

# PREDICTION & MODELING

# New Generation of Models for Optimization and Forecasting of Lake Okeechobee Water Quality

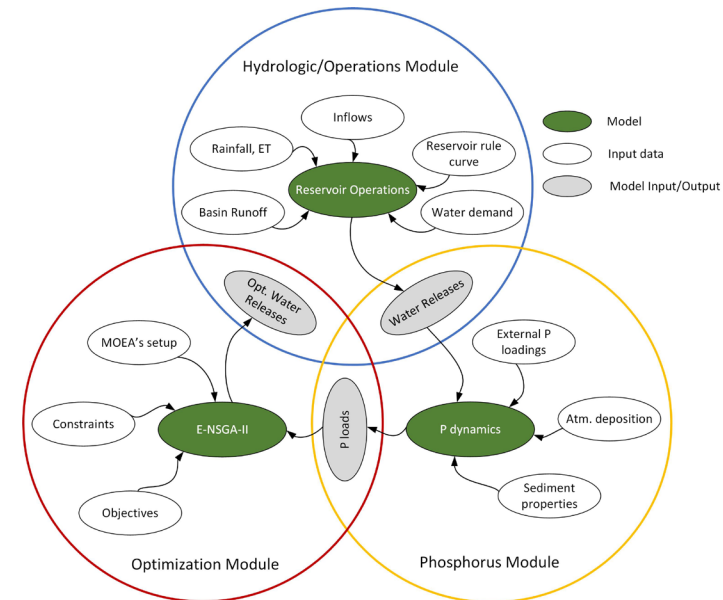
---

Mauricio E. Arias, PhD, PE  
Assistant Professor  
University of South Florida



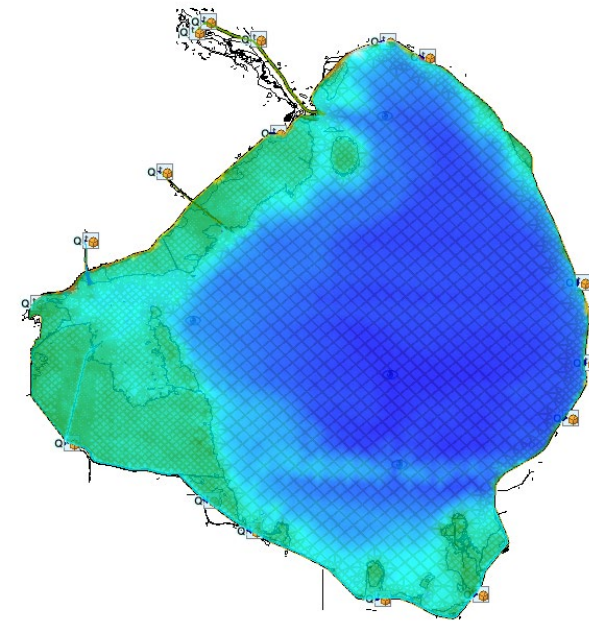
# PROJECT SUMMARY

- 1. Understand the effects of flow regulations on nutrient exports from Lake Okeechobee**
- 2. Evaluate alternative lake operations that minimize nutrient loads during sensitive times**
- 3. Evaluate how different nutrient management scenarios could affect algal blooms**



## LO Optimization of Nutrients Exports (LOONE)

LO Delft3d



# MAJOR TAKEAWAYS

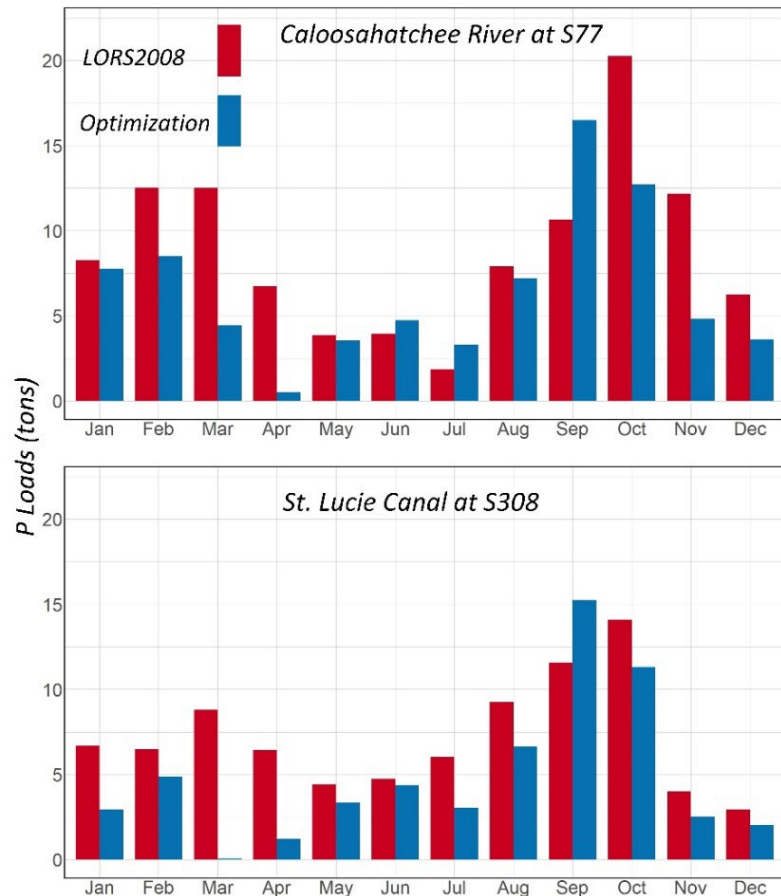
---

- **Phosphorus exports are sensitive to resuspension parameters and load imports.**
- **Lake operation optimization could reduce P loads into Caloosahatchee River and St. Lucie Canal by 27.4% and 32.6%.**
- **Water temperature is a strong indicator of blooms.**
- **Reducing nitrogen AND phosphorus is more effective at reducing blooms than targeting a single nutrient.**

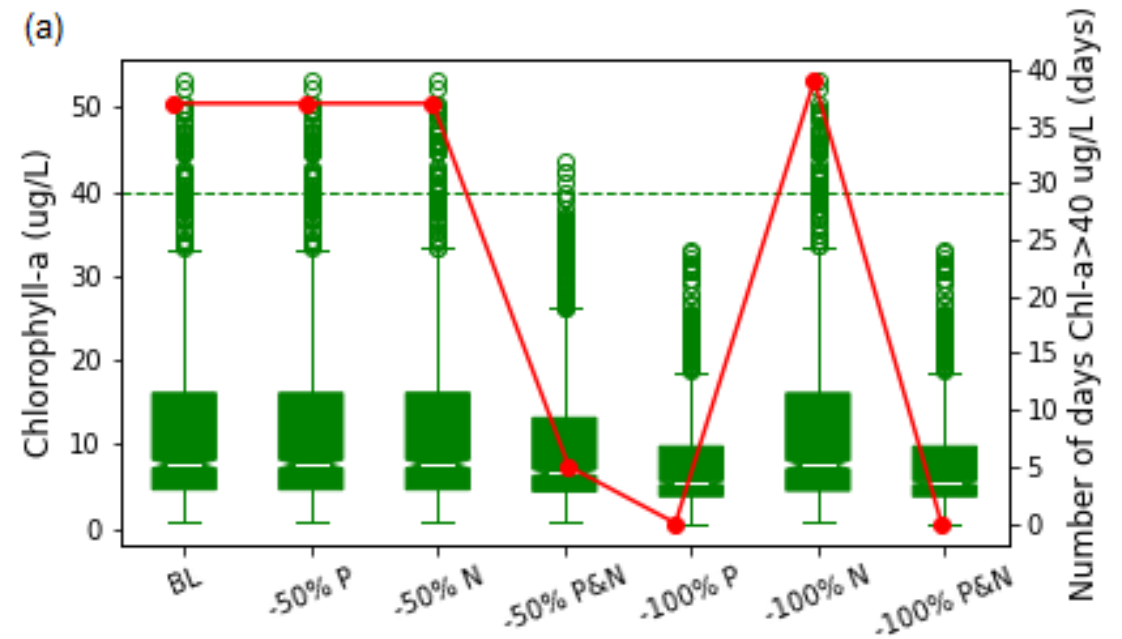


# ADDITIONAL RELEVANT INFO

## Optimization could reduce P loads exports



## Reducing nitrogen AND phosphorus is more effective



# RESEARCH PRIORITIES

---

- Collect regular nutrient (external and internal) load data into Lake Okeechobee
- Improve blue-green algae prediction
- Develop good physical models of water column structure and circulation
- ~~• Evaluate the accuracy of satellite imagery compared to discrete and *in situ* sampling~~
- ~~• Create a better explanation of satellite imagery for the lay audience~~



# NEW DATA GAPS

---

- How effective is lake discharge optimization for Nitrogen loads and algal biomass?
- What is the optimal level of N and P reduction from the watershed?
- What are other important predictors to include in a bloom forecast?



# ACKNOWLEDGEMENTS

---

- Everglades Foundation Scholarship to Osama Tarabih
- Gulf Research Program Early Career Fellowship from the US National Academy of Sciences to Mauricio Arias
- US Environmental Protection Agency (Grant number: 840090) to Qiong Zhang
- US Army Corps of Engineers Engineer Research and Development Center (Grant number: W912HZ-21-2-0057) to David Kaplan

