INNOVATIVE TECHNOLOGIES COMPLETED PROJECTS SUMMARY

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AGENDA

- Program Overview
- Grant Categories
- Nutrient Removal Project
- Algae Removal and Treatment Project
- Prediction and Monitoring Project
- Questions

INV38: AECOM Algae Harvesting System, Bonnet Springs Park.

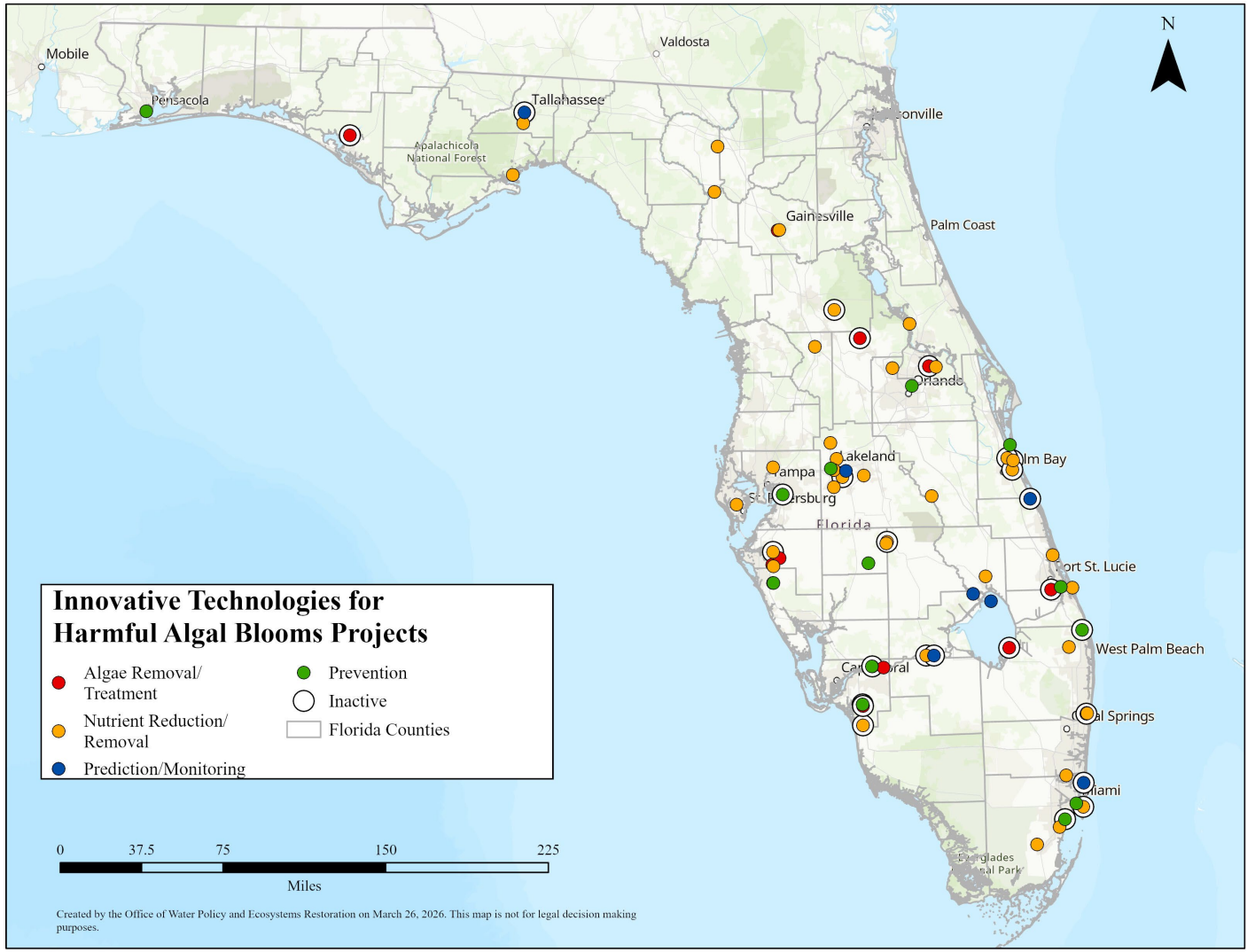
PROGRAM OVERVIEW

- Blue-Green Algae Task Force recommendations: invest in technologies that aid in prevention, cleanup and mitigation of harmful algal blooms.
- Program History and Milestones
  - Started in 2019.
  - 84 Grants Awards as of April 2026.
  - $75 million appropriated.
  - 27 projects completed.
  - 51 projects under evaluation.

STORY MAP LINK -- HTTPS://STORYMAPS.ARCGIS.COM/STORIES/4B3D92570E9148CEAB05384ECDE678DA .

GRANT CATEGORIES

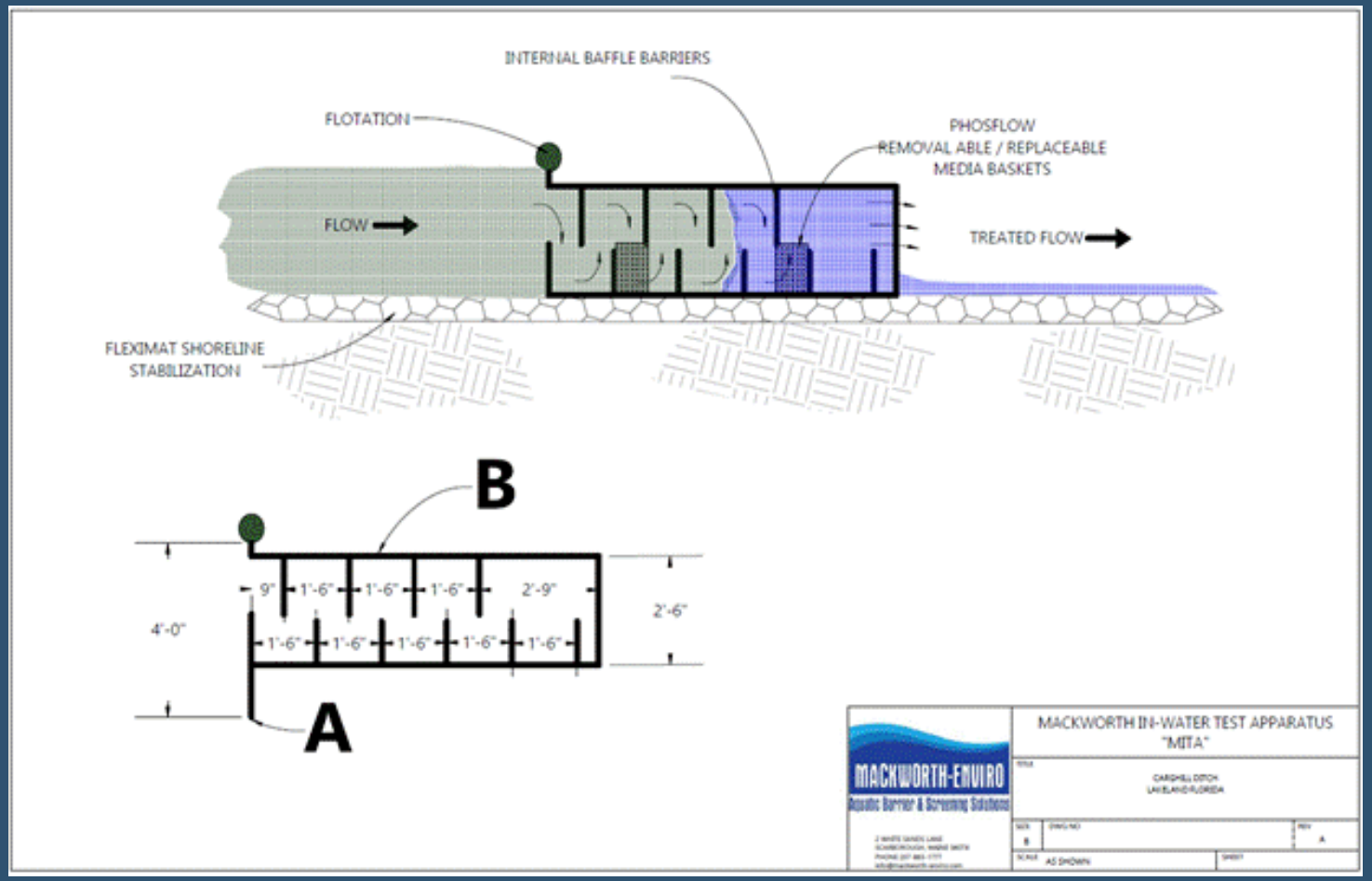
- Nutrient Reduction/Removal:
  43 Grant Awards – 9 completed
- Prevention:
  13 Grant Awards – 4 completed
- Algae Removal and Treatment:
  13 Grant Awards – 6 completed
- Prediction and Monitoring:
  9 Grant Awards – 5 completed



NUTRIENT REMOVAL

Rapid Deployment of Biochar Filter Barriers for Nutrient Recovery
Se7en Wetlands Park, Polk County – USF

Used phosphorus-sorbing materials in a Mackworth In-Water Test Apparatus (MITA).



NUTRIENT REMOVAL

Rapid Deployment of Biochar Filter Barriers for Nutrient Recovery
Se7en Wetlands Park, Polk County – USF

Results:

- Statistically significant reductions in orthophosphate ($p = 0.004$)
- <30% reduction in orthophosphate

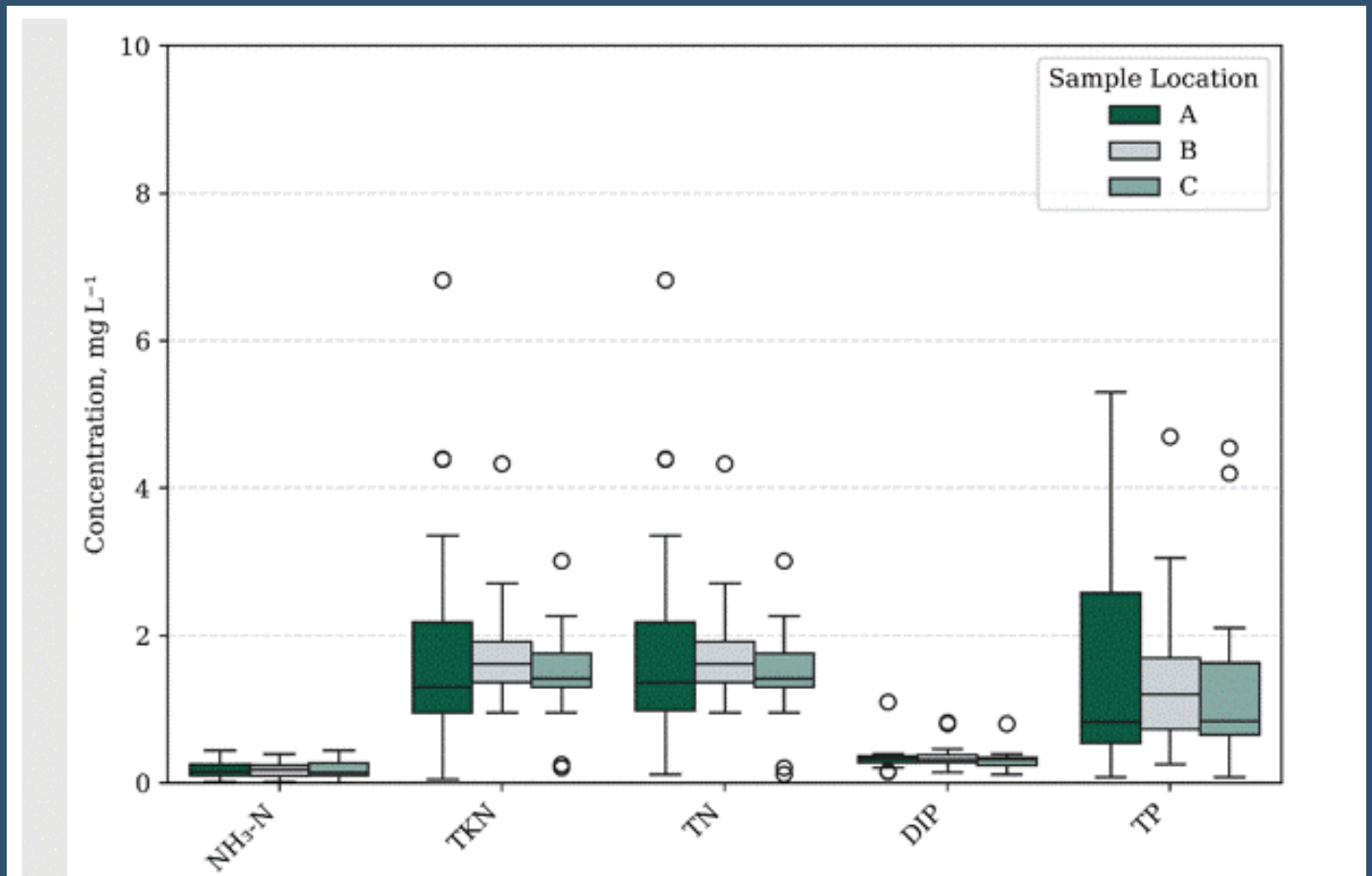


Figure 4.7 Boxplots of water quality parameters at the three sampling locations (a) upstream of the MITA, (b) the middle of the MITA, and (c) at the MITA outlet.

PREVENTION

Pilot Project for Algae Control Using Non-Invasive Ultrasonic Technology
Hillsborough Reservoir -- City of Tampa

- Used two LG Sonic ultrasonic buoys in the reservoir.
- Buoys emit low-power ultrasound waves across the upper water layer.
- Causes algae to sink in the water column and naturally degrade over time.

PREVENTION

Pilot Project for Algae Control Using Non-Invasive Ultrasonic Technology
Hillsborough Reservoir -- City of Tampa

Figure 20: Buoy Pro Chlorophyll-a (µg/L) Quarter 5

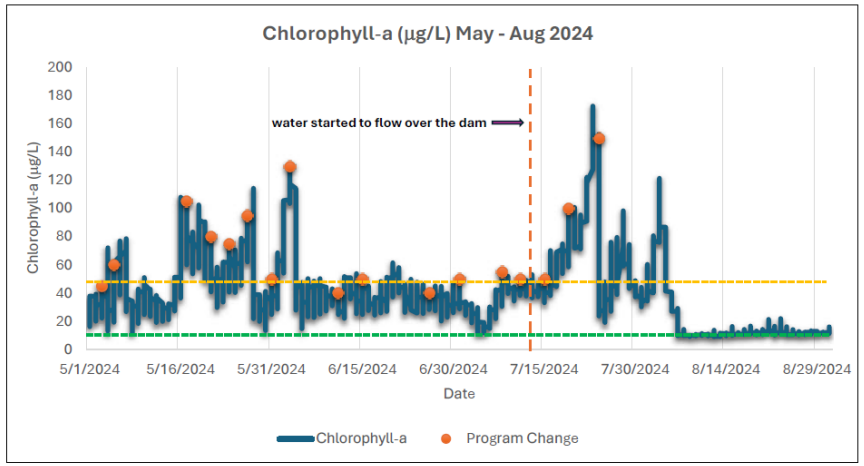
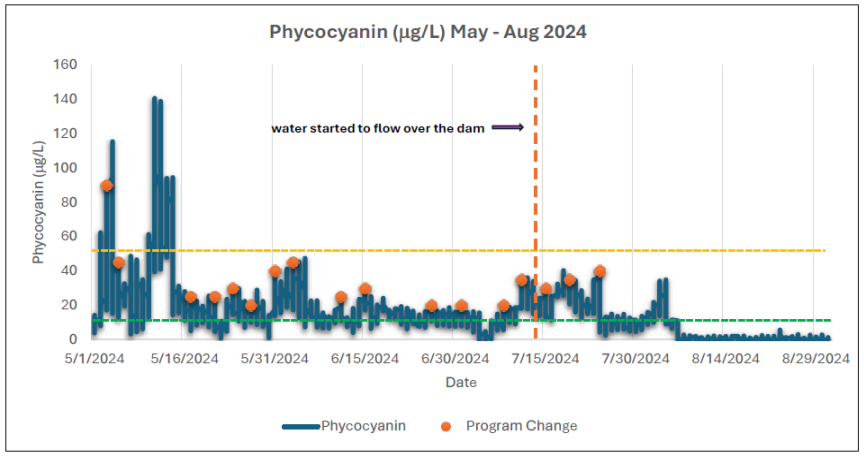


Figure 21: Buoy Pro Phycocyanin (µg/L) Quarter 5



Resulted in a reduction in markers of algae growth:

- 71% reduction in chlorophyll-a.
- 72% reduction in phycocyanin.

Shift toward chemical-free algae management:

Copper sulfate reduction:

- 650 lbs used in 2022 (pre-project).
- 100 lbs applied in 2023 (start-up precaution).
- 0 lbs in 2024 in zones 3 and 4.

ALGAE REMOVAL AND TREATMENT

Intact Cellular Algae Harvesting with Simultaneous Nutrient Export to Mitigate HABs and Reduce Nutrients Lake Jesup and Apalachee Regional Park – SJRWMD and NWFWMD

- The algae harvester withdraws water from the source treats it to coagulate the algae into larger "floc" particles.
- Microscopic air bubbles are generated and attach to the floc.
- Floc floats to the surface of the water in the flotation tank and is skimmed off the surface.

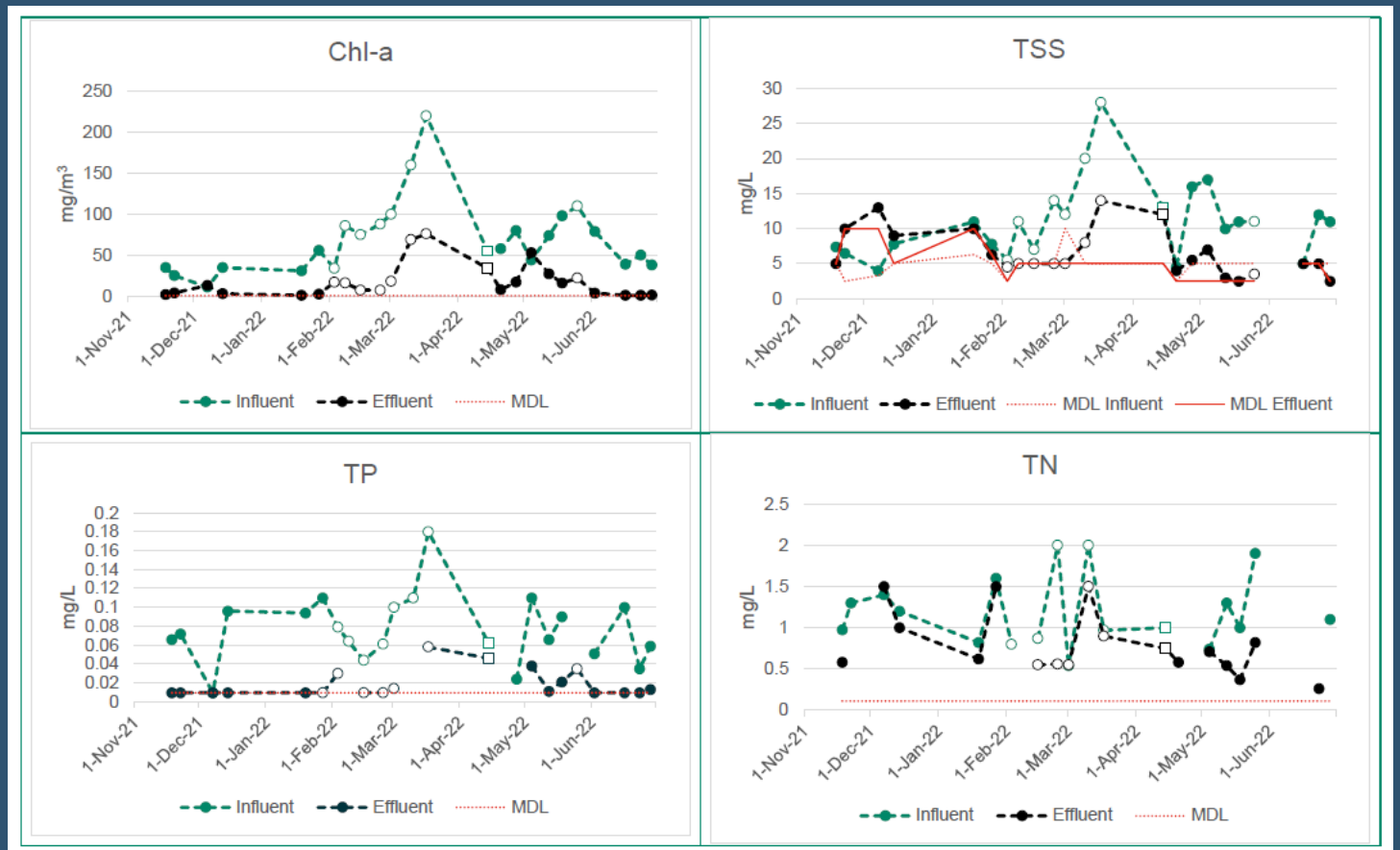
Algae harvester with Hydronucleation Flotation Technology
AECOM Technical Services Inc.

ALGAE REMOVAL AND TREATMENT

Intact Cellular Algae Harvesting with Simultaneous Nutrient Export to Mitigate HABs and Reduce Nutrients Lake Jesup and Apalachee Regional Park – SJRWMD and NWFWD

Resulted in a reduction in :

- Chlorophyll-a:
  83% to 94% reduction
- Total suspended solids
  55% to 83% reduction
- Total phosphorus:
  85% to 88% reduction
- Total nitrogen:
  45% reduction



Notes: Closed circles denote standard treatment (ACH = 20 ppm, PT-2160 = 1 ppm). Open circles denote organic treatment (PT-2160 = 2 ppm). Open squares denote coagulant only treatment (ACH = 40 ppm). MDL = Method Detection Limit

PREDICTION AND MONITORING

Multi-Spectral Optical Sensor Trained Remote Sensing Analysis of Satellite Imagery to Track Nutrient Sources and Propagation of Algae Blooms, Indian River Lagoon – Brevard County

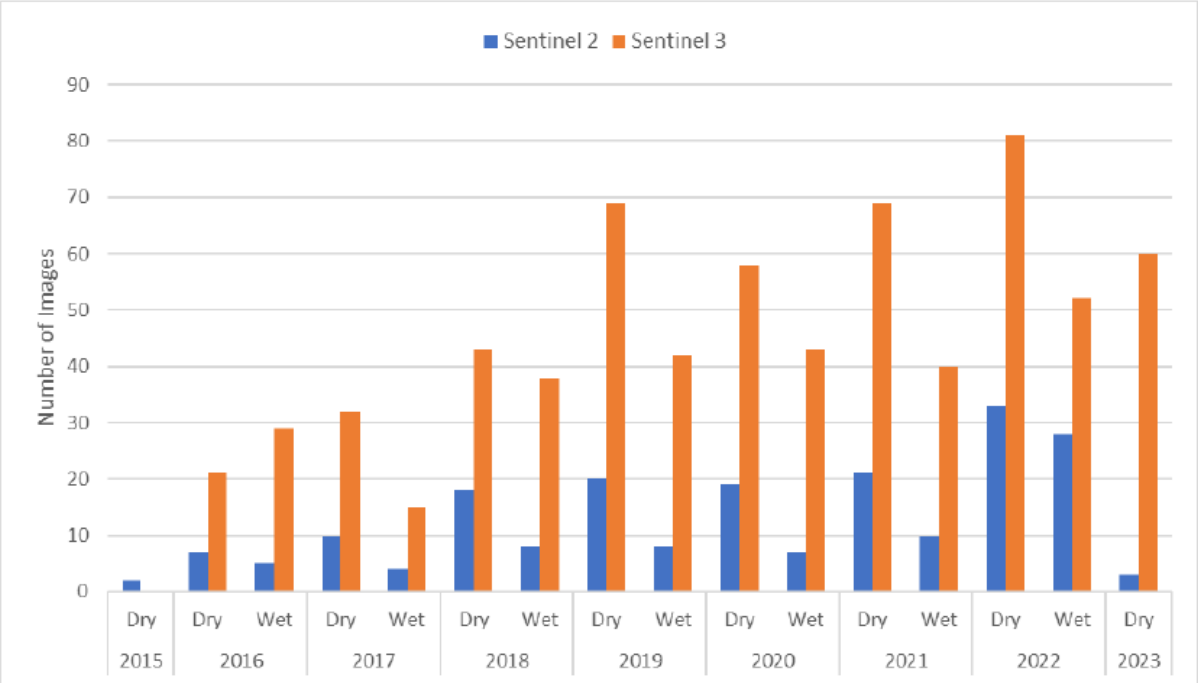
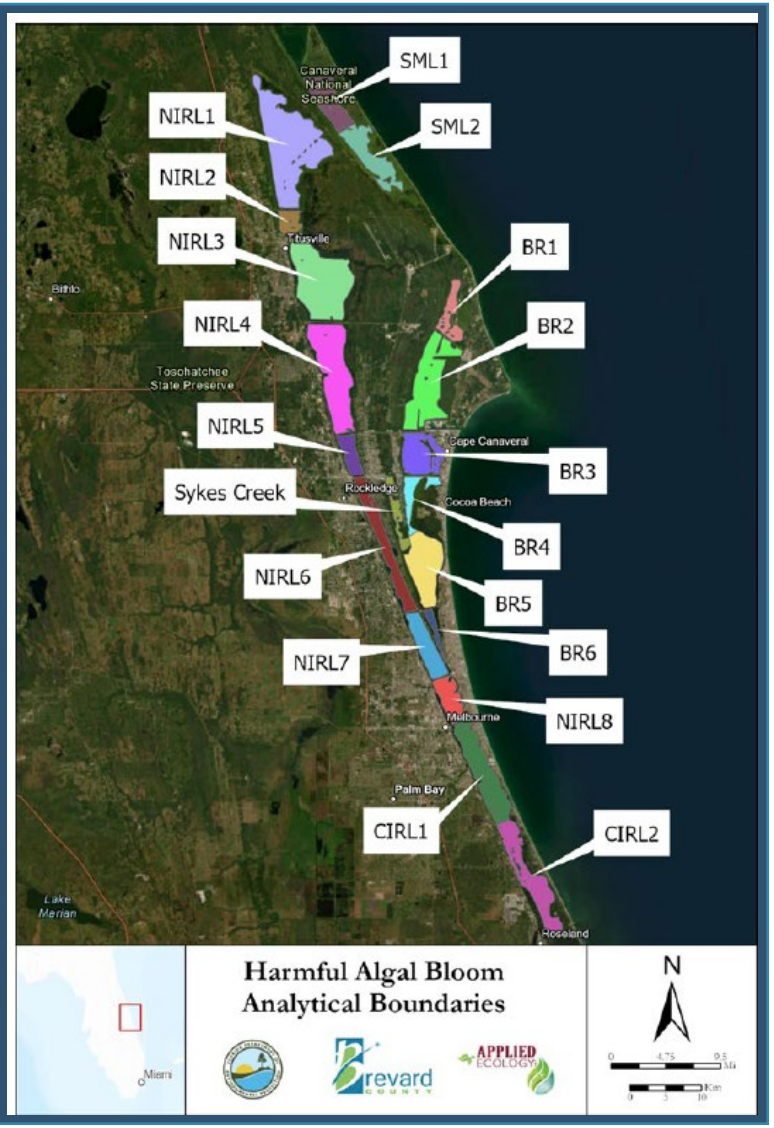
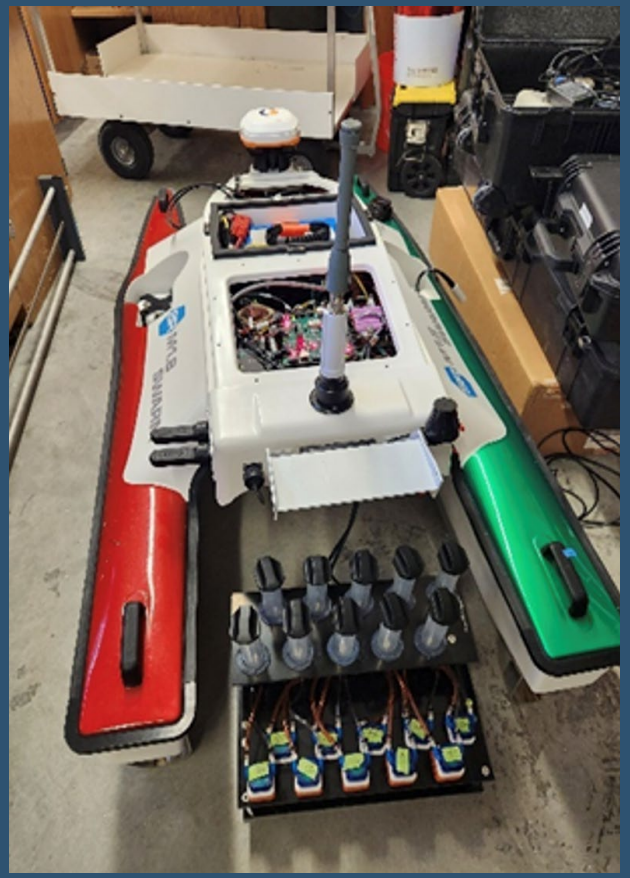


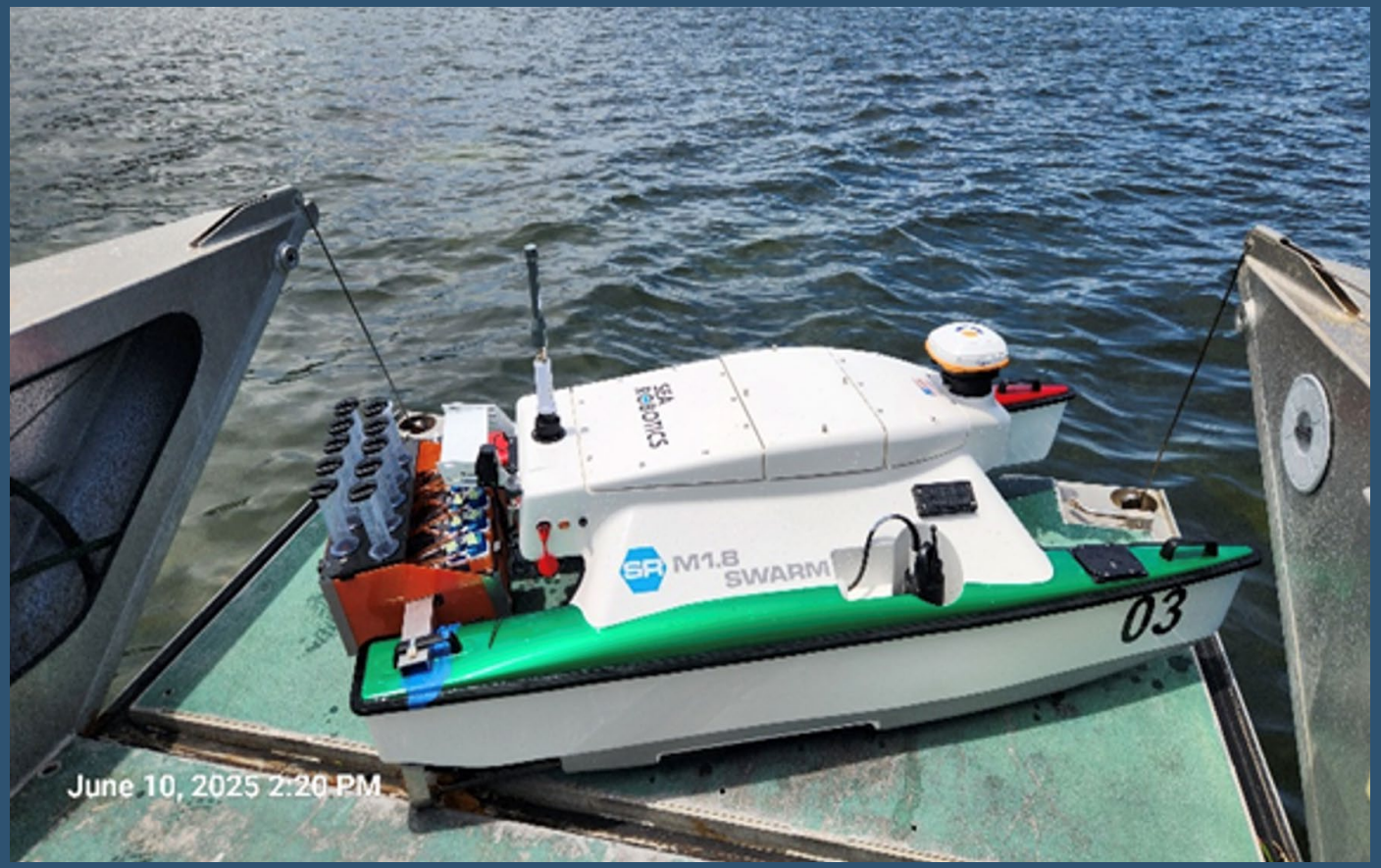
Figure 4. Sentinel 2 and Sentinel 3 data inventory from 2015 to 2023 by year and season. Long Description of Figure 4.

- Developed and implemented a framework for rapid Harmful Algal Bloom detection in the Indian River Lagoon.
- Demonstrated that remote sensing can reliably determine bloom intensity, duration and severity, as well as other trends.



QUESTIONS?





INV31 autonomous surface vessels deployed by Florida International University in Biscayne Bay for harmful algal bloom detection and water quality monitoring.

THANK YOU

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