Hornsby Springs Restoration Project

Greg Owen
Environmental Protection

Hornsby Spring Restoration Project

$423,480 Springs Grant Funding for a Two Phased Project

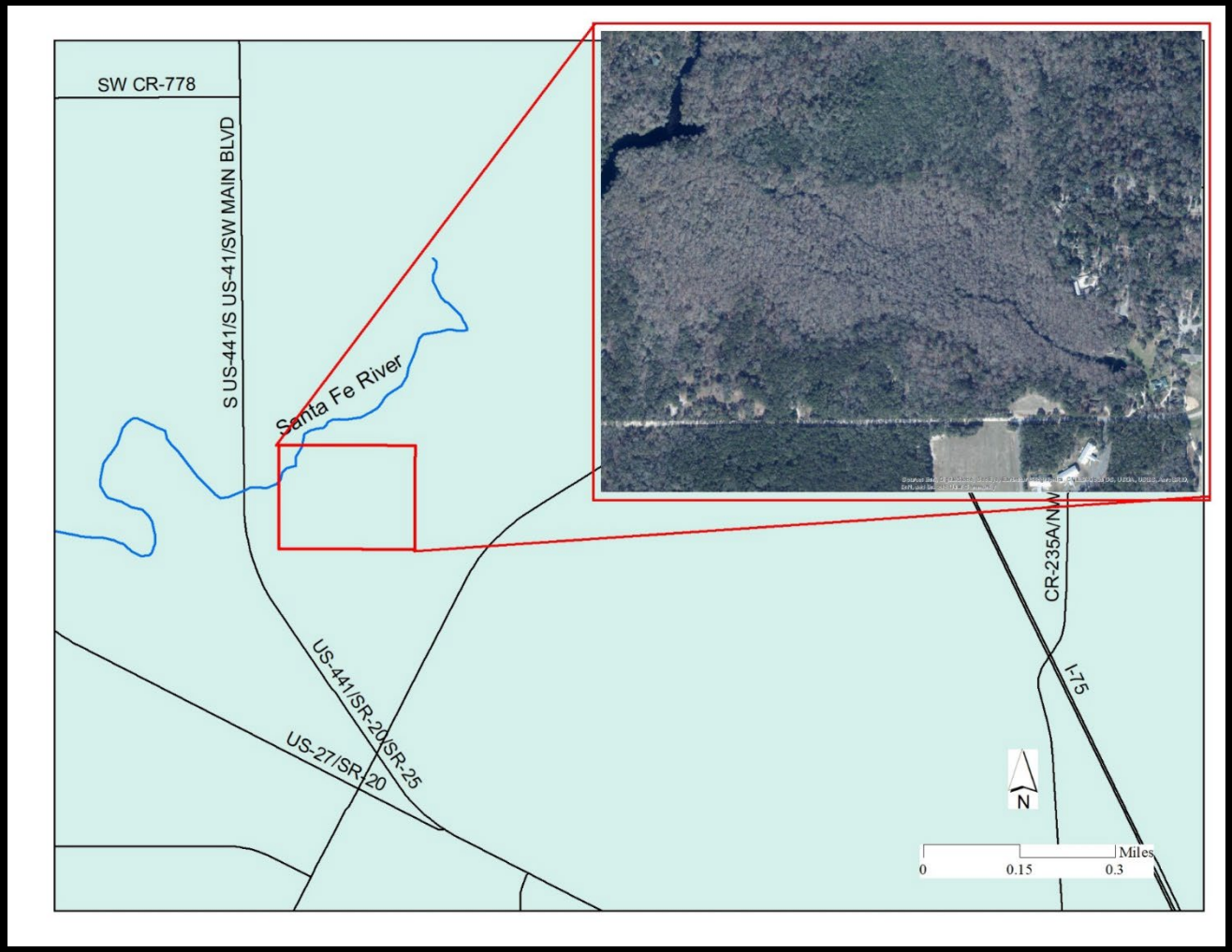
Phase I: Pilot project to evaluate the role of dissolved oxygen as a restoration technique $78,164

Phase II: Removal of sediments and nuisance algae from the spring pool and planting of submerged aquatic vegetation $215,594

Project Partners: Camp Kulaqua, Suwannee River Water Management District, Florida Department of Environmental Protection, and the University of Florida.

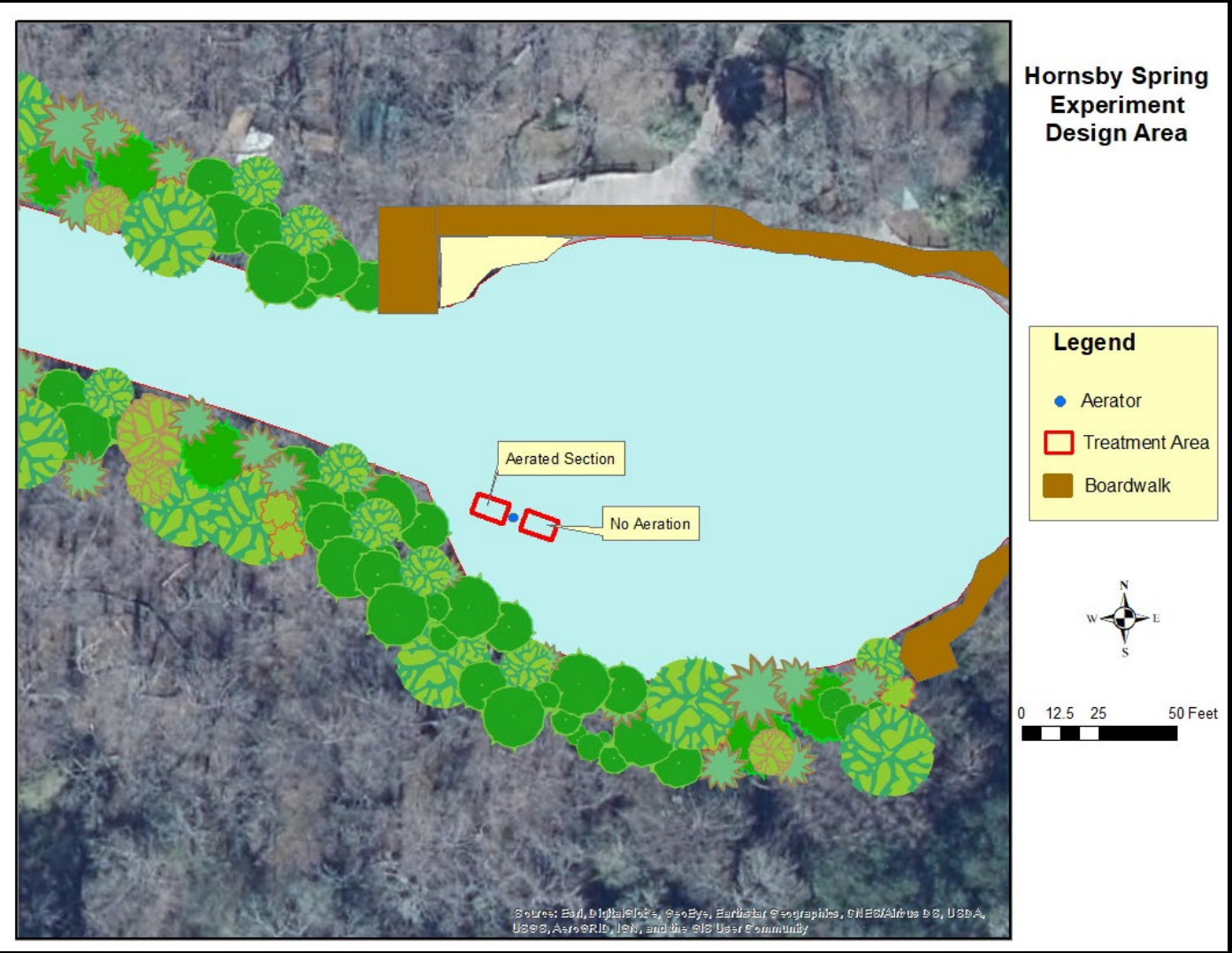
Phase I Aeration Pilot Project Experiment

- Evaluate competing restoration activities at Hornsby Spring

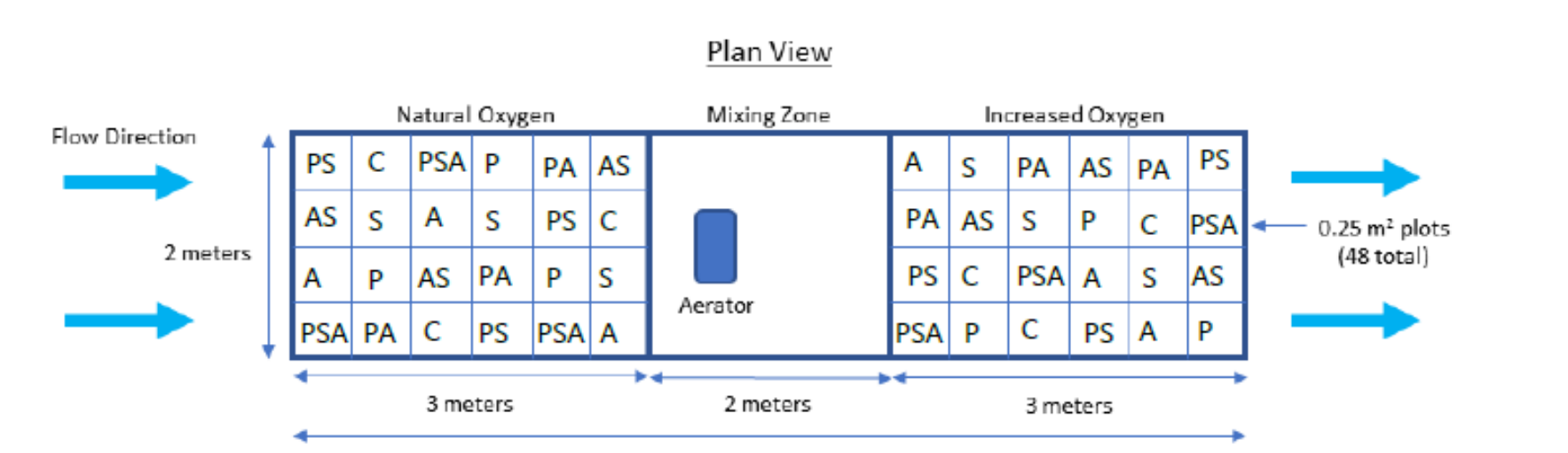


Phase I Hornsby Dissolved Oxygen Study

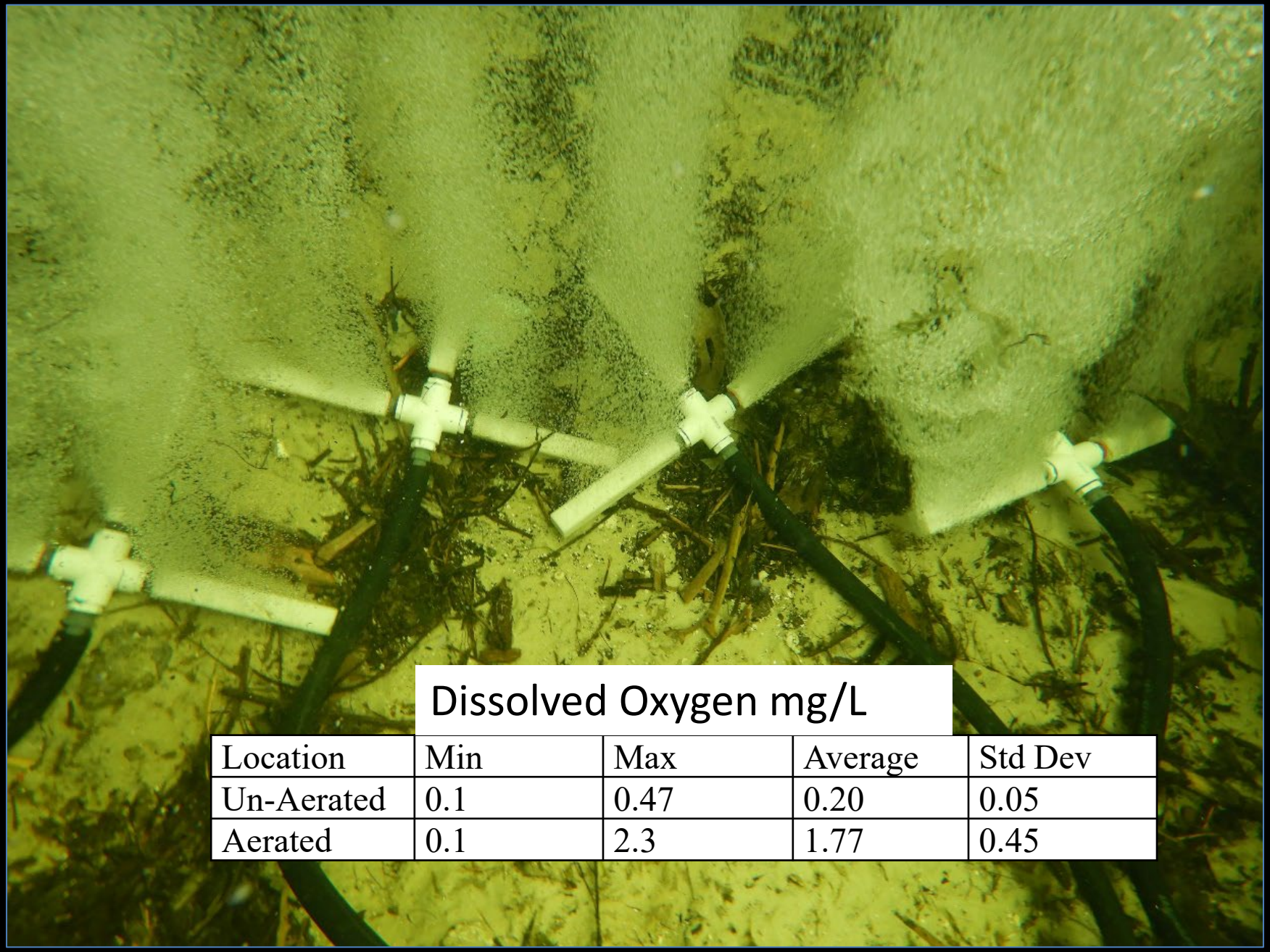
- Variables:
  - Aeration
  - Addition of snails
  - Plantings
  - Removal of Algae



Variables: Plants (P), Snails (S), Removal of Algae (A), and Control (C)



16 total treatments, 3 replications



Dissolved Oxygen mg/L

Location	Min	Max	Average	Std Dev
Un-Aerated	0.1	0.47	0.20	0.05
Aerated	0.1	2.3	1.77	0.45


St. Johns River
Water Management District
florida's water
it's worth saving
www.floridaswater.com
TOOLS FOR SCHOOLS

Photo courtesy of Jennifer Adler

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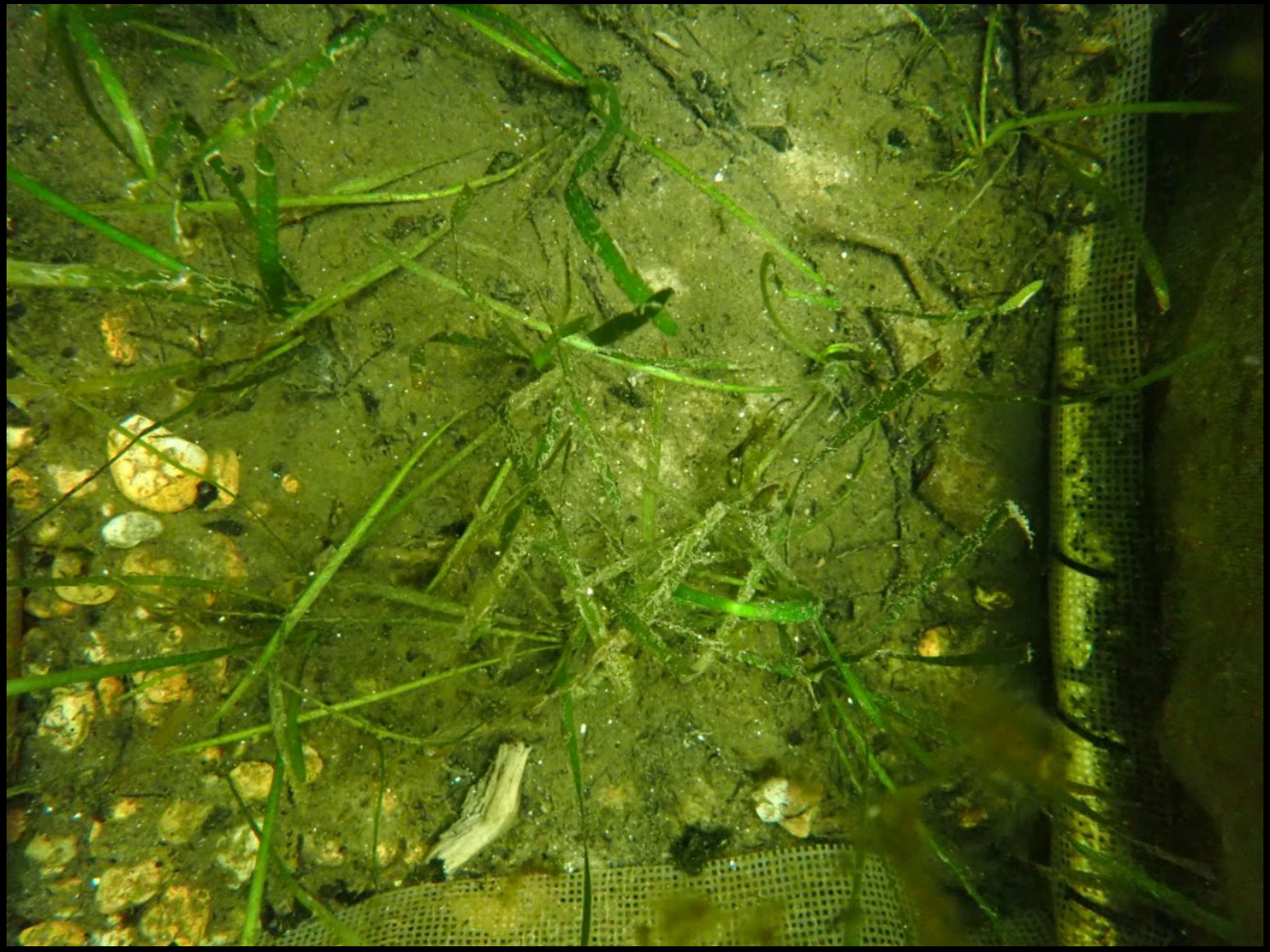
Unaerated PSA 11 days

Unaerated PSA 25 days

Unaerated PSA 57 days

Unaerated PSA 102 days

Unaerated PSA 340 days



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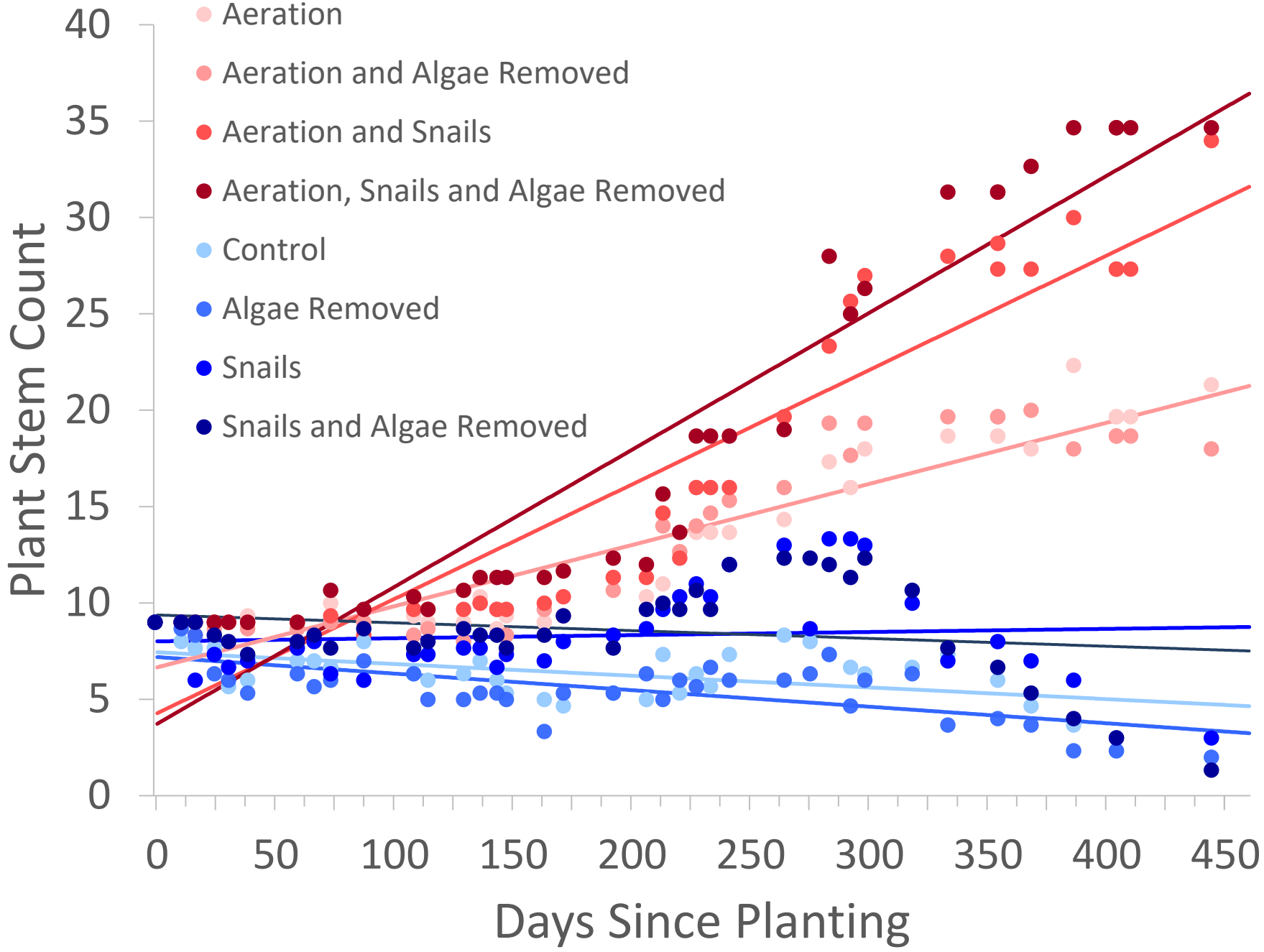

Aeration
Aeration and Algae Removed
Aeration and Snails
Aeration, Snails and Algae Removed
Control
Algae Removed
Snails
Snails and Algae Removed
Plant Stem Count
0
5
10
15
20
25
30
35
40
0
50
100
150
200
250
300
350
400
450
Days Since Planting

Leaf Blade Measurements

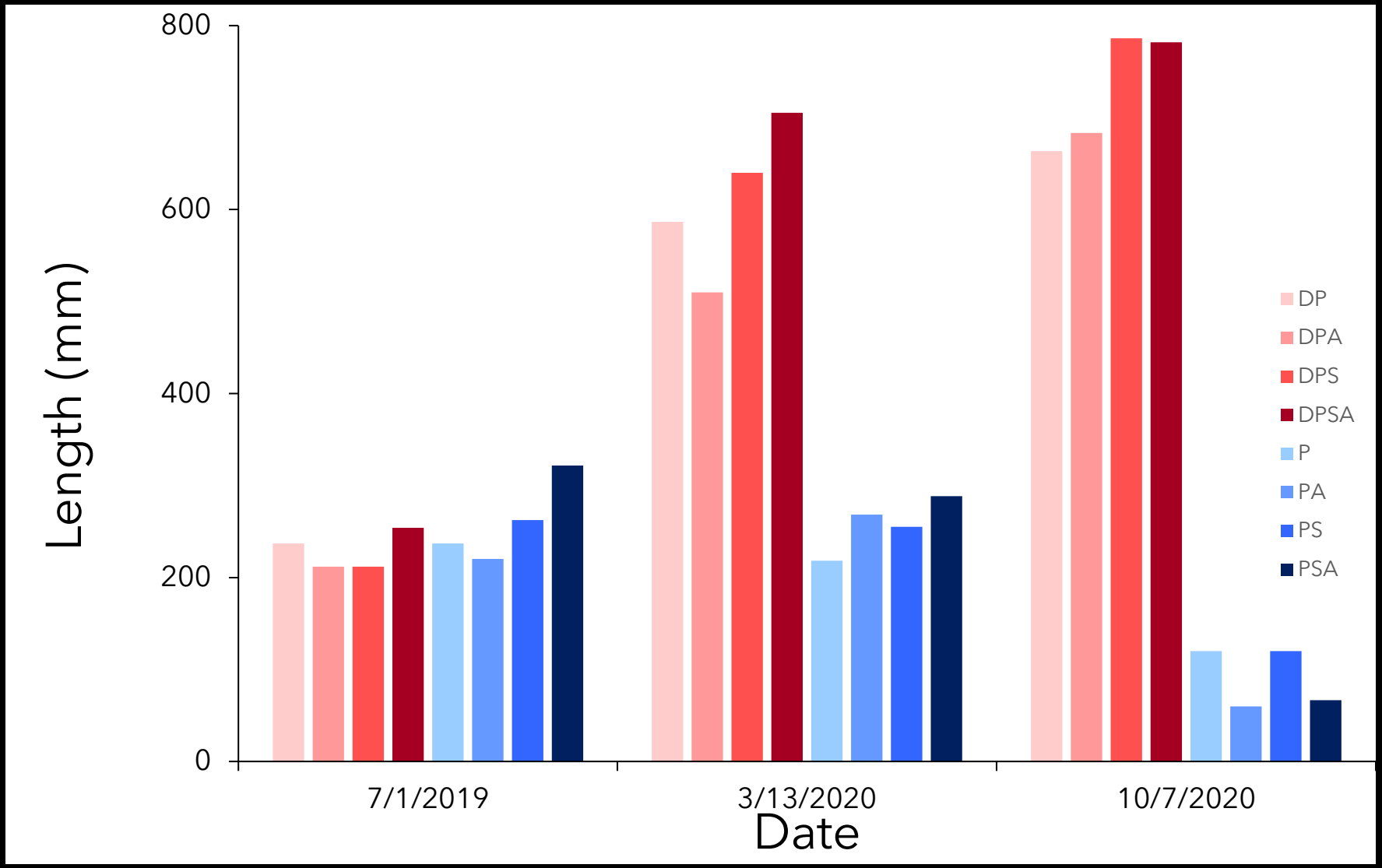
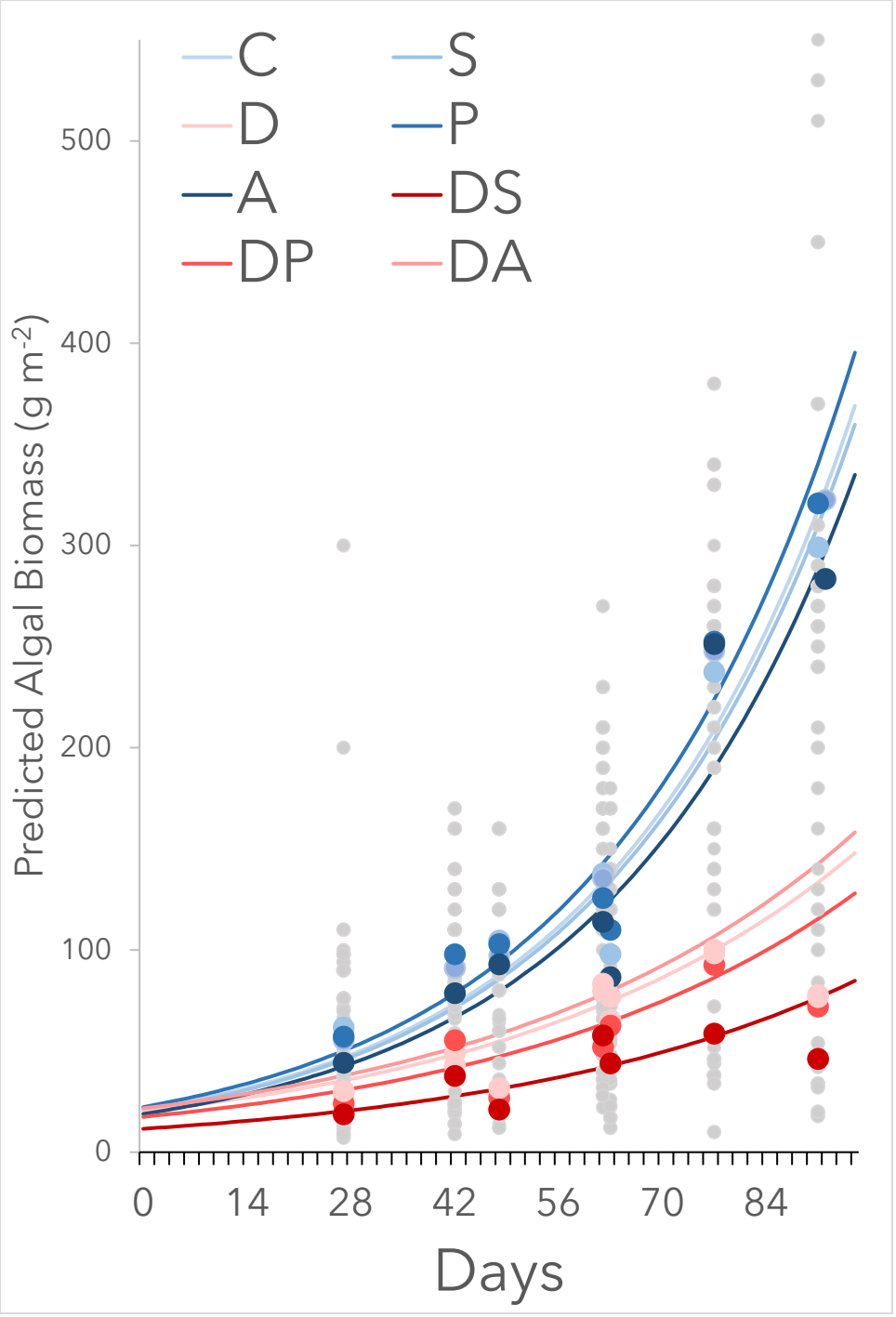
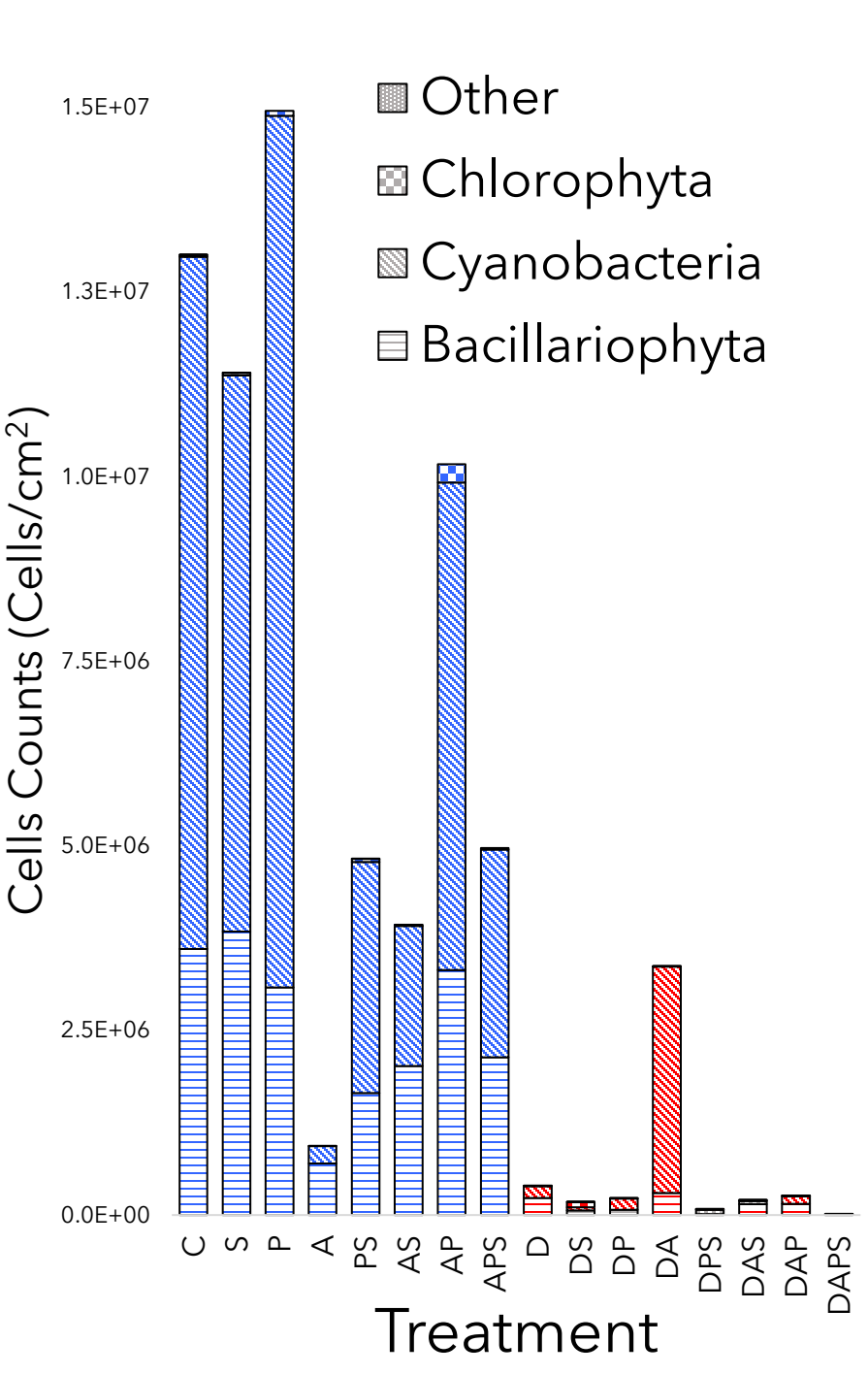
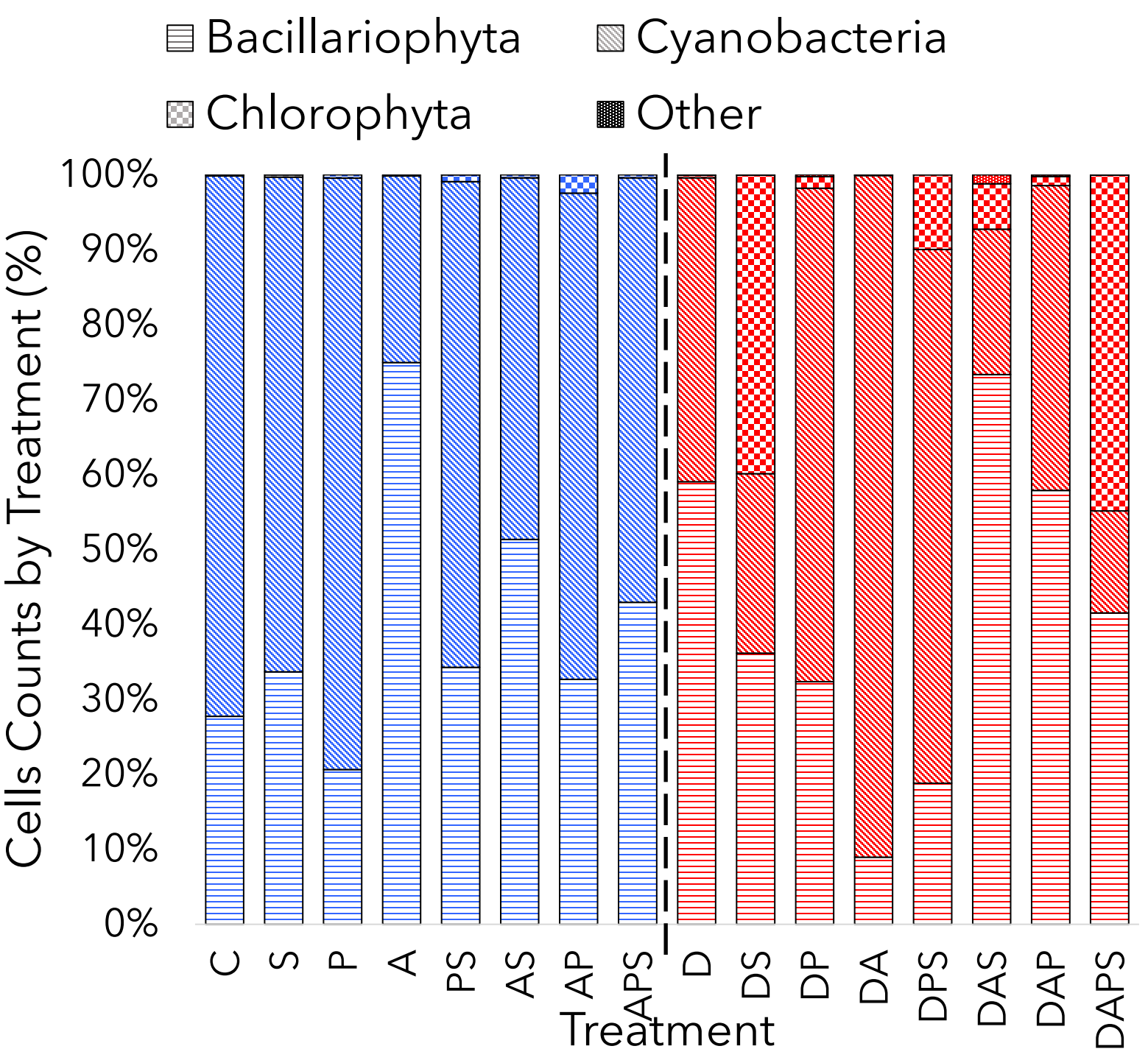


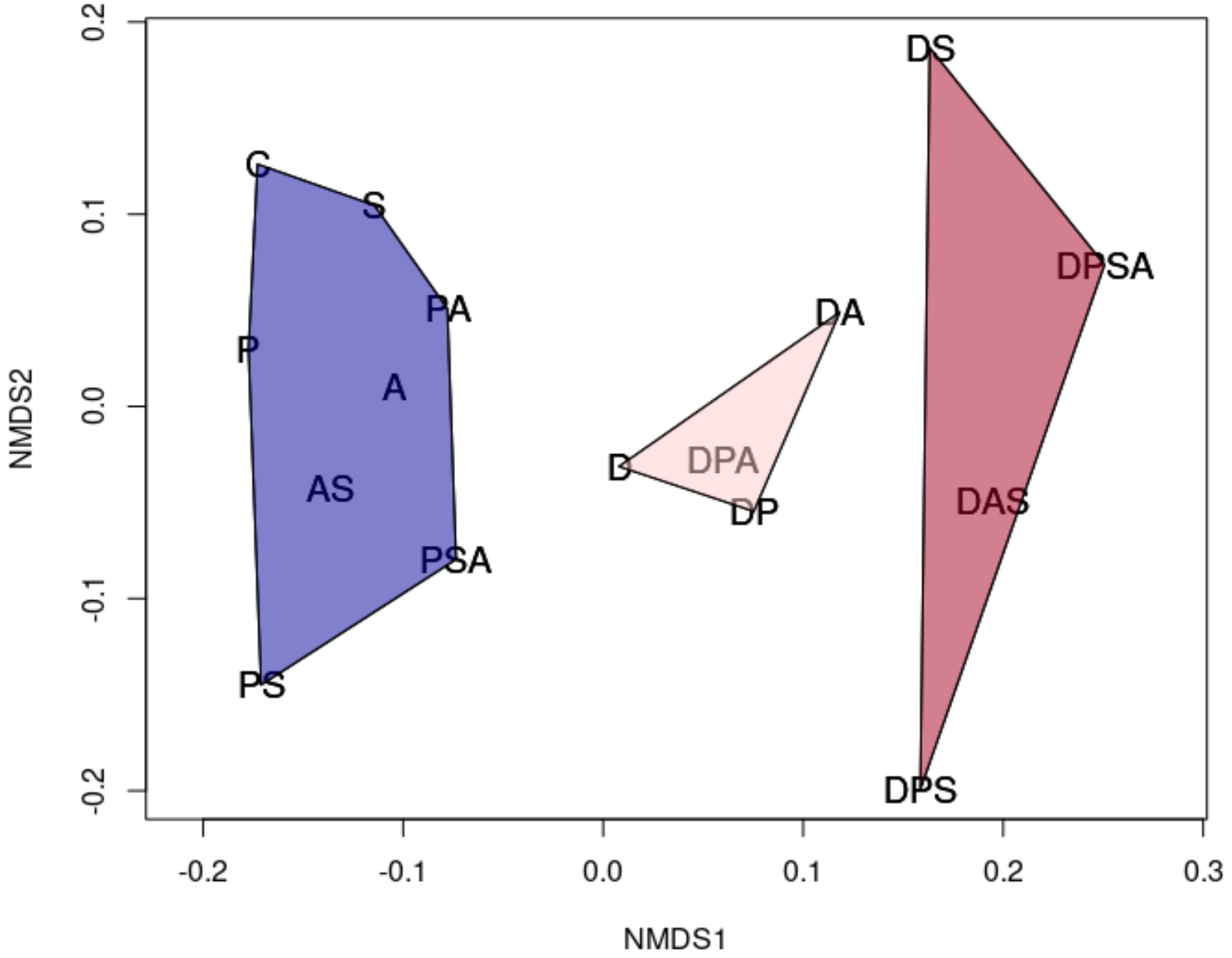
Photo courtesy of Jennifer Adler


C
S
D
P
A
DS
DP
DA
Predicted Algal Biomass (g m-2)
0
100
200
300
400
500
0
14
28
42
56
70
84
Days


Other
Chlorophyta
Cyanobacteria
Bacillariophyta
Cells Counts (Cells/cm2)
0.0E+00
2.5E+06
5.0E+06
7.5E+06
1.0E+07
1.3E+07
1.5E+07
C
S
P
A
PS
AS
AP
APS
D
DS
DP
DA
DPS
DAS
DAP
DAPS
Treatment


Bacillariophyta
Cyanobacteria
Chlorophyta
Other
Cells Counts by Treatment (%)
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
C
S
P
A
PS
AS
AP
APS
D
DS
DP
DA
DPS
DAS
DAP
DAPS
Treatment

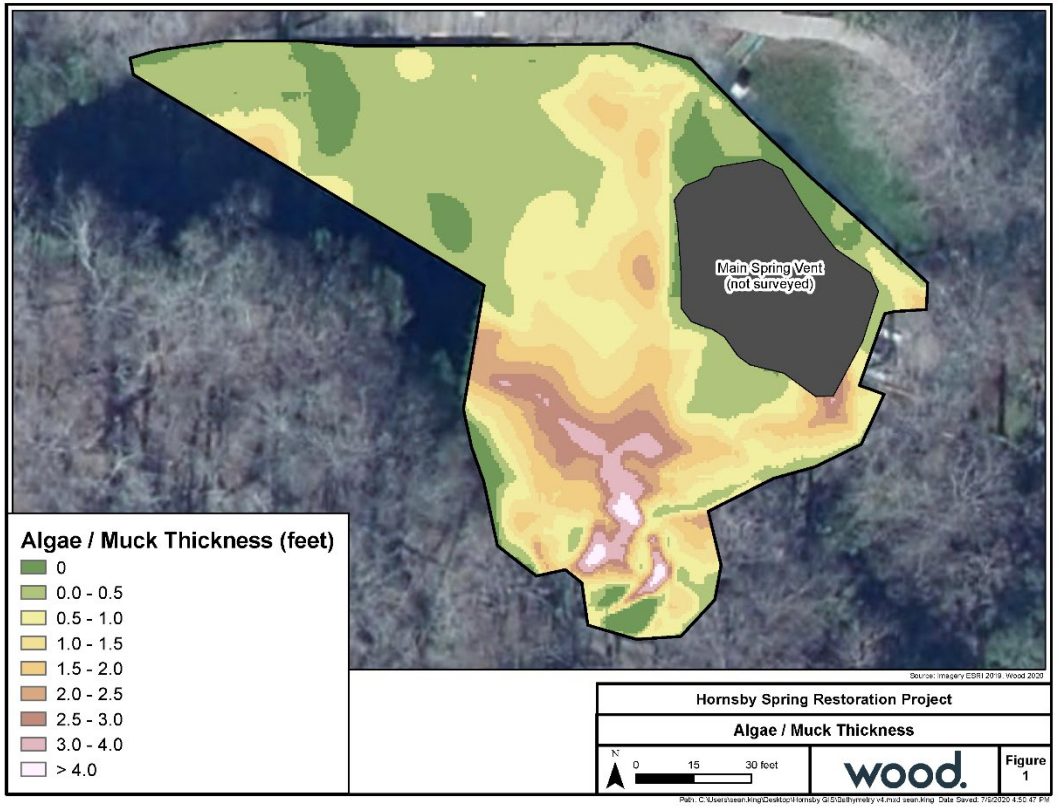
Principal Component Analysis



Results

- Aeration alone was statistically significant and reduced the predicted algal biomass by
- Snails were statistically significant when combined with aeration,
- Planting SAV and aeration lesser yet still statistically significant reduction in algal biomass
- Removal of algae at the start of the project did not have significant effect of the growth of algae

Phase II Sediment Removal and Replanting



- Attain Permit Requirements
- Remove algae and muck from Spring Pool (400 CY)
- Replant with native SAV

Permitting Requirements

- Division of Historic Resources – Archeological Resource Management
- 404 FDEP State Submerged Sovereign Land moved from USACE
- SRWMD Environmental Resource Exemption Permit


Hornsby Spring
Legend
Project Area
Muck/Algae Removal Area
Staging/Dewatering Area

Request for Proposal Sediment Removal

- Sea and Shoreline was selected for the sediment removal
- Bi-weekly site visits were conducted during the sediment removal
- Plantings were completed by Wood under the effort of three divers between March 8th and March 10th

Water Return with Erosion Controls

Geotube Bag to Prevent Turbidity of Return Water

Debris Being Removed from Pump

Removal Area Comparison of Cleaned vs Uncleaned

Diver Using Suction Dredge

Plantings

- Plants were sourced from Duke Energy Mariculture Center and Hornsby Spring
- 0.21 acre planted area
- 50 *Vallisneria americana* “burritos”
- 70 *Vallisneria americana* peat pots
- 1,800 bare root *Vallisneria americana*
- Plants spaced evenly 18” centers


March 2022

November 2022

Conclusions

- Complex interactions among ecosystem drivers and internal processes limit the efficacy of some restoration actions
- Algal removal activities offered limited value either alone or in combination with other activities
- Gastropods have a strong affect on algal growth, but only when dissolved oxygen threshold (>1.67 mg/L) are met

- SAV planting were successful only when dissolved oxygen thresholds (>1.67mg/L) are met
- Dissolved oxygen is the keystone variable controlling spring restoration

Thank You

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Photos courtesy, Jennifer Adler