Evaluation of Inundation Depth and Duration Threshold for Cattail Sustainability

In-situ Study – Cattail Monitoring

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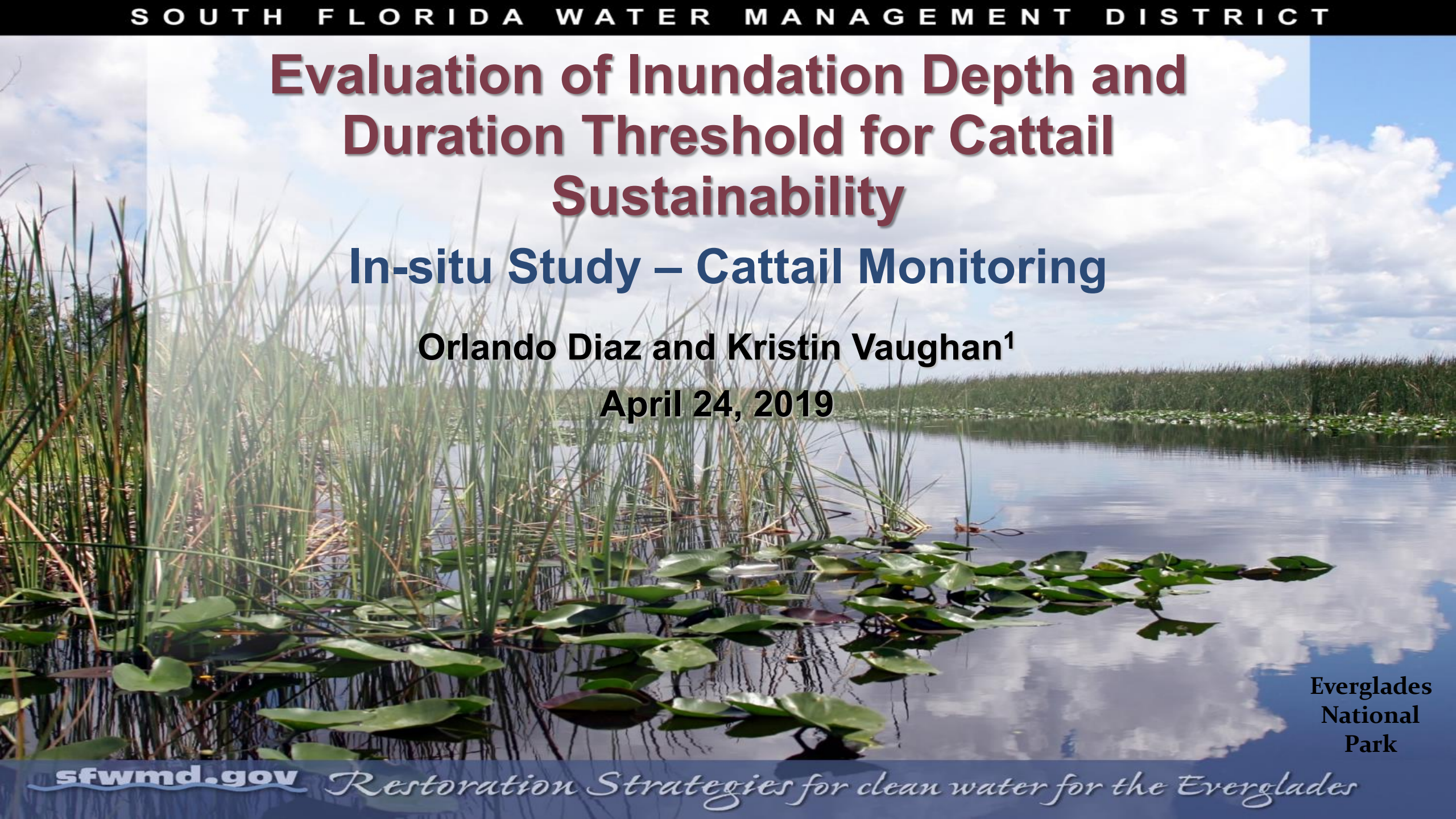


Everglades National Park

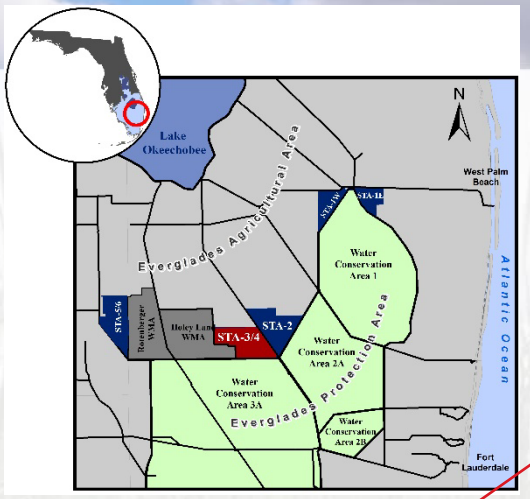
Overall Study Objective

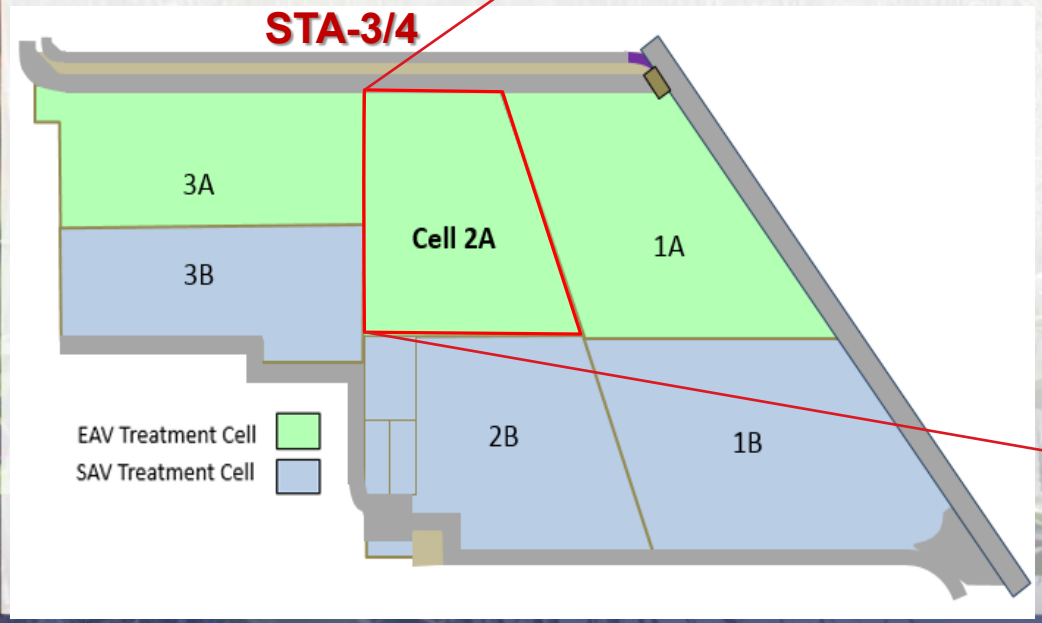
- Identify field conditions such as water depth, duration, and frequency of inundation affecting Cattail (*Typha domingensis*) sustainability in the STAs

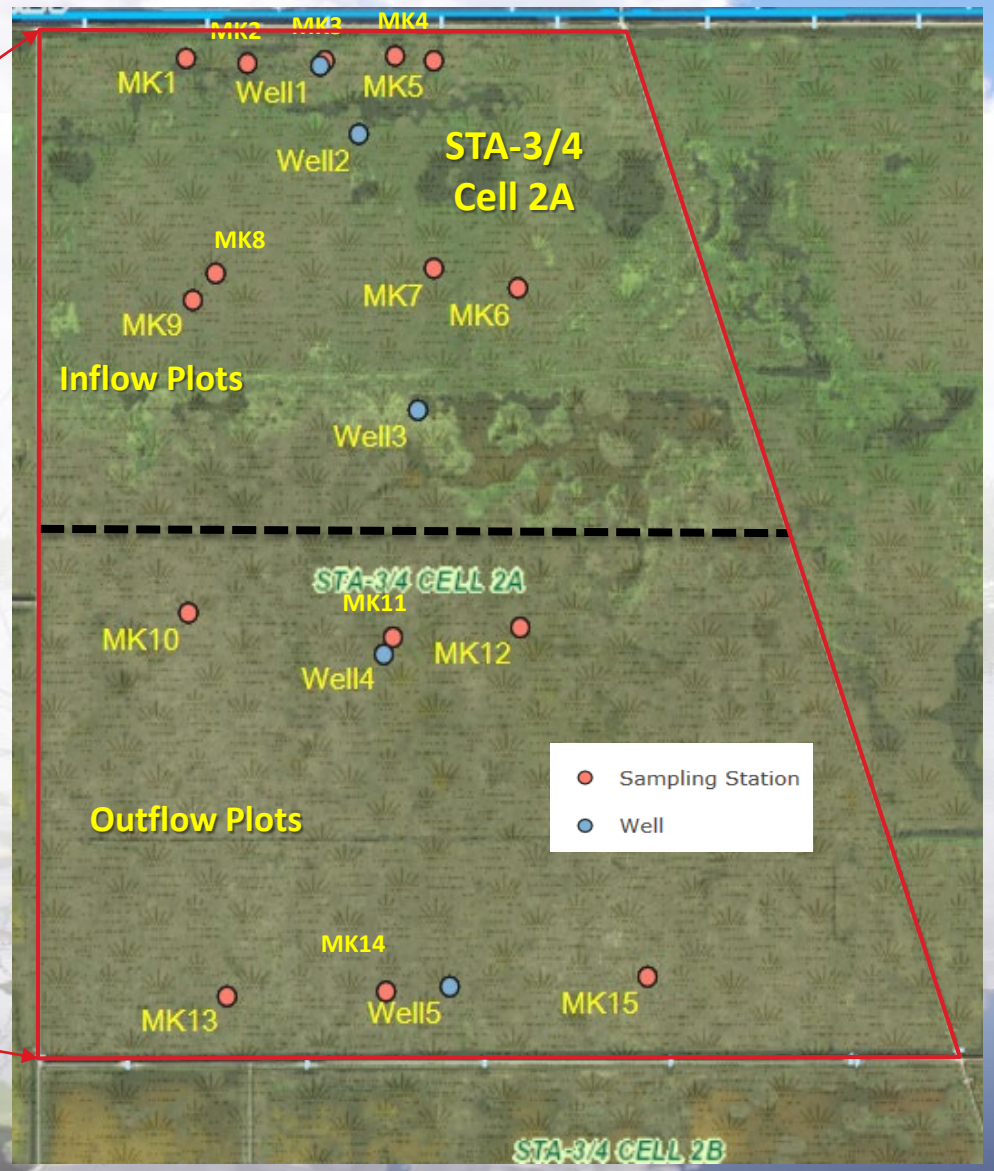
Hypotheses

- There is an inundation duration threshold for cattail sustainability at a specific inundation depth, in terms of survival, growth, and propagation
- The inundation period threshold is longer at a relatively shallow inundation depth than at deeper inundation conditions
- Longer inundation durations than the threshold result in a decline in plant density, biomass, and the ability to propagate

STA-3/4 Cell 2A – Plot Location



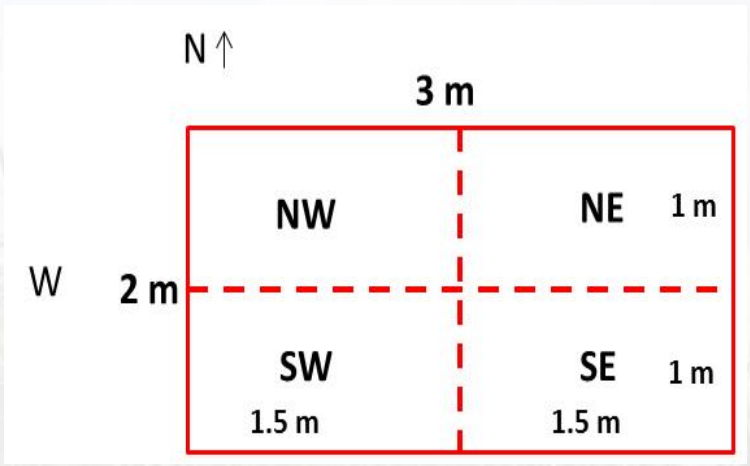




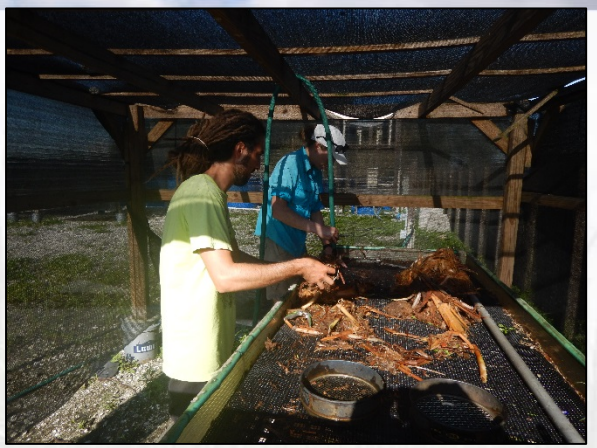
Monitored Parameters

- Water Depth
  - DBHYDRO Stage Data
- Cattail Monitoring Parameters
  - Plant density (adults, juveniles, adults with flower, and dead)
  - Photosynthesis
  - Leaf Elongation
- Plant Biomass
  - Samplings: November 2014, October 2015, and November 2017
  - Biomass components: Leaf, shoot base, root, rhizome and dead

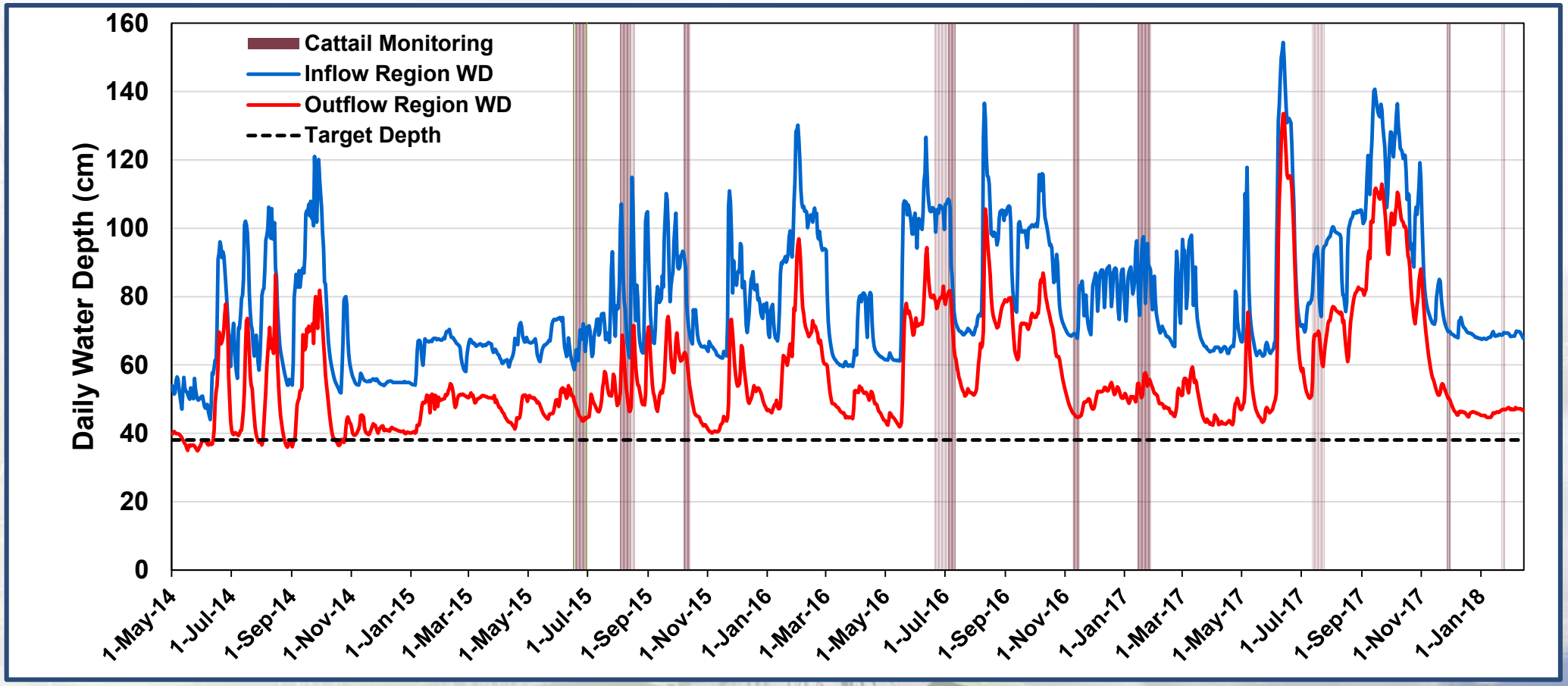
Cattail Density Monitoring



Plant Biomass Processing



STA-3/4 Cell 2A - Water Depth Data



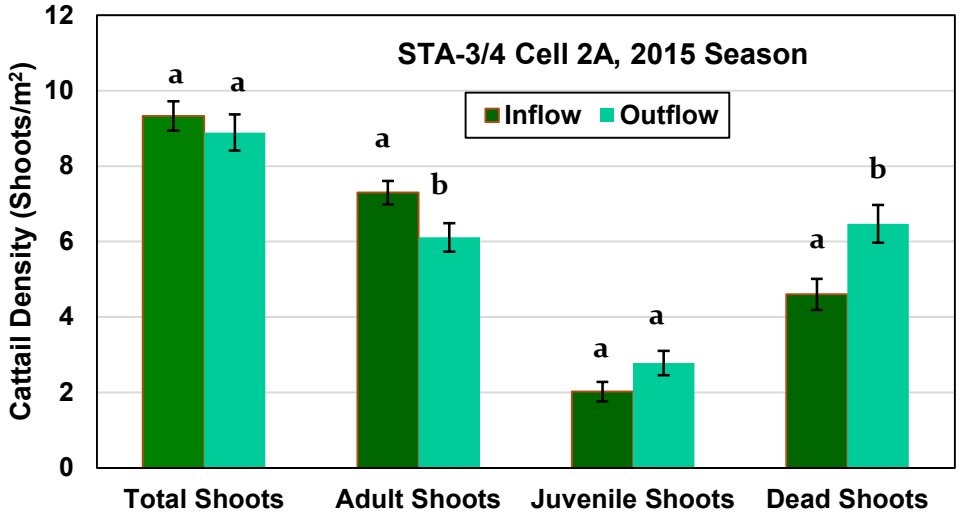
Frequency of Occurrence of Water Depth Ranges

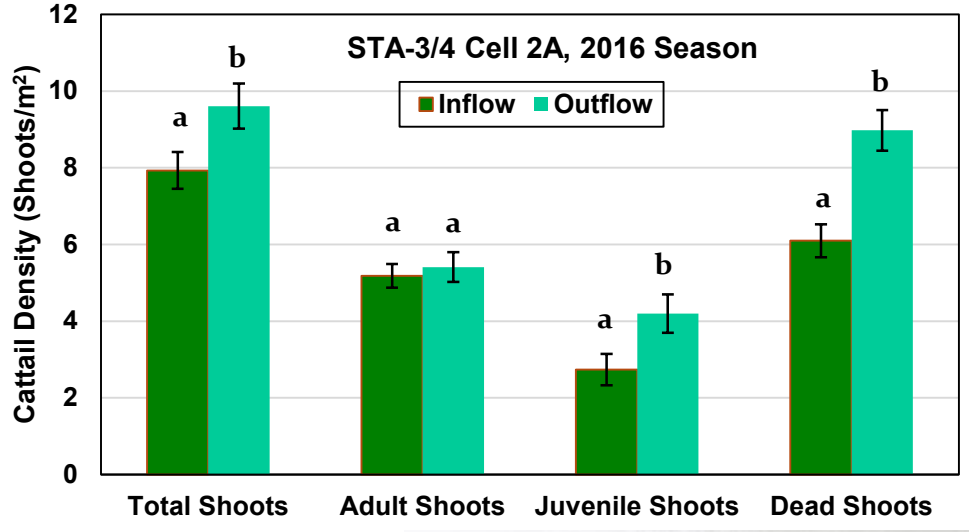
Water Year	Water Depth Range Categories (cm) [a]				
	< 38	38–61	61–76	76–91	> 91
	Days within Each Depth Range Category [b]				
Inflow					
WY2015	0 (0%)	155 (43%)	136 (37%)	34 (9%)	40 (11%)
WY2016	0 (0%)	20 (5%)	190 (52%)	83 (23%)	73 (20%)
WY2017	0 (0%)	0 (0%)	145 (40%)	90 (25%)	130 (35%)
WY2018	0 (0%)	0 (0%)	132 (46%)	34 (12%)	123 (42%)
Outflow					
WY2015	53 (14%)	263 (72%)	42 (12%)	7 (2%)	0 (0%)
WY2016	0 (0%)	286 (78%)	71 (19%)	5 (2%)	4 (1%)
WY2017	0 (0%)	227 (62%)	76 (21%)	54 (15%)	8 (2%)
WY2018	0 (0%)	143 (50%)	52 (18%)	36 (12%)	58 (20%)

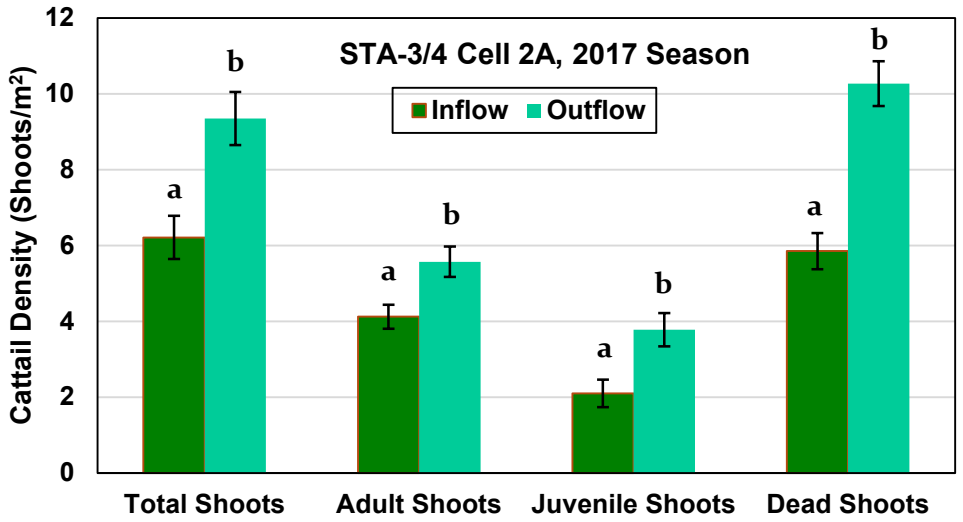
[a] Water depth ranges are based on stages at inflow and outflow structures.

[b] Number of days per range category with their respective percentage in parenthesis.

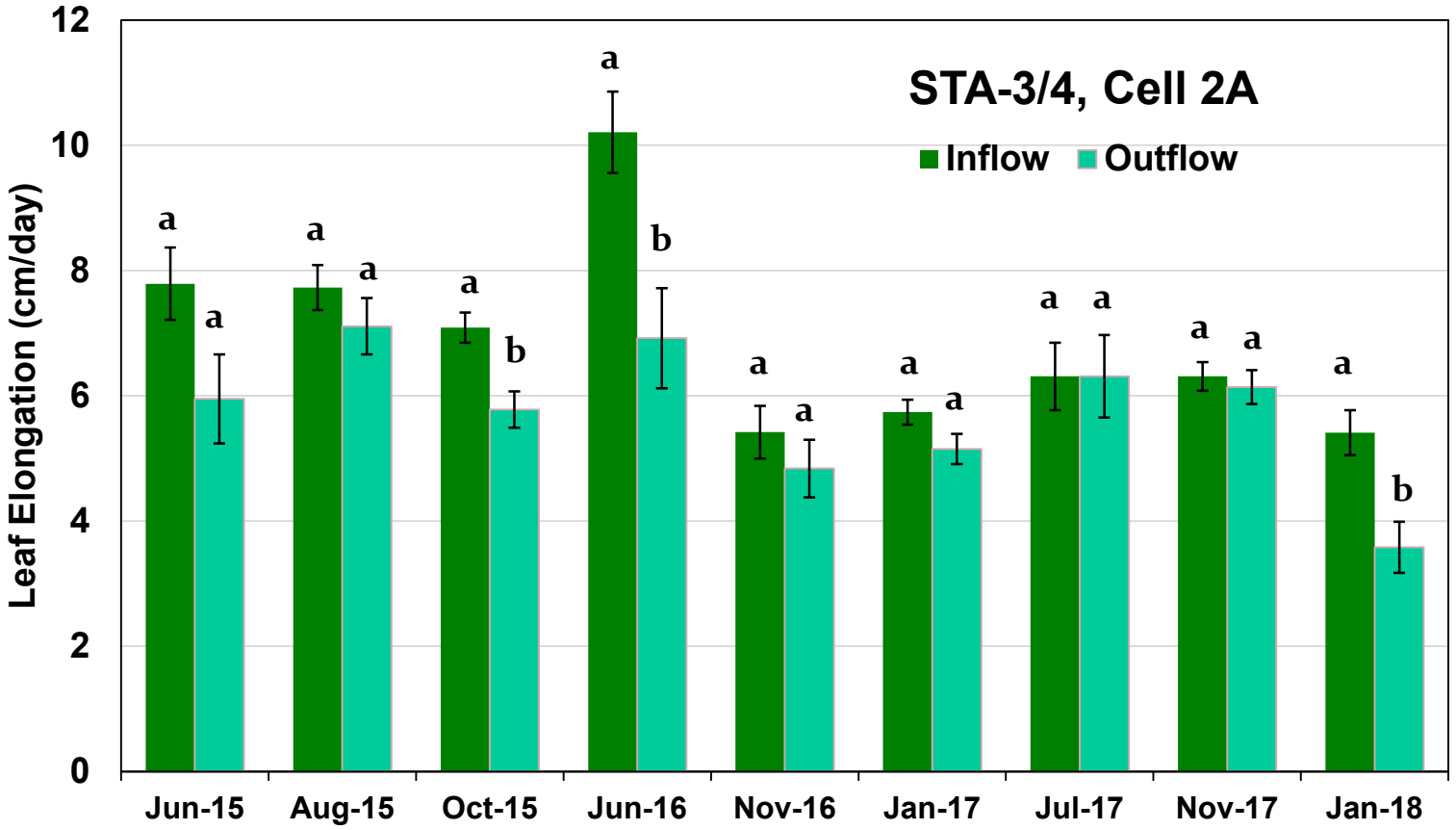
Cattail Density Parameters



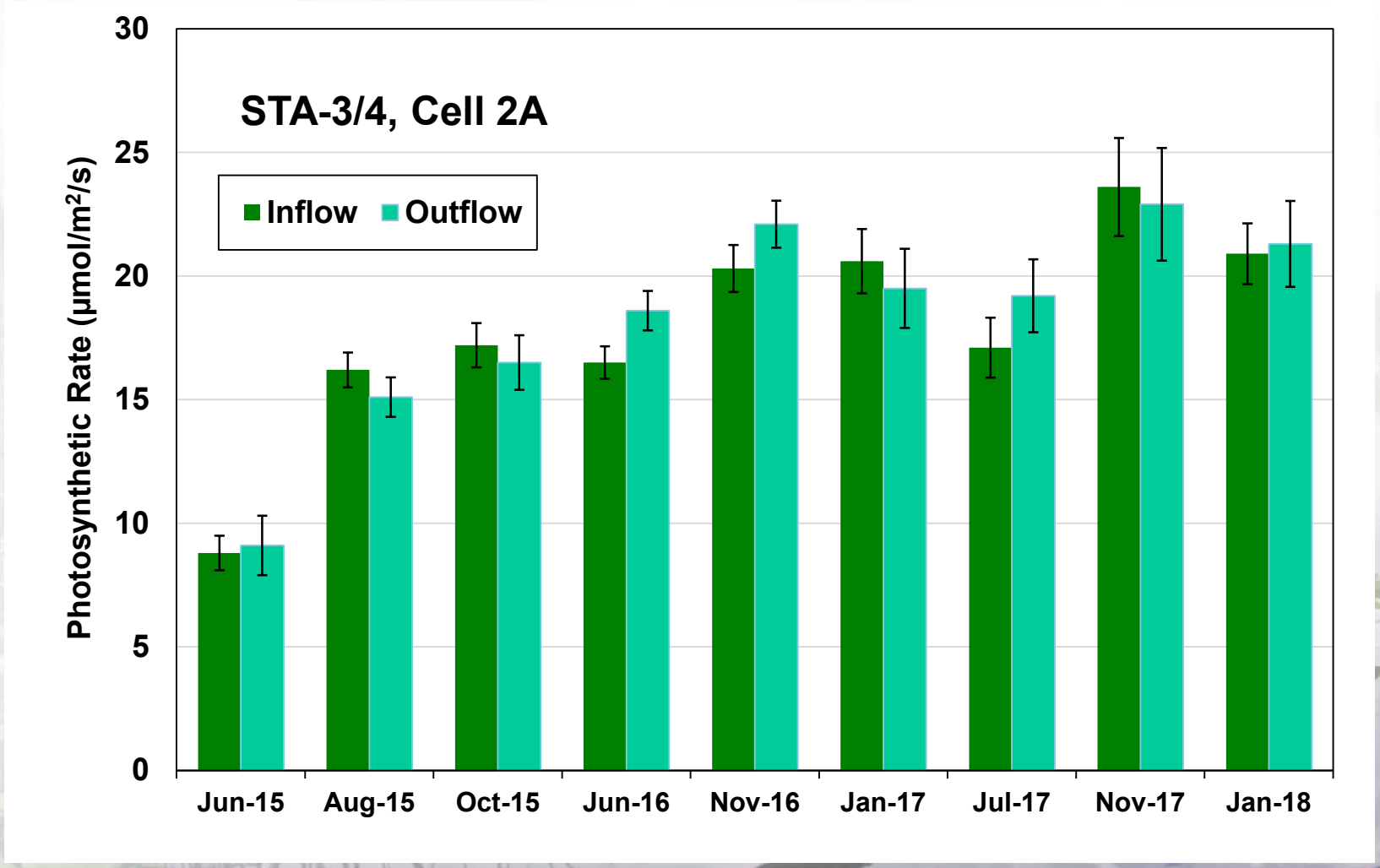




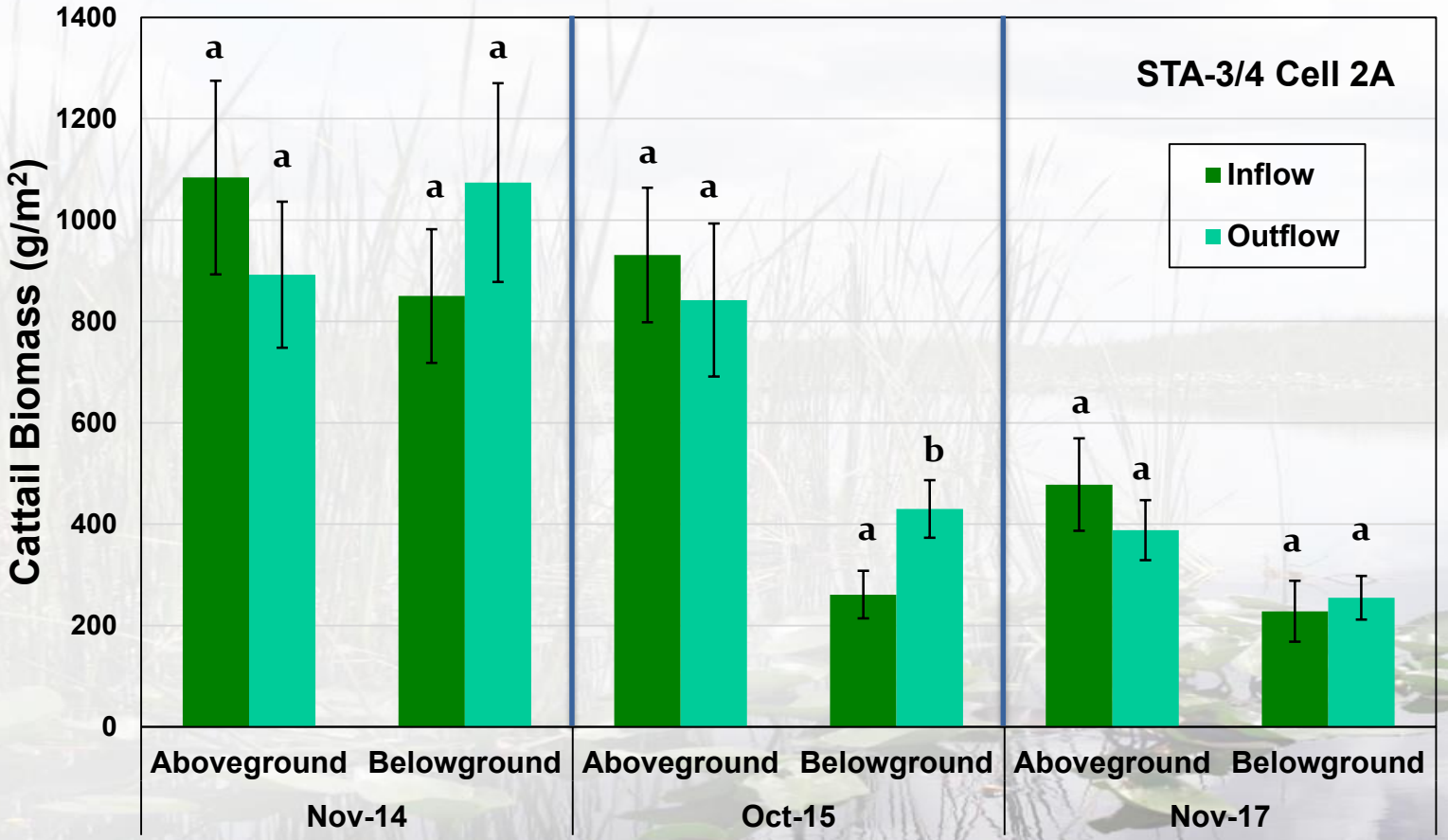
Leaf Elongation Rate



Photosynthetic Rate



Cattail Biomass



	Belowground/Leaf Ratio		
Zone	Nov-14	Oct-15	Nov-17
Inflow	0.84	0.31	0.49
Outflow	1.31	0.57	0.68

	Biomass Distribution		
Biomass	Nov-14	Oct-15	Nov-17
Leaf	52%	73%	65%
Belowground	48%	27%	35%

Summary

- Total cattail densities (adult and Juvenile) significantly decreased in the deeper inflow region of the cell after the 2015 wet season
- Cattail decline in the inflow region was likely caused by the prolonged deep water conditions during the 2016 and 2017 wet seasons
- Leaf elongation rates were consistently higher in the inflow region, with higher rates measured early in the wet season (June-July)

Summary

- Aboveground biomass differences between the inflow and outflow region was not significant, but biomass values were consistently higher in the inflow region, suggesting that cattail plants from the inflow region grew larger to escape the deeper water condition

- A noticeable decrease in the belowground biomass:leaf ratio in the inflow over the three –year period suggests the root and rhizomes of the cattail population were likely stressed more than shoots

- Notable change in the in biomass distribution in terms of aboveground and belowground biomass over time; with belowground biomass significantly decreasing at the end of the study

Questions

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