



Smart Pond Success
Monitoring Results from SR 45 Pond 1 CMAC Retrofit

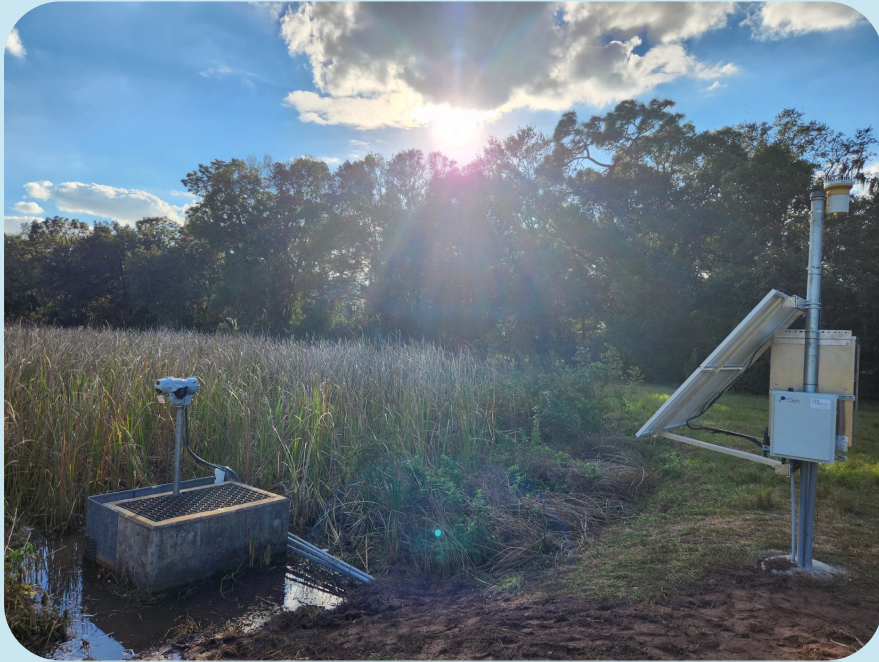
Mark Thomasson, P.E.



Smart Pond Webinar Series



What is a Smart Pond?



An automatically monitored and controlled pond that maximizes the stormwater treatment and attenuation capability of a given volume. (aka Continuously Monitored and Adaptive Control – CMAC)

Features:

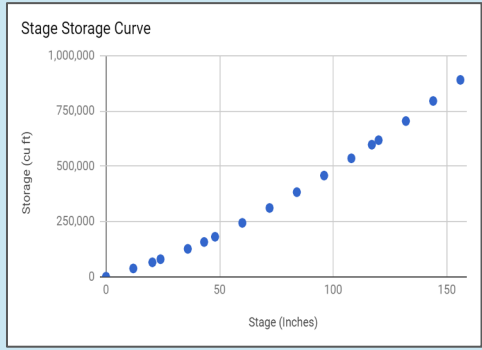
- Increased treatment efficiency
- More attenuation capacity
- Water surface manipulations (i.e. enhanced hydroperiod)
- Continuous Monitoring

Benefits:

- Better effluent water quality
- BMAP Credits
- Reduced pond sizes
- Flood reduction
- Meet new stormwater rules
- Less Maintenance
- Easier reporting



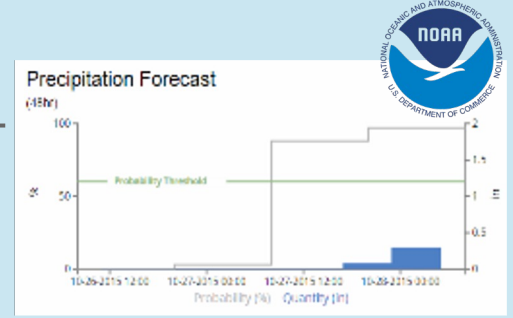
Continuous Monitoring and Adaptive Control (CMAC)



web-based dashboard



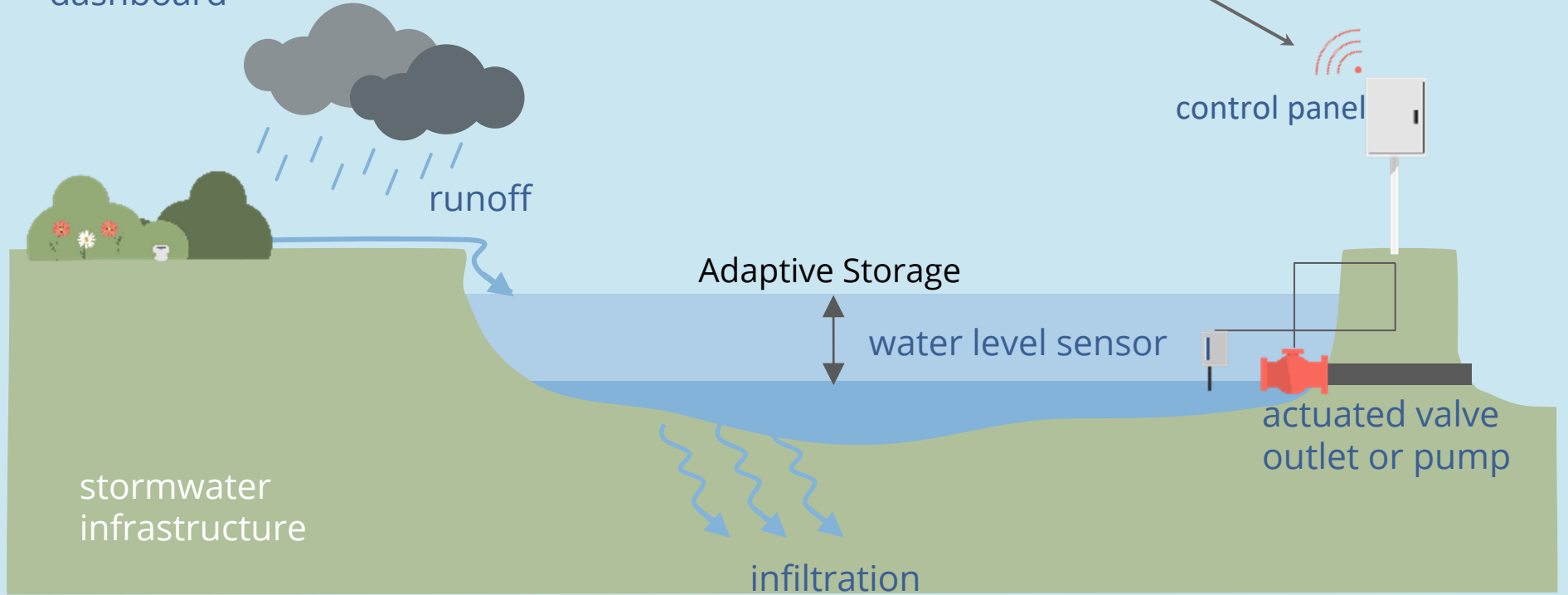
Real-Time Inputs → Model → Output



control panel



actuated valve outlet or pump



Product Configuration

Example Parameters

- Watershed Area
- Impervious Area
- Valve Diameter
- Overflow Invert
- Peak Discharge
- Retention Period
- PoP Threshold



Cost-Saving, Smart Stormwater Solution for Berth 214



Pre-CMAC Conditions – SR 45 Pond 1

Existing WD Treatment

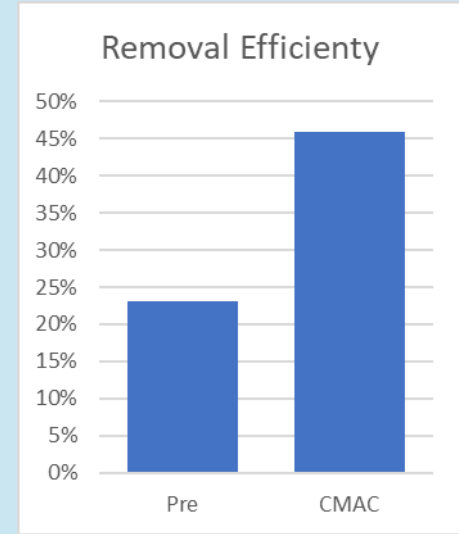
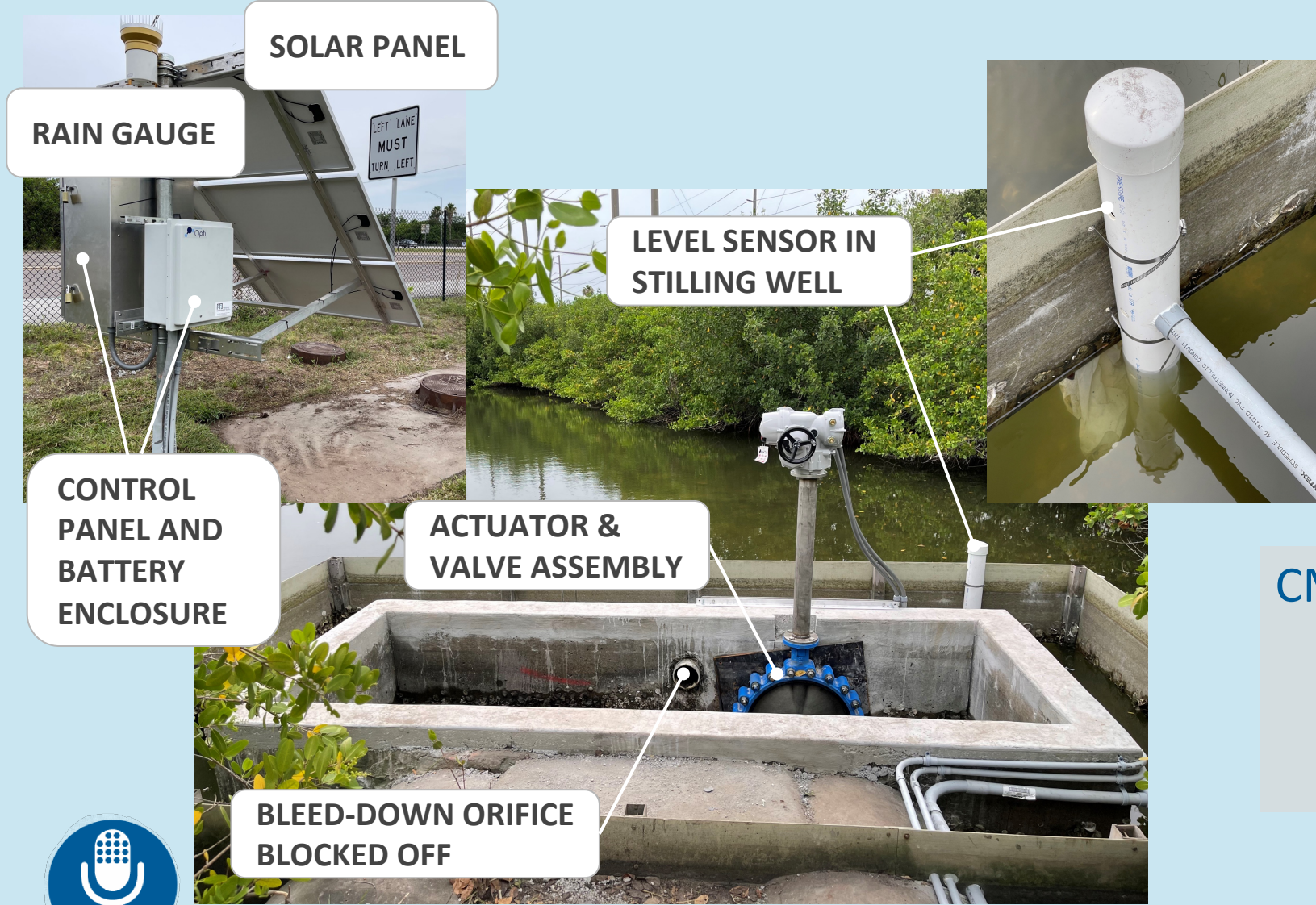
TV: 1.05 ac-ft

TN Removal Eff: 23%

TN Removal: 47 lbs/yr



CMAC Modifications – SR 45 Pond 1



CMAC Treatment
CMAC Vol: 4.19 ac-ft
TN Removal Eff: 46%
TN Removal: +91 lbs



SR 45 Pond 1 CMAC Dashboard

FL-D7-HILL-003 (SR 45 Pond 1)

Live - ?

System Control

Operation Mode
Current State: Automatic Control

Manual Control
 Automatic Control

[Change](#)

Manual Valve Setpoint
0% Open
Not available for control.

Storm Status

Current Weather
06/11/2023 14:15
DRY ↔

24-hr Expected Precipitation (in)
06/11/2023 14:15
0.0 ↔

24-hr Expected Watershed Runoff Volume (ft³)
06/11/2023 14:15
0.0 ↔

Available Capacity (ft³)
06/11/2023 14:15
46121.4 ↑

System Status

48hr ↖

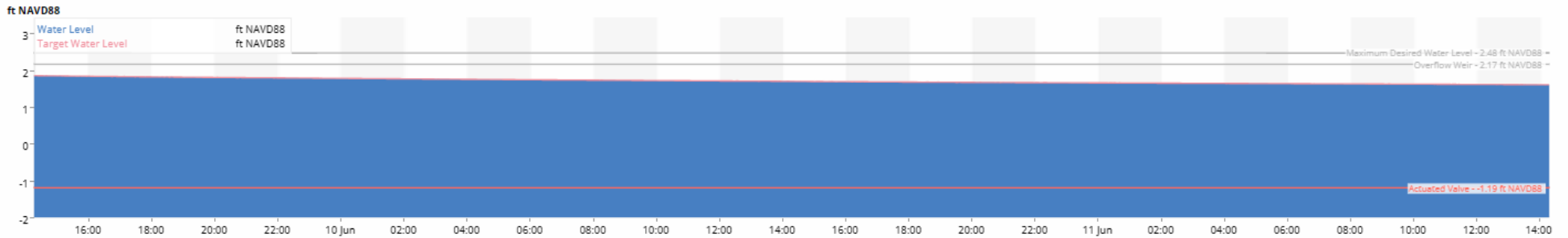
Online Status
100.0% Online | 0.0% Offline

Operation Mode
100.0% Automatic | 0.0% Manual Override | 0.0% Failsafe

Site Location

Water Elevation

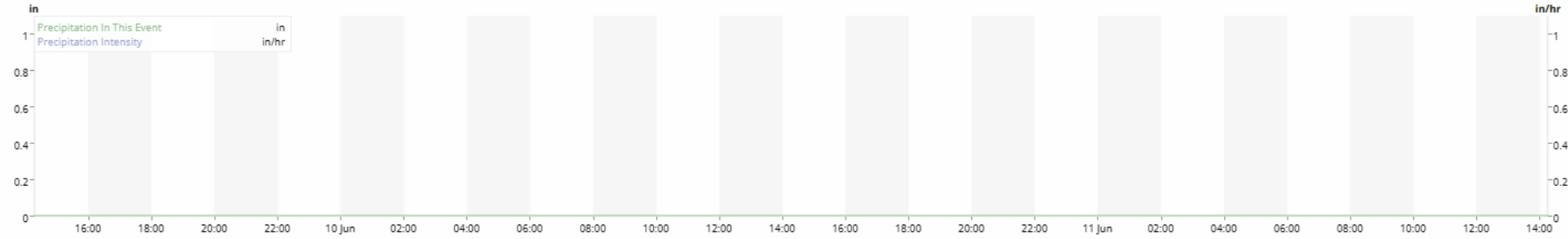
12hr | 24hr | **48hr** | 1wk



Event Rainfall

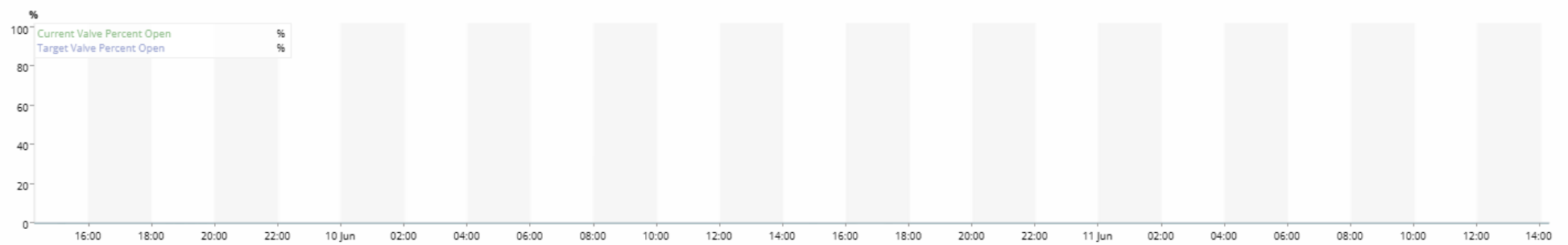
Tipping Bucket Rain Gauge

12hr | 24hr | **48hr** | 1wk



Valve Status

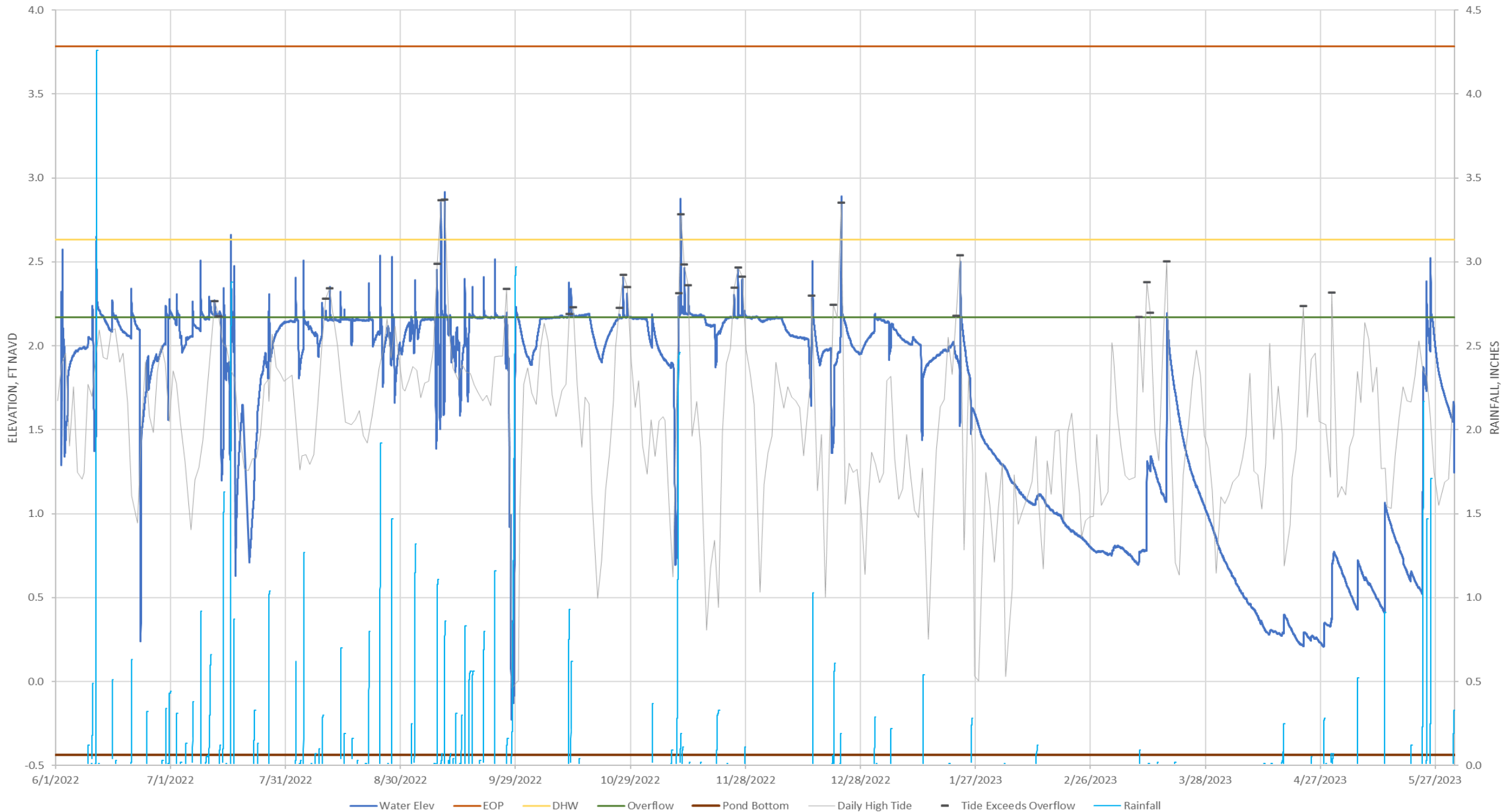
12hr | 24hr | **48hr** | 1wk



Precipitation Forecast

Source: National Weather Service

SR 45 POND 1 ANNUAL SUMMARY

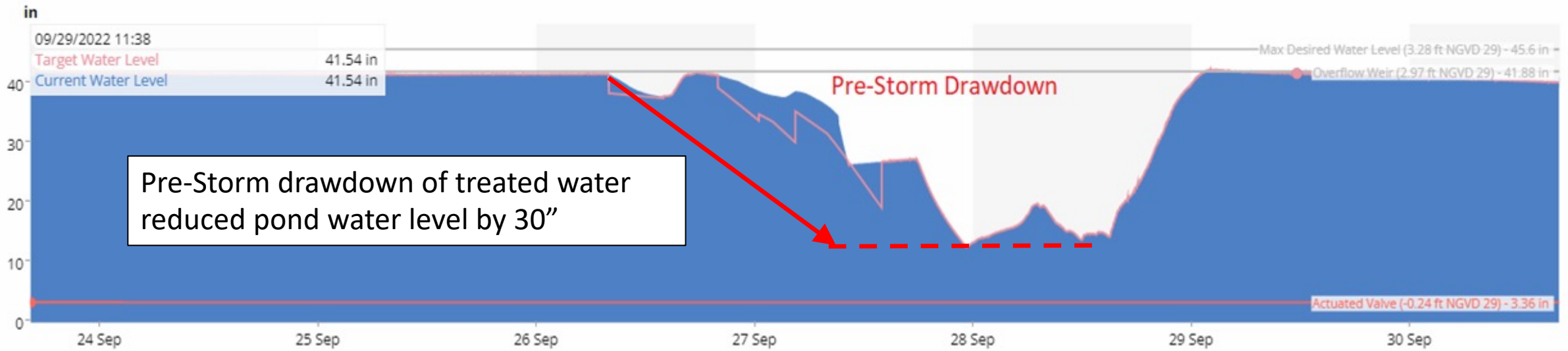


Water Elevation

Relative to Water Level Sensor

12hr | 24hr | 48hr | [1wk](#)

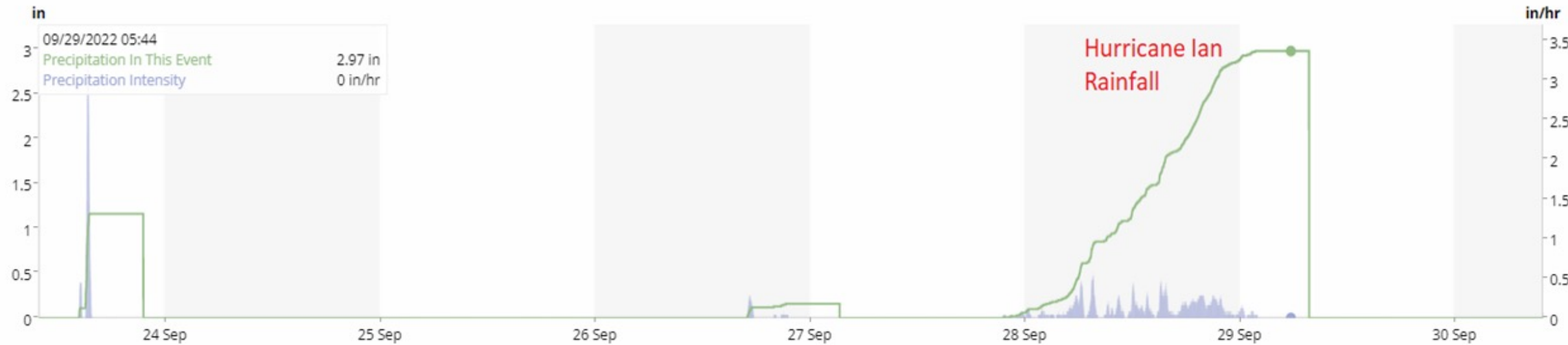
Smart Pond Performance During Hurricane Ian



Event Rainfall

Tipping Bucket Rain Gauge

12hr | 24hr | 48hr | [1wk](#)

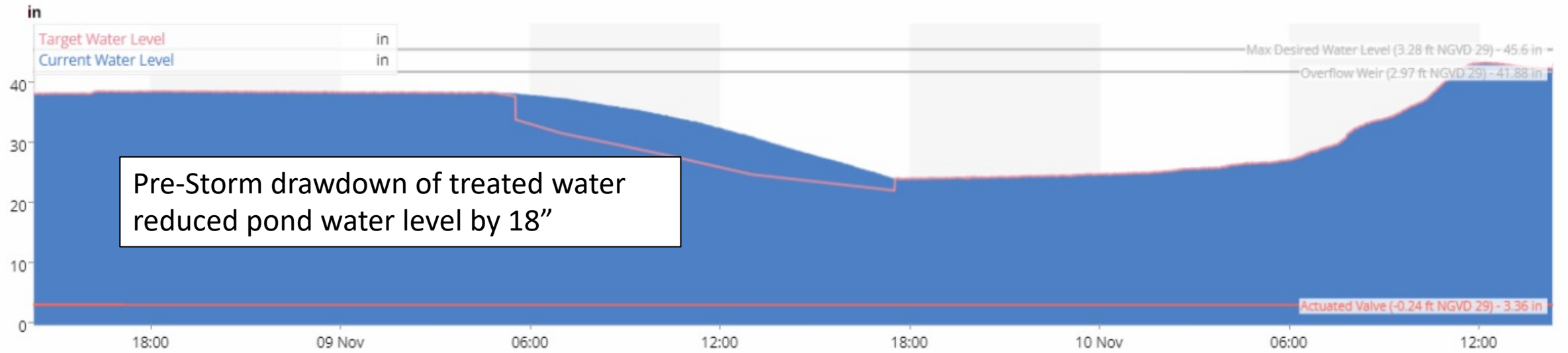


Water Elevation

Relative to Water Level Sensor

12hr | 24hr | 48hr | 1wk

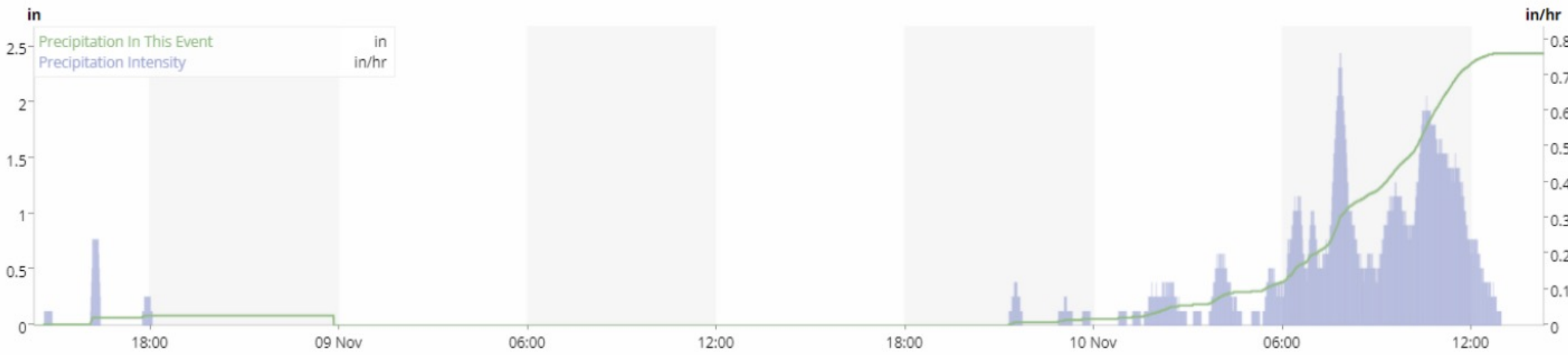
Smart Pond Performance During Hurricane Nicole



Event Rainfall

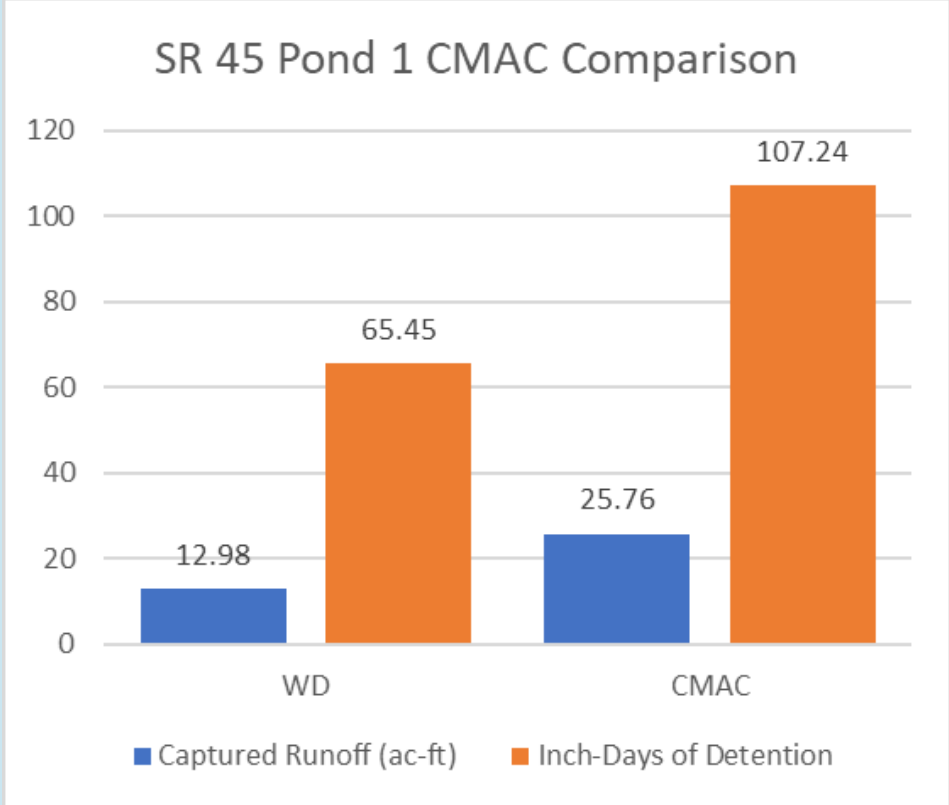
Tipping Bucket Rain Gauge

12hr | 24hr | 48hr | 1wk

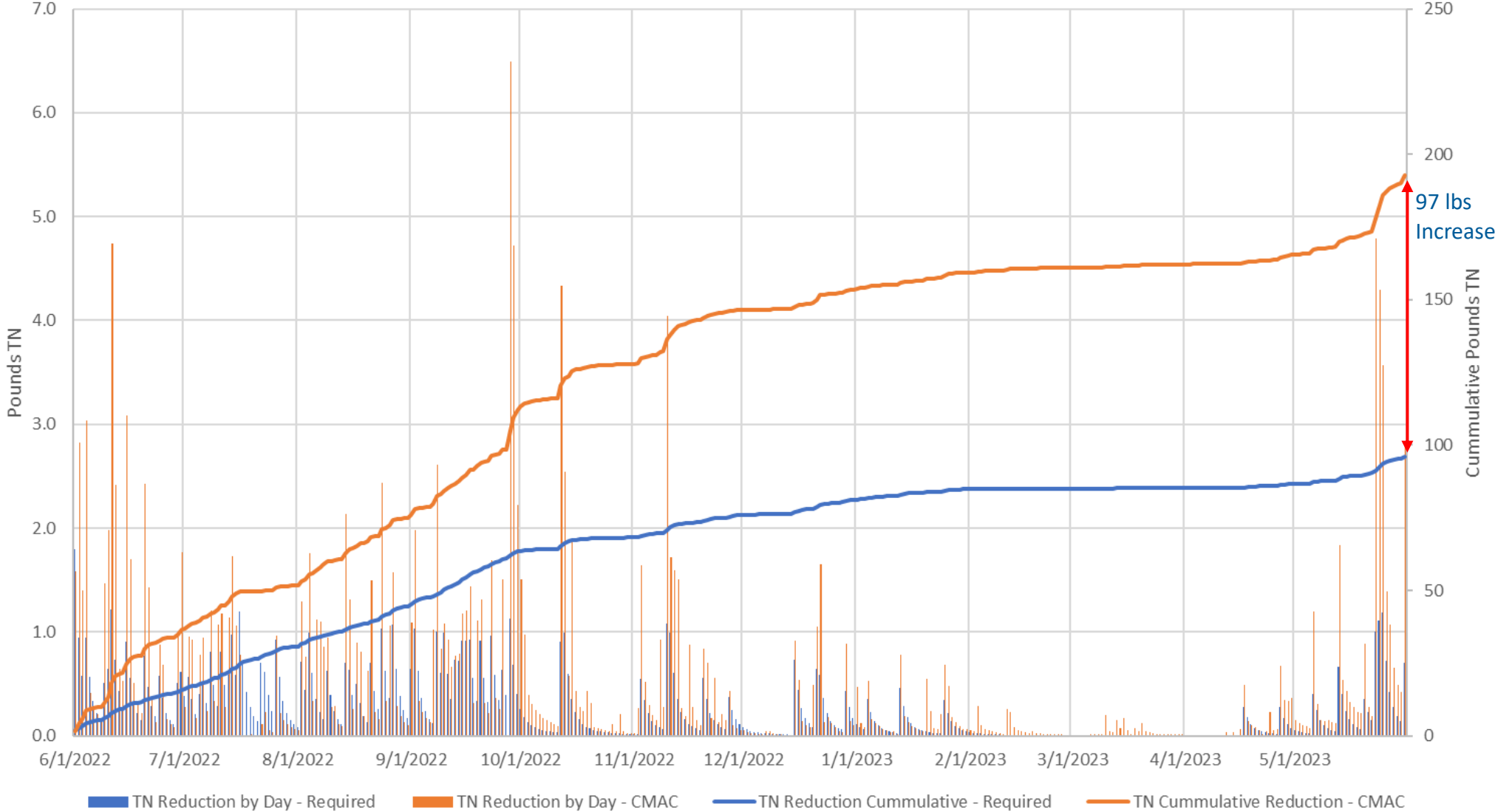


SR 45 Pond 1 CMAC 1st Year By The Numbers:

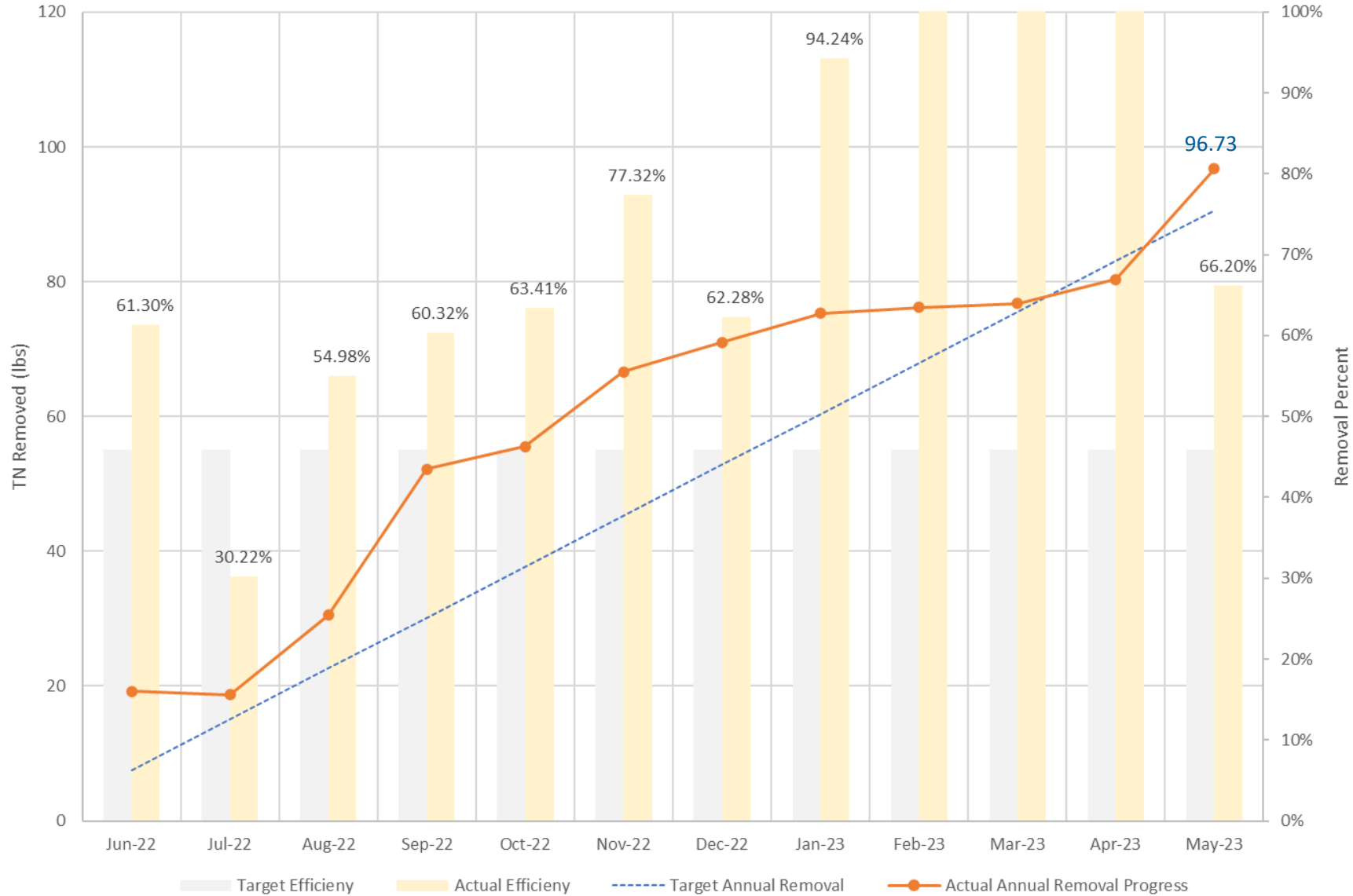
	WD	CMAC	Increase	% Increase
Number of Days with Rainfall	112	112		
Number of Pre-storm Discharges	0	69		
Number of Storm Overflows	19	48		
Number of Days with Discharge	246	120	-126	-49%
Total Rainfall (inches)	54.46	54.46		
Runoff Volume (inches)	36.49	36.49		
Captured Runoff (inches)	12.98	25.76	12.77	98%
Captured Runoff (% of Runoff)	36%	71%	35%	98%
Weighted Inch-Days of Detention	65.45	107.24	41.79	64%



TN Reduction Comparison



SR 45, Pond 1 TN Removal Reporting Summary June 2022 - May 2023



CMAC Annual Monitoring Summary

CMAC:

- Adaptively managed the pond
- Reduced pond overflow events
- Captured and treated more runoff volume
- Treated runoff longer
- Produced 97 lbs excess TN removal

