

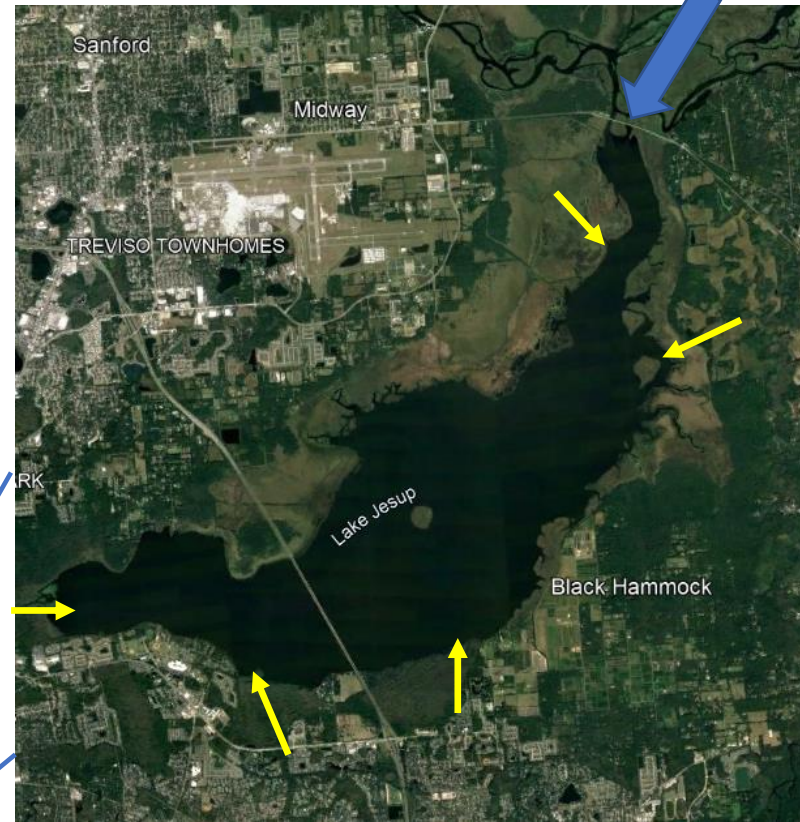
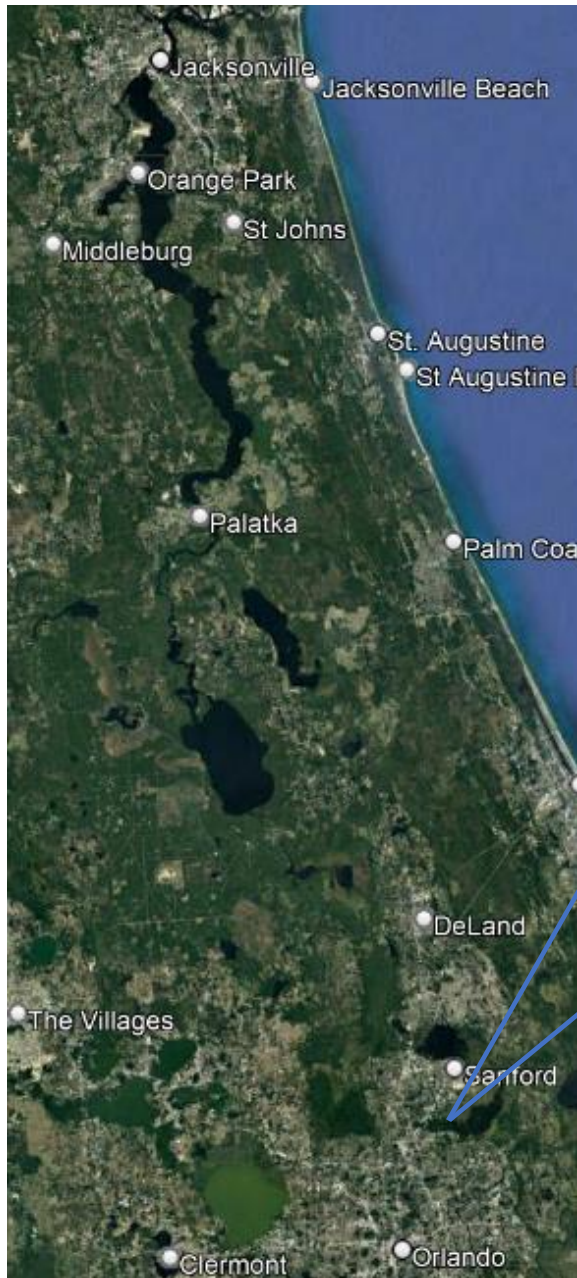
Lake Jesup In-Lake Phosphorus Reduction

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St. Johns River
Water Management District

Lake Jesup



Typical Bloom on Lake Jesup, 2022

- Located in the Middle Basin
- Approximately 8,120 acres
- Hypereutrophic, shallow lake
- TMDL concentration targets were established for TP (0.094 mg/L) and TN (1.32 mg/L) in 2006.

Since Lake Jesup has not met its TMDL targets and has experienced high levels of *Chl-a* and algal blooms, the District is focusing efforts to address in-lake nutrient loading.



In-Lake Phosphorus Reduction

Goal is to evaluate the effectiveness of 3 soil phosphorus binding amendments.

Phase 1 Bench Assessment and lab study

- CDM Smith was contracted to investigate various amendments and methods on effectiveness on phosphorus reduction.
- After an extensive literature review examining improvements in water quality, nutrient removal, feasibility, and cost of each method.
- Recommended a mesocosm study with three Amendments were selected for their effectiveness in laboratory study: Phoslock, Virophos and Nclear TPX.

Lake Sediment Characterization (completed)

- Sediment muck thickness and characterization
- Compare to previous results from Cable (1997) and ERD (2014).
- Results among studies were similar and allowed us to better understand TP distribution in sediments throughout the lake.
- Three samples were collected for in-house flux study

Toxicity Evaluation (in progress)

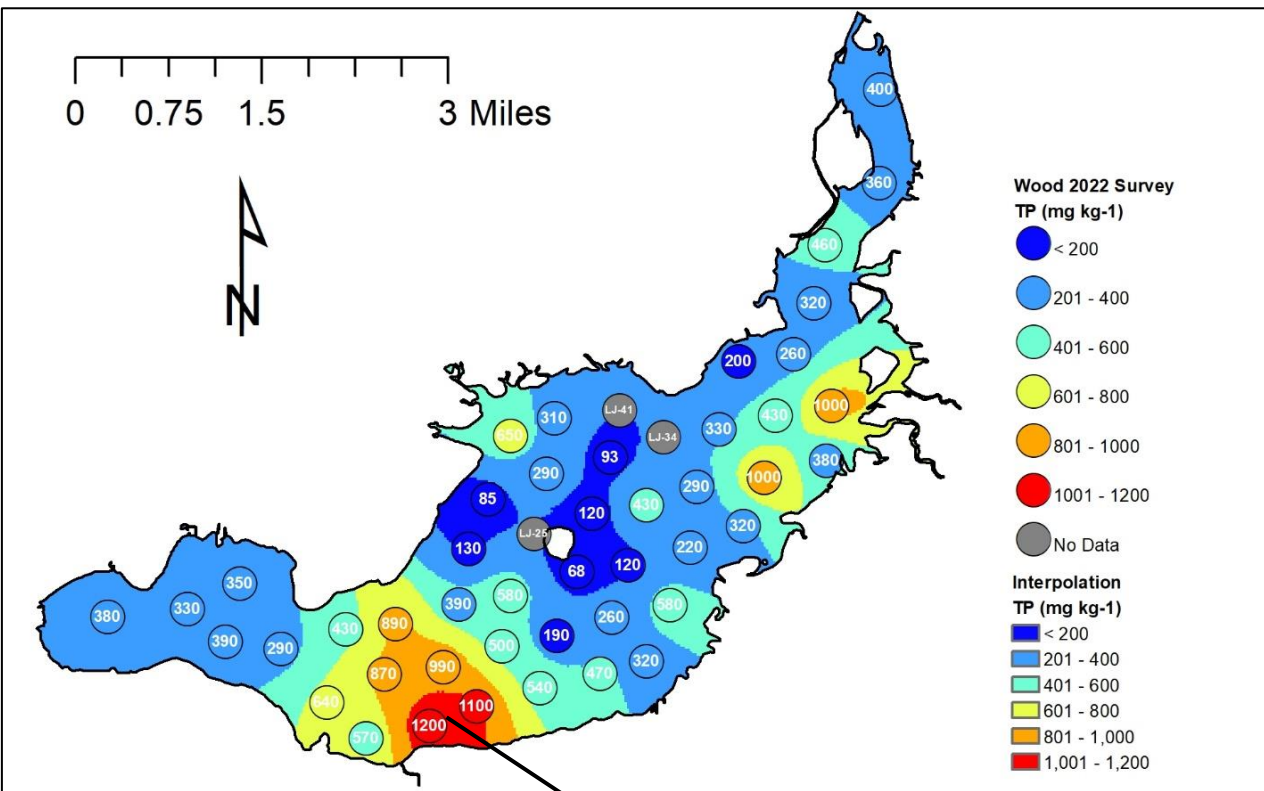
- Peer-reviewed literature was examined for the 3 products.
- Acute, chronic toxicity results for elutriate test for both sediment and freshwater organisms.
- Bioassays will be performed if the concentrations in literature are less than the manufacturer application rate.



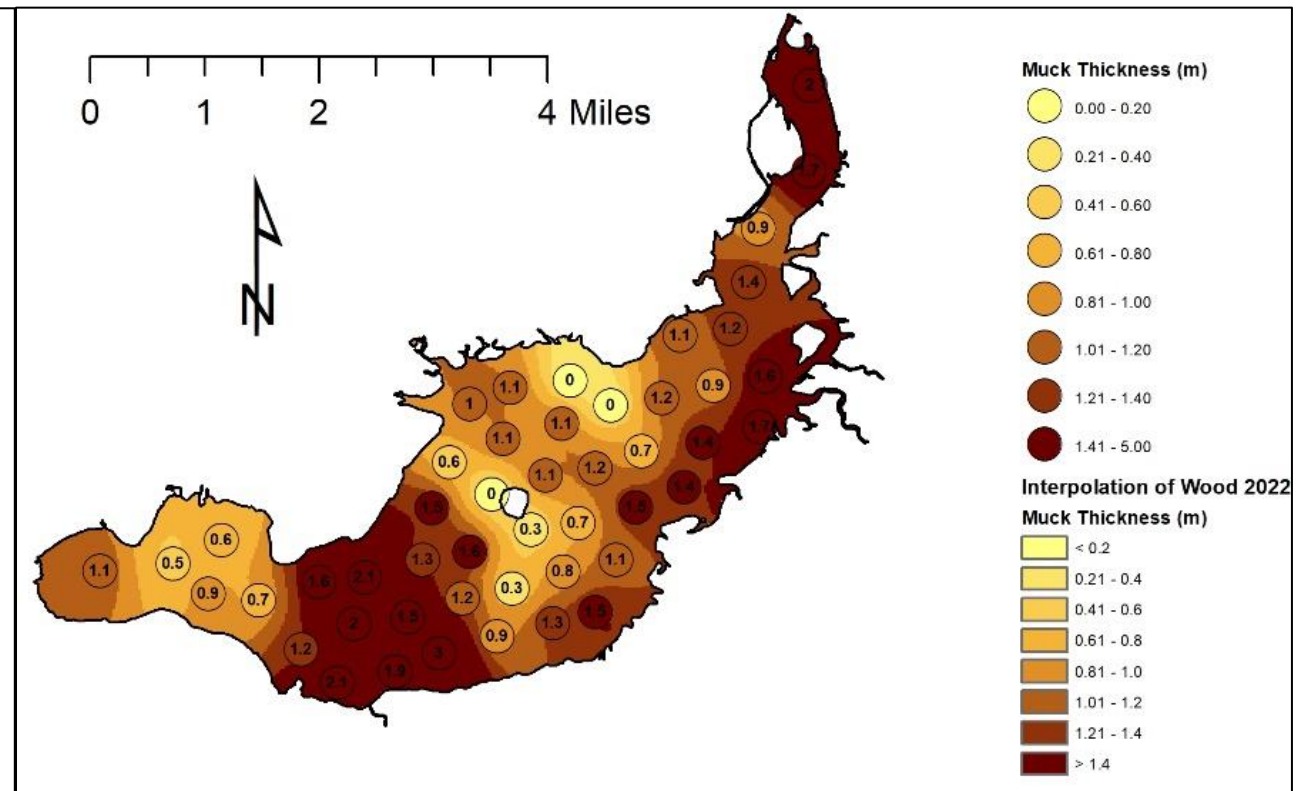
Lake Sediment Characterization

- Sediment characterization via thickness survey, water depth, and physical/chemical characterization
- Areas with the highest TP concentration were selected for limnocorrals deployment

Soil Total Phosphorus Concentrations



Muck Thickness



Experimental Limnocorrals

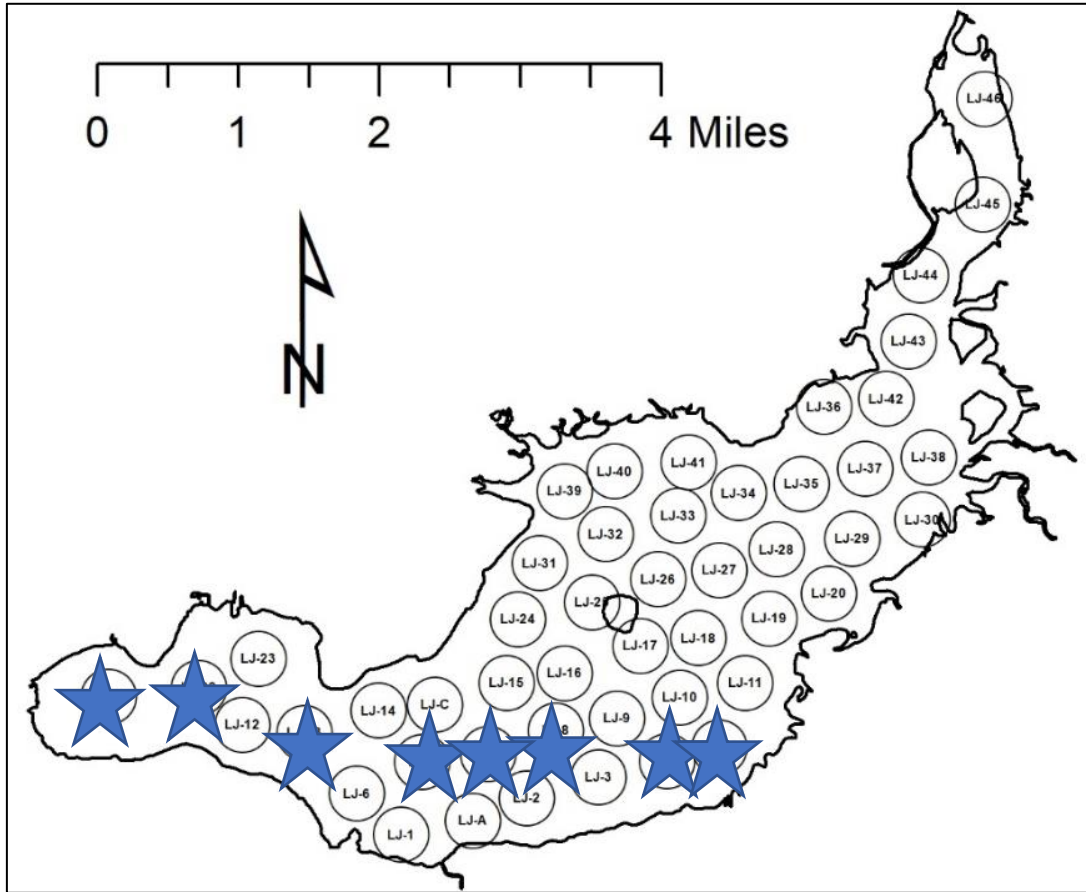


Summer mesocosm sampling

- 8 Mesocosms were deployed on May 23, 2023
- After 1 week, In-situ measurements, water chemistry, and phyto/zooplankton samples were collected from each of the corrals.
- Six corrals were dosed with amendments (2 replicates each) and 2 were left as controls
- Bi-weekly In-situ measurements and water chemistry samples are taken
- Lake water levels are monitored for adjustments in mesocosms anchors
- Mesocosms will remain for a total of 6 months, after which final In-situ measurements, water chemistry, and phyto/zooplankton samples will be taken.
- All mesocosms and all associated equipment will be removed in late November 2023
- Will also remove the soil fill associated with each mesocosm.
- WSP final report will be due in April 2024



Additional Flux core sampling



- 32 core sediment flux incubations; 4 from each site, 2 aerobic, and 2 anaerobic
- Water quality and in-situ grab samples, depth profiles will be collected at each site
- Ambient water will be collected within 1 meter of the sediment surface
- Flux will be evaluated in sediments with varying TP concentrations
- Nutrient flux estimations will be calculated based on the change of nutrient concentration over time.

Knowledge learned from this information will ultimately help estimate the annual nutrient load from internal cycling in Lake Jesup

WSP In-House Flux



WSP Laboratory Overview



Sediment flux samples



Questions?

