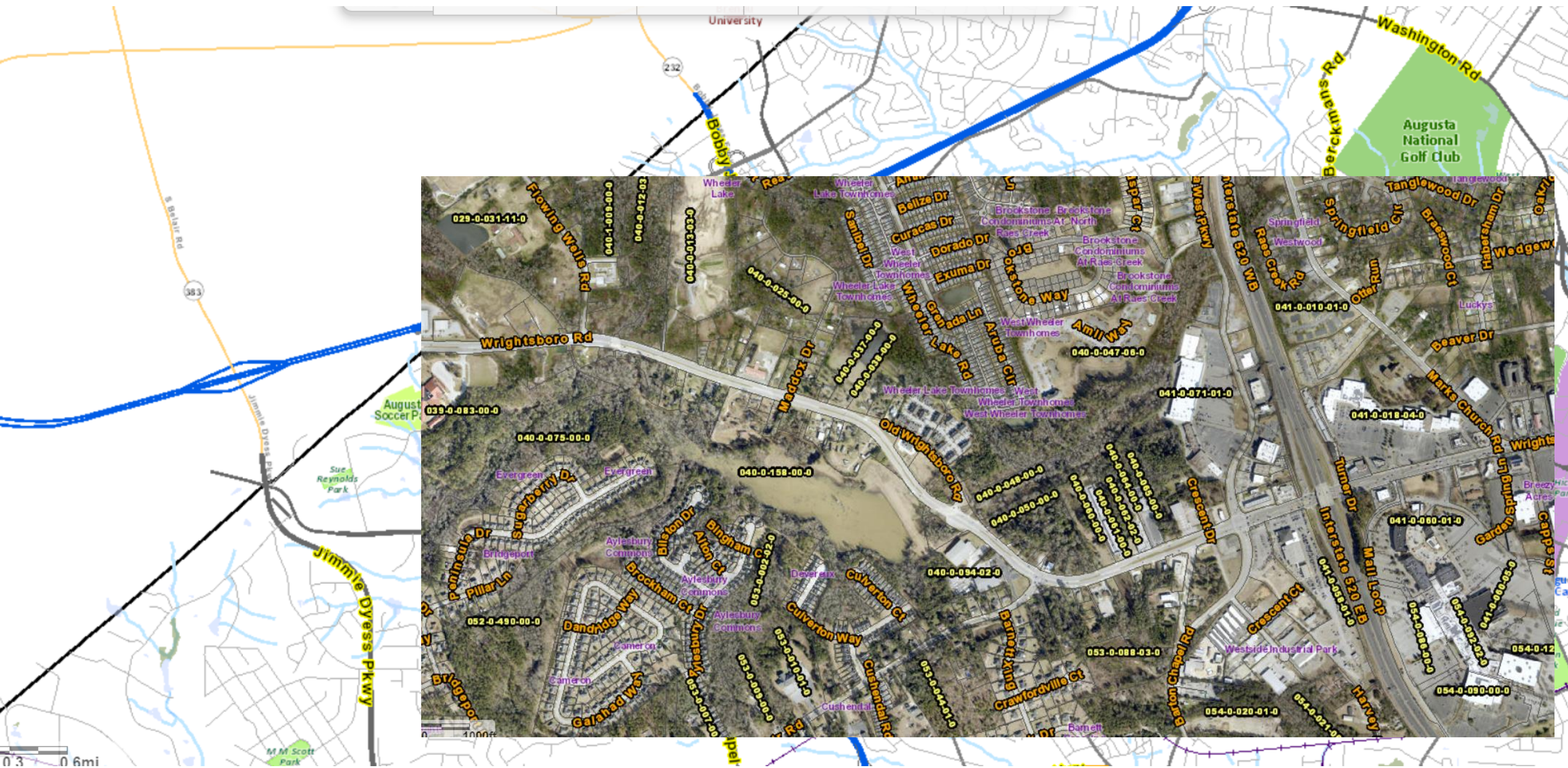
Rocky Creek



Butler Creek



Aggradation Widening Degradation



Site Overview

Customer Name
City of Augusta
OP Number
OPI095.1
Project Name
Wrightsboro Rd Pond
Site Name
Wrightsboro Rd Pond
Subscription Type
Opti Essentials
Location
Wrightsboro Pond
Coordinates
33.4659631060749
-82.09604372758619
Expected Commissioning Date:
Opti Subscription Start Date:
Configuration Report Date:
July 2023



Site Location - Google Maps Satellite Image



Site Photo

Project Overview & Goals

Opti's adaptive control solution will allow the selected stormwater facility to drain down in anticipation of storm events and target zero discharge during wet weather, thereby mitigating flood risk, reducing erosive flows, and protecting downstream infrastructure. By way of example, should Opti's CMAC solution be implemented to control the top 12 inches of Augusta's Lake Aumond, it would provide approximately 10 acre-feet of additional flood storage capacity along the impacted Rae's Creek watershed.

Objective

Flood Mitigation - Reduce impacts of excess surface water.

Water Quality Improvement - Reduce nutrients, temperature, and solids in surface water.

Infiltration expected?

FALSE

Site Characteristics

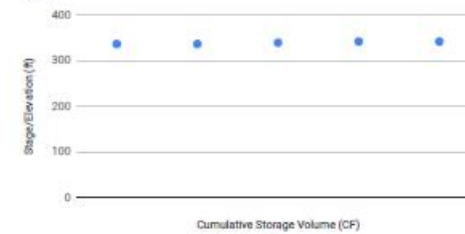
The following settings represent physical characteristics of the site and are used to model expected inflows, outflows, and storage volumes.

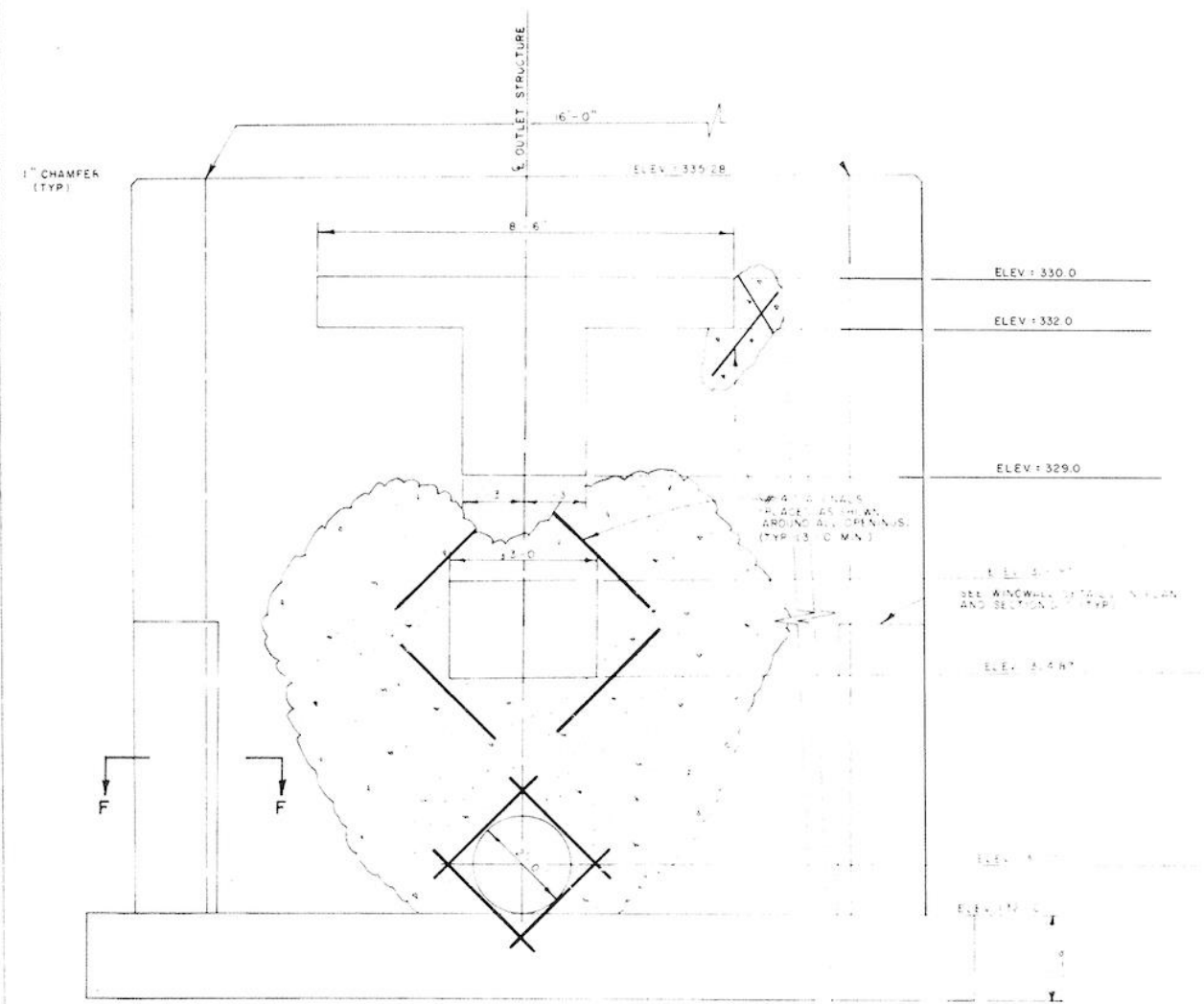
Watershed Characteristics	
Runoff Surface 1 Name	Wrightsboro Rd Pond Basin
Runoff Surface 1 Watershed Area (acres)	1,964.80
Runoff Surface 1 Impervious Area (acres)	334.016
Runoff Coefficient (Rv)	0.5

Stream Stats Assumptions

Control Structure Characteristics	
Valve Diameter (inches)	12
Active Volume (cf)	Assumed
Power Supply	Line
Control Interface	Continuous Position Target Reference

Cummulative Storage Volume (CF) vs. Stage/Elevation (ft)

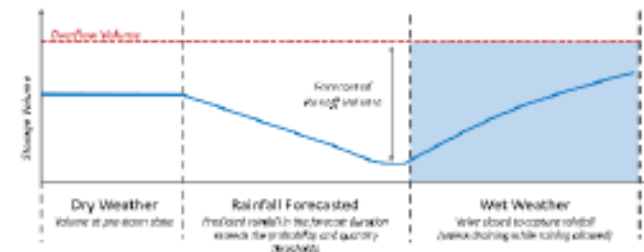




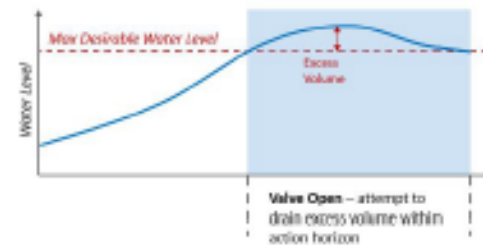
Control Logic Explanations

Graphical representations of Nimbus settings applied to the system.

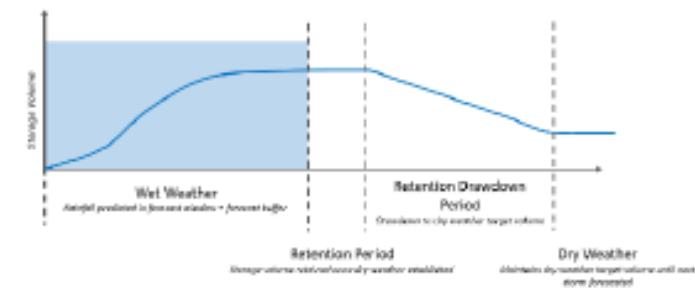
Pre-Event Behavior



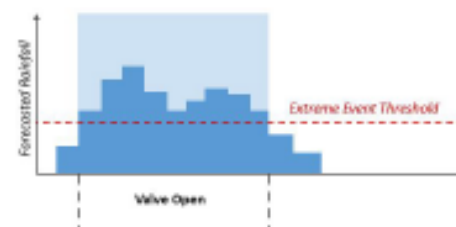
Maximum Desirable Water Level Behavior:



Post-Event Retention Behavior:



Extreme Event Mode Behavior:



Coordinated Release Behavior

