

Evaluating Drawdown Effects on Nutrient Removal Efficiencies in a Treatment Wetland: Lake Apopka Marsh Flow-Way, Florida, USA

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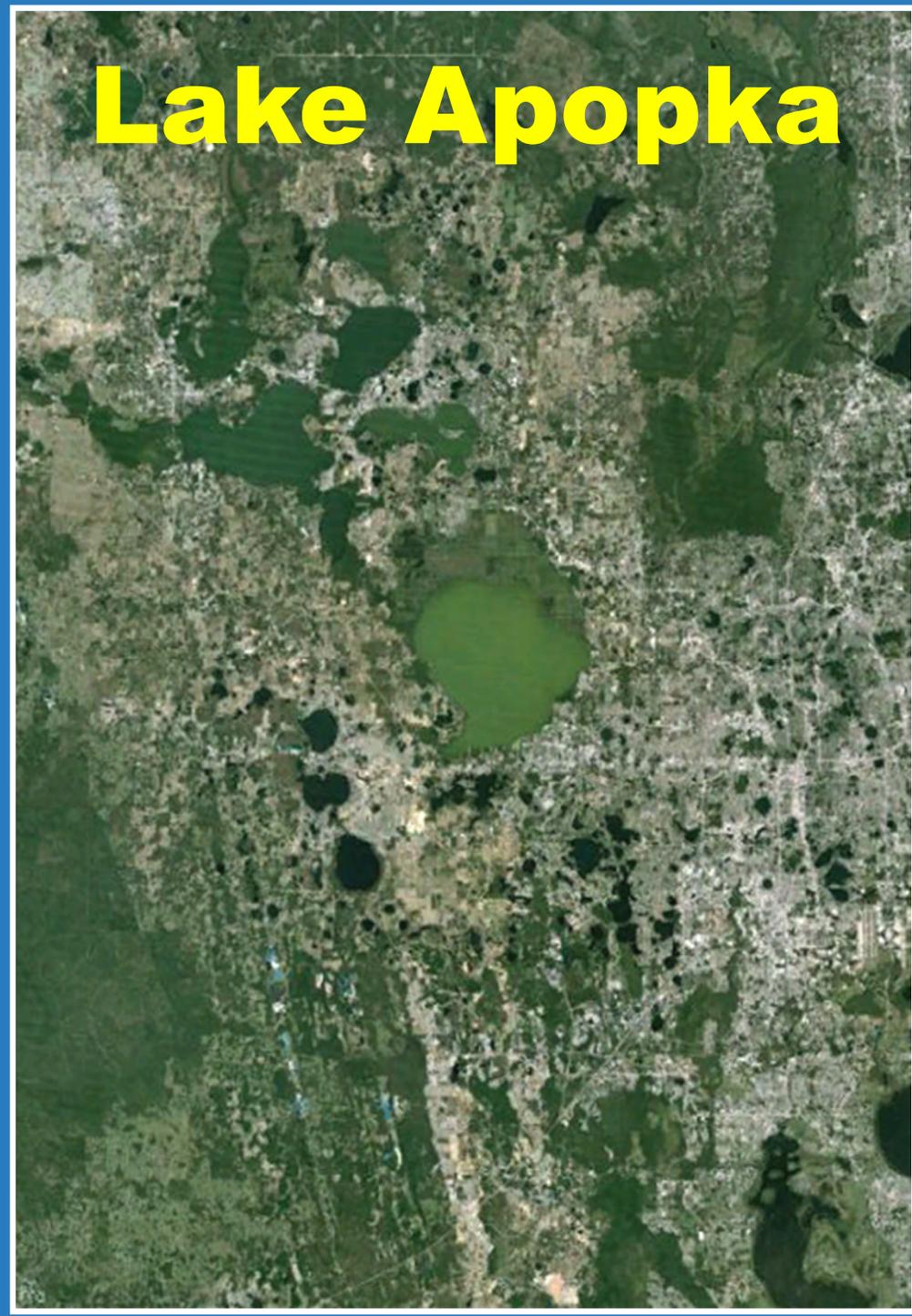
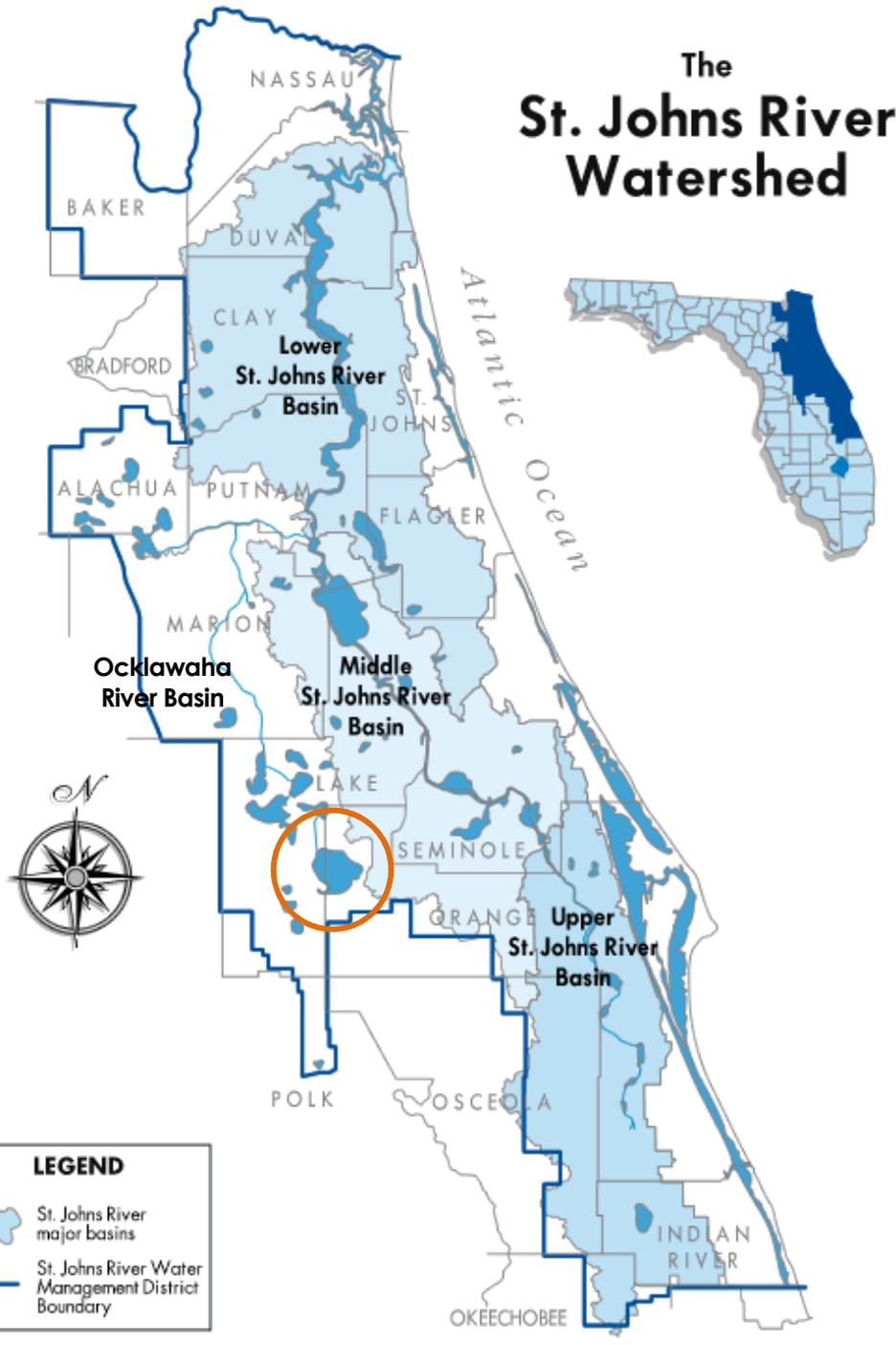
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The St. Johns River Watershed

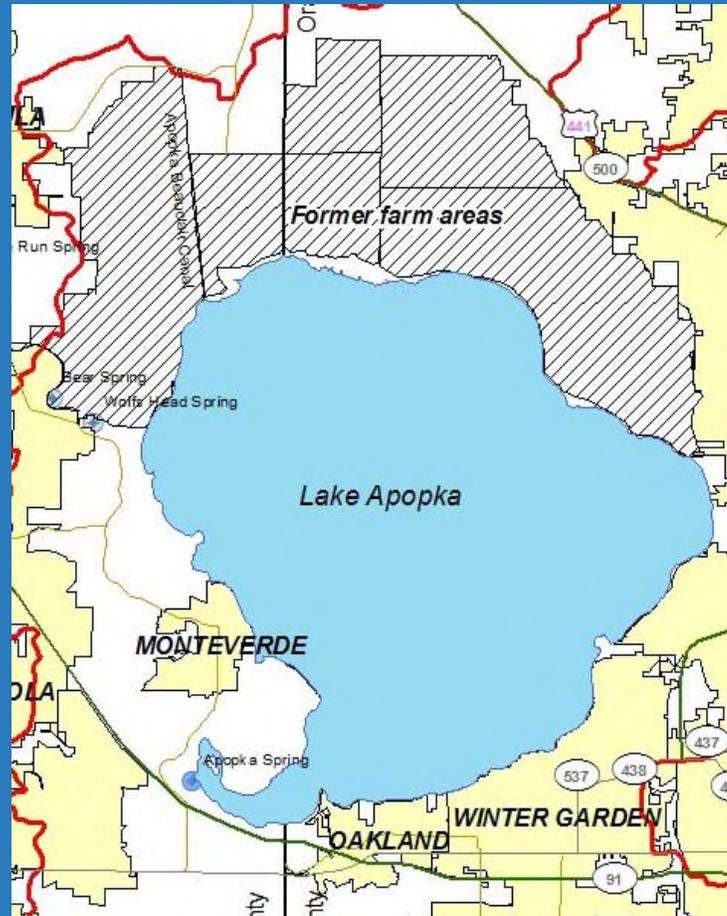
Lake Apopka



Lake Apopka

1930s

- North Shore Marsh
- Mesotrophic
- Clear water
- Abundant aquatic plants
- Abundant gamefish
- Firm organic and mineral sediments



1980s

- North Shore Farms
- Hypereutrophic
- Algal blooms
- Few aquatic plants
- Few gamefish
- Flocculent, nutrient-rich sediment

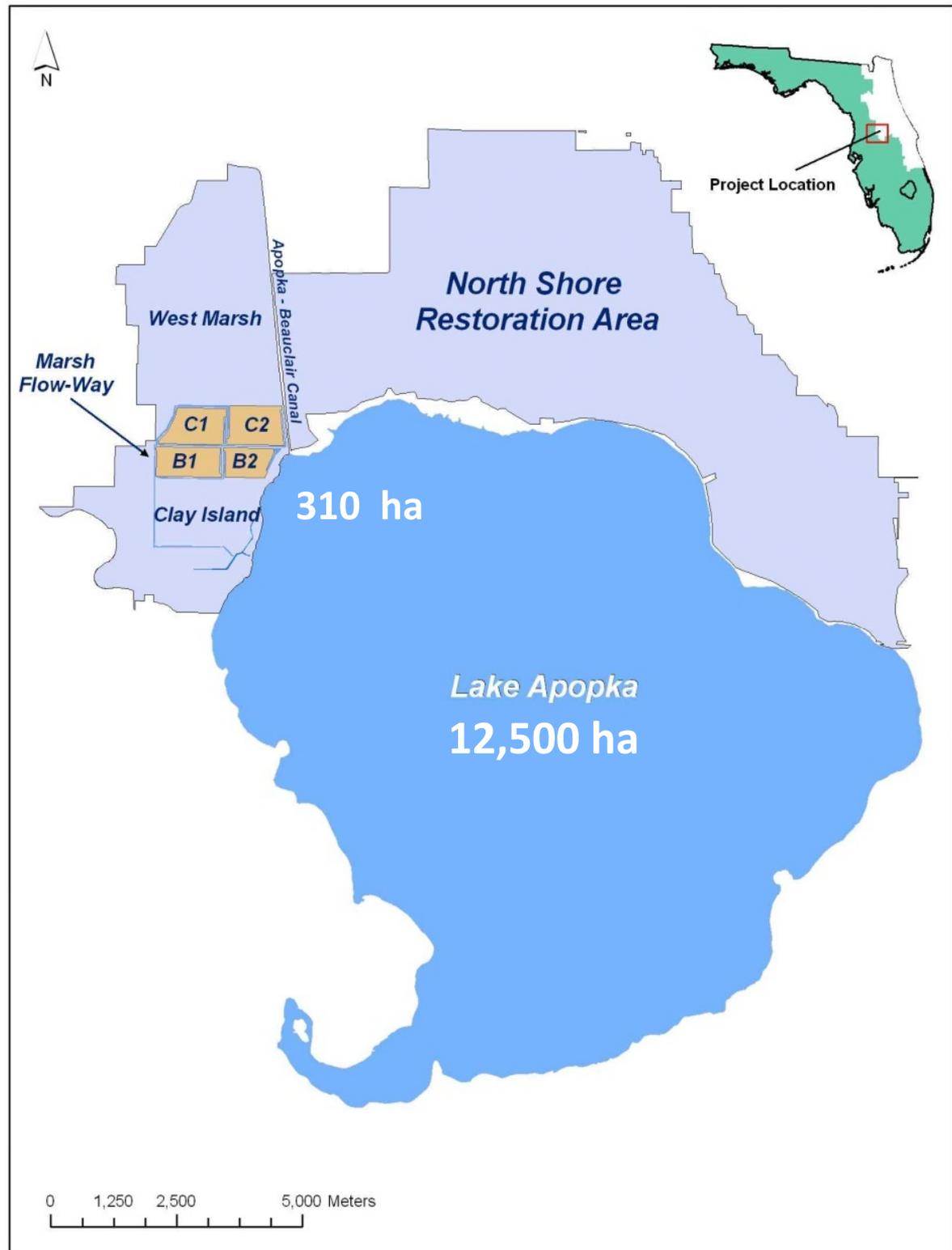


The Restoration Program for Lake Apopka

- Restore farmlands to wetlands (reduce P external loading and provide habitat)
- Remove rough fish (remove P, reduce P recycling)
- Plant native species and fluctuate water levels to develop habitat
- Prevent expansion of *Hydrilla verticillata*
- Wetland filtration (remove P from lake water)



The Marsh Flow-Way



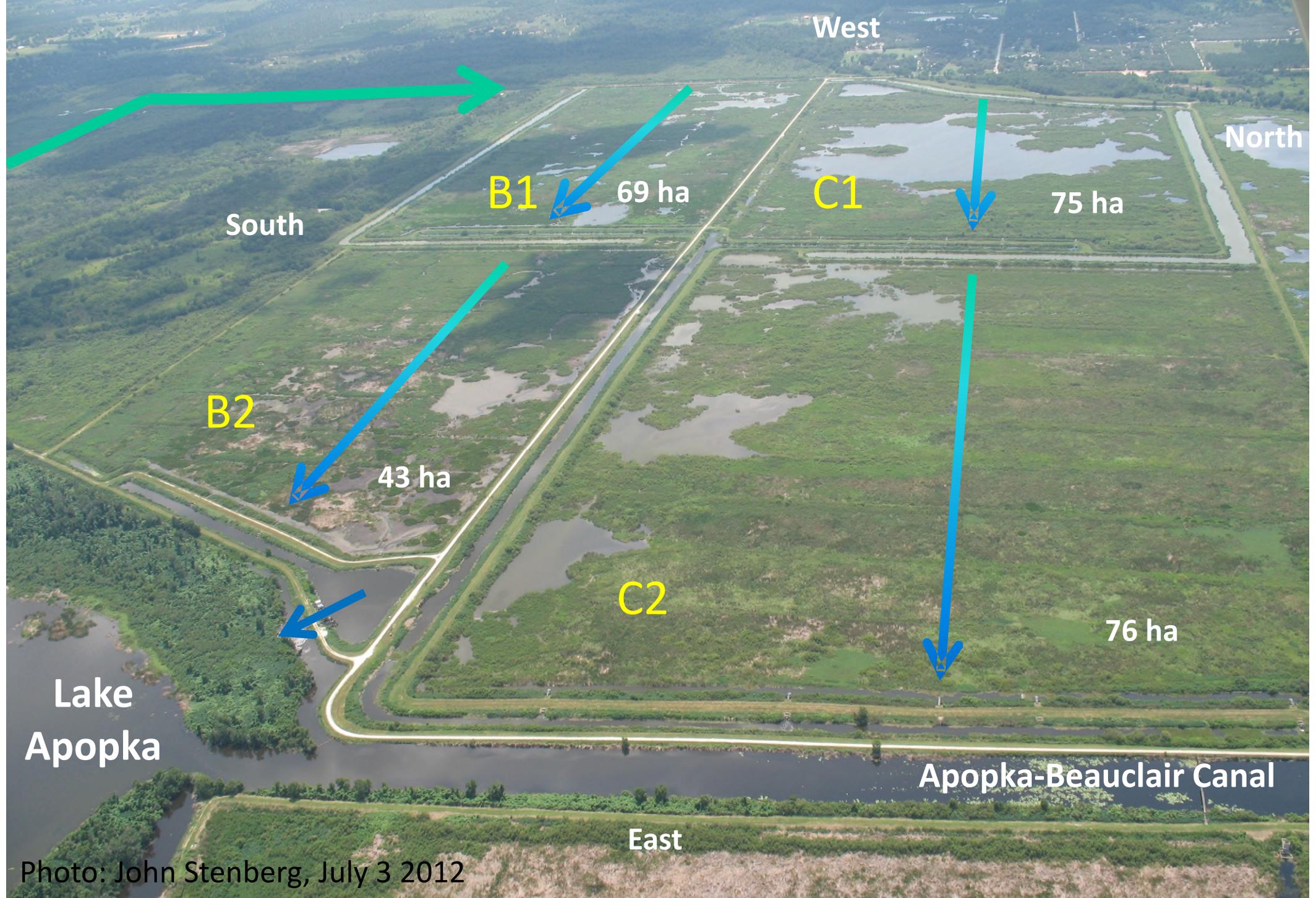


Photo: John Stenberg, July 3 2012



Photo: John Stenberg, June 20 2013



St. Johns River
Water Management District



Dynamic management to sustain performance

Major Maintenance

- Finger dike construction
- Ditch cleaning
- Mowing
- Alum injection

Minor Maintenance & Operation

- Manipulating levels and flows
- Drawdown, resting
- Turning off/on cells
- Planting



Drawdown began April 2014



Photo: John Stenberg, May 22 2014



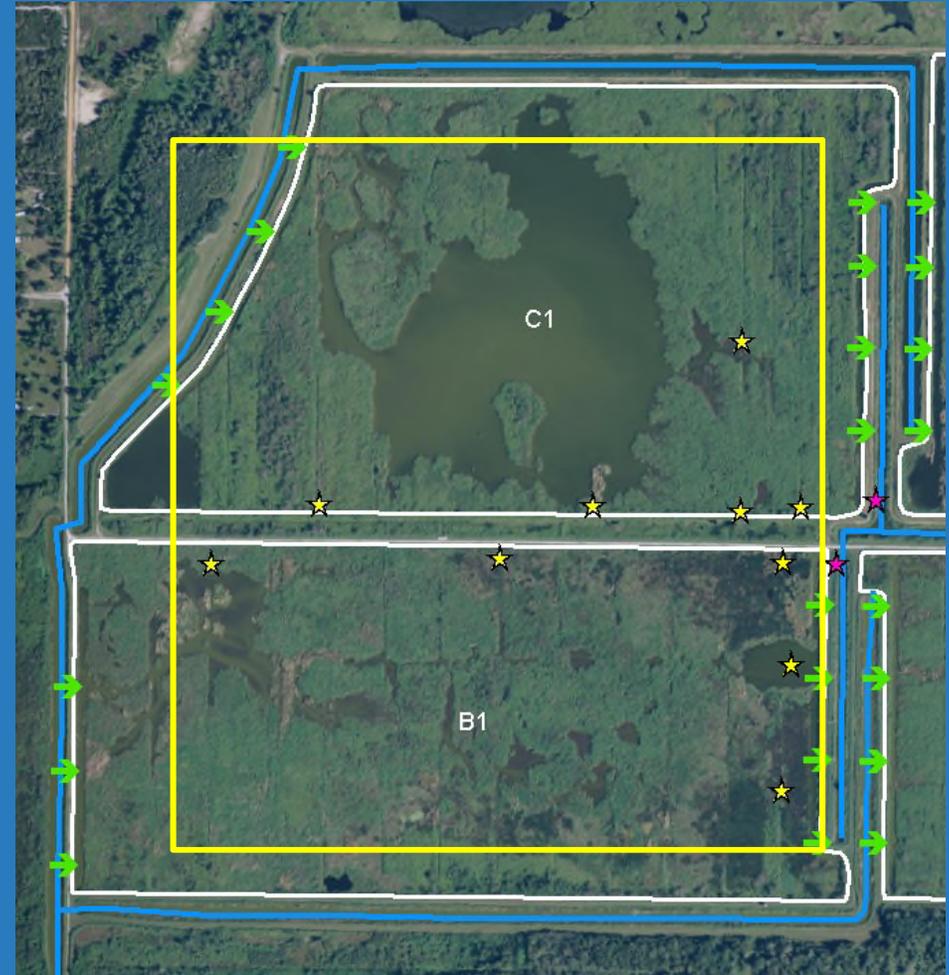
St. Johns River
Water Management District

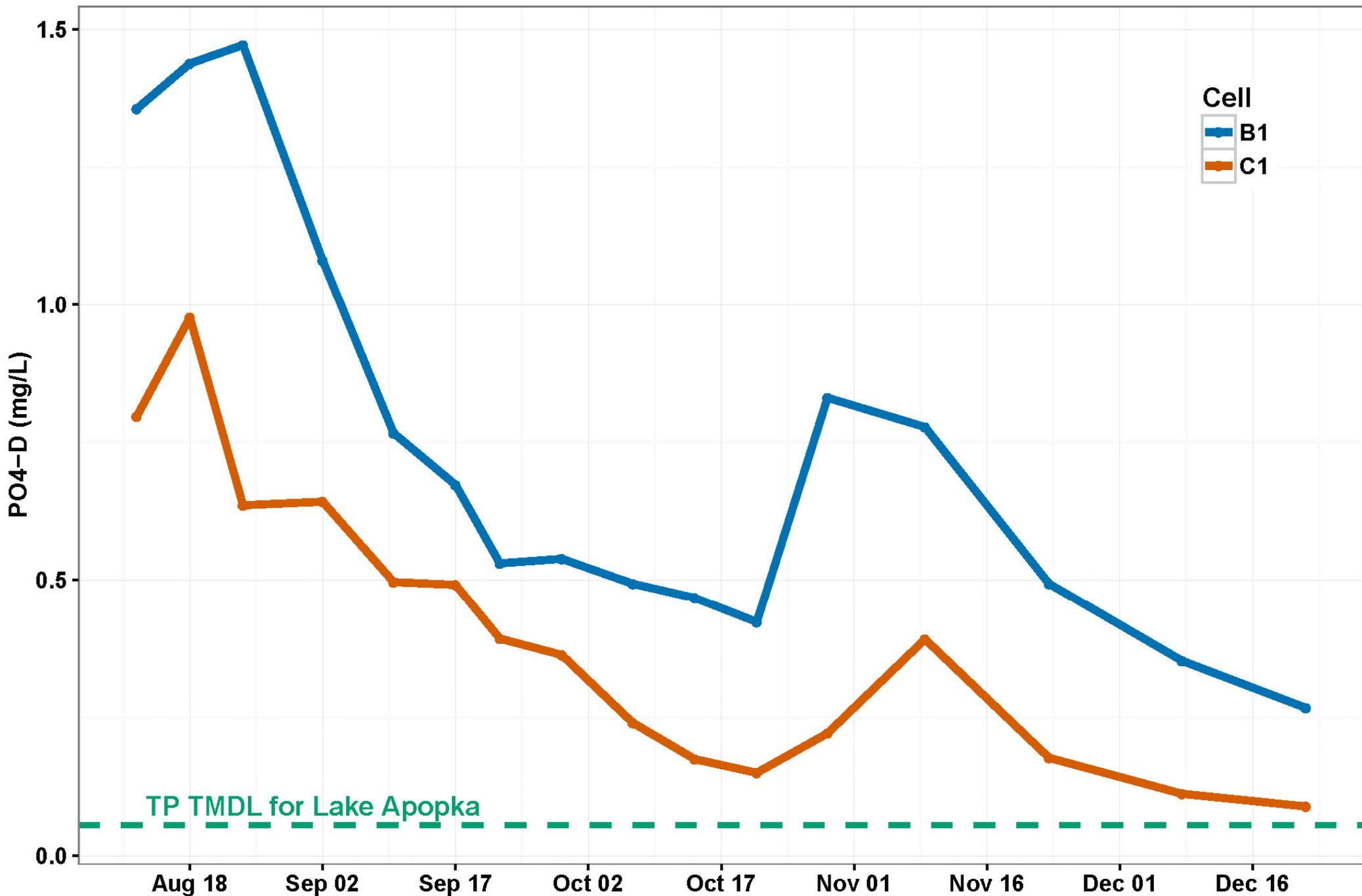
Maintenance completed Summer 2015

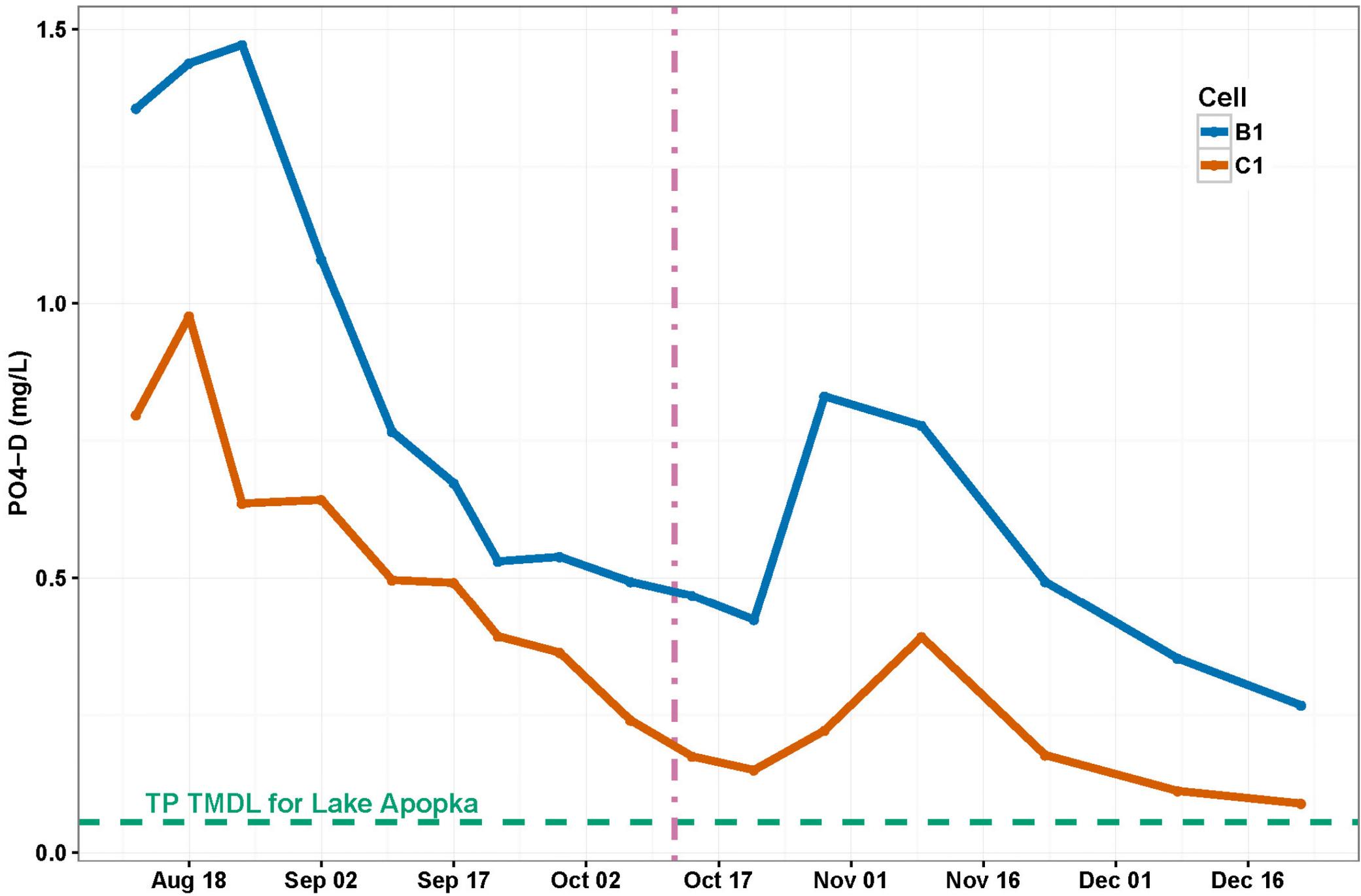


Two-Stage Research and Sampling Plan

- Stage 1
 - Reflood the cells
 - Retain water in the cells
 - Monitor water quality at internal cell locations
 - Use results to help determine when to reopen

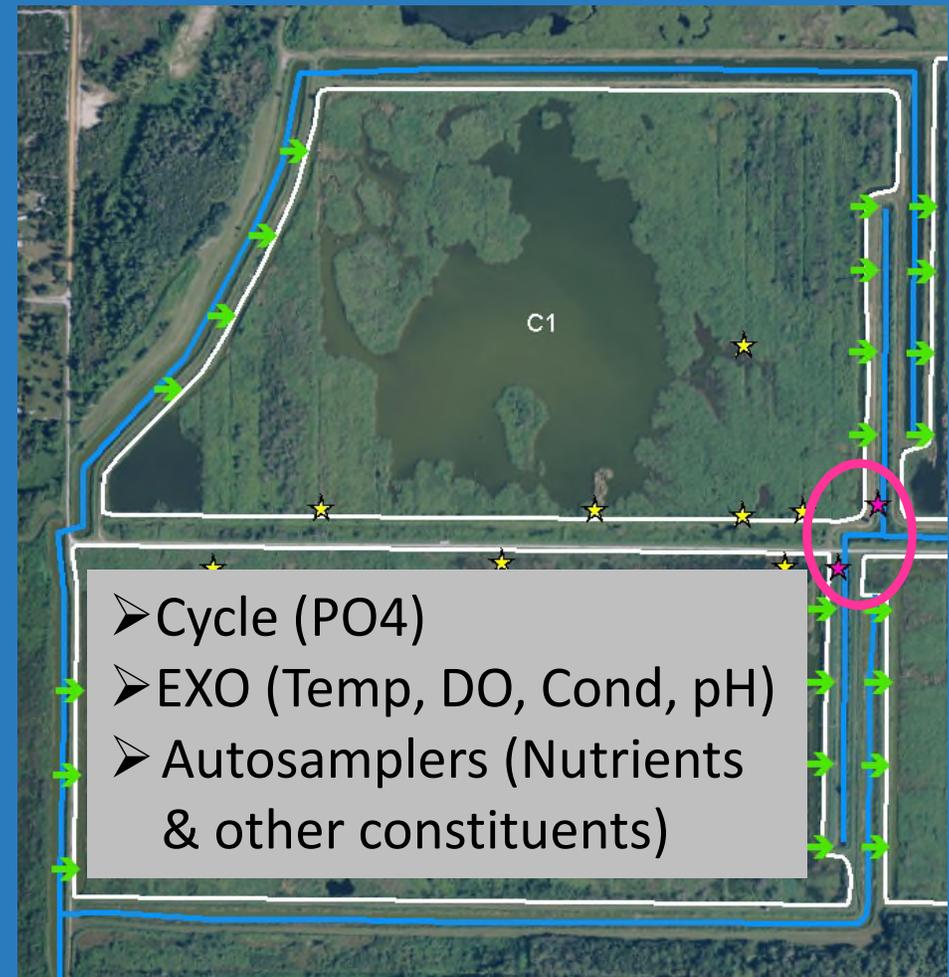






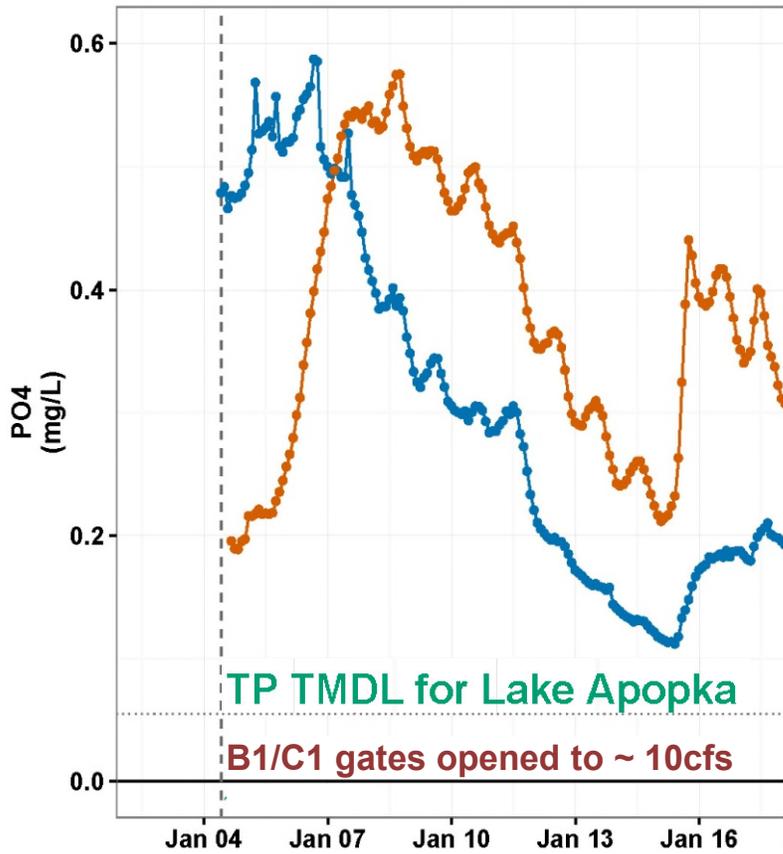
Two-Stage Research and Sampling Plan

- Stage 2
 - Release water from the cells
 - Increase flow gradually
 - Monitor water quality at the outflow for 8 weeks



Cycle PO₄ Data

Cell ■ B1 ■ C1



Management Implications

- Holding water in the cells after reflooding likely reduces P export
- Water needs to be flushed out to eliminate P released during reflooding
- We should not drawdown and let any cells rest for this long again
- If the system is dry for a long period of time again, we should consider an alum soil amendment



Questions?

Special Thanks

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