Continuously Monitoring Bottom Water Dissolved Oxygen in Muck and Sand Sediments in the IRL

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Introduction

The IRL has suffered from an increasing number of hypoxic events, leading to fish kills and changes in nutrient cycling. When bottom water and sediments become anoxic, they switch from a sink to a source of both dissolved phosphate and nitrogen. Reduced sediments release sorbed phosphate and coupled nitrification-denitrification is inhibited, preventing the oxidation of ammonium and subsequent conversion to N_2 gas that leaves the system. To better understand nutrient cycling in the lagoon, we are working to establish a network bottom water DO sensors. These data will help show improvements to water quality following restoration efforts and can help improve modeling of nutrient cycling in the lagoon.

Methods

Dissolved Oxygen (DO) was continuously monitored using HOBO U26 DO Data Loggers in sensor housings to prevent fouling, muck-filling, and to protect sensors (Figure 2). Data was retrieved and sensors were calibrated every two to four weeks.

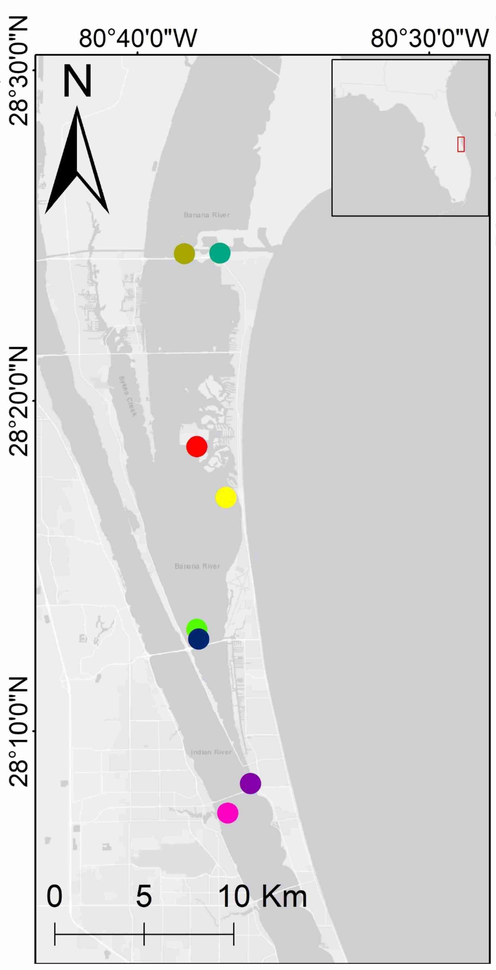

Figure 1: Map displays sites where bottom water sensors have been deployed in the IRL

Figure 2: DO sensor for deployment

Results and Discussion

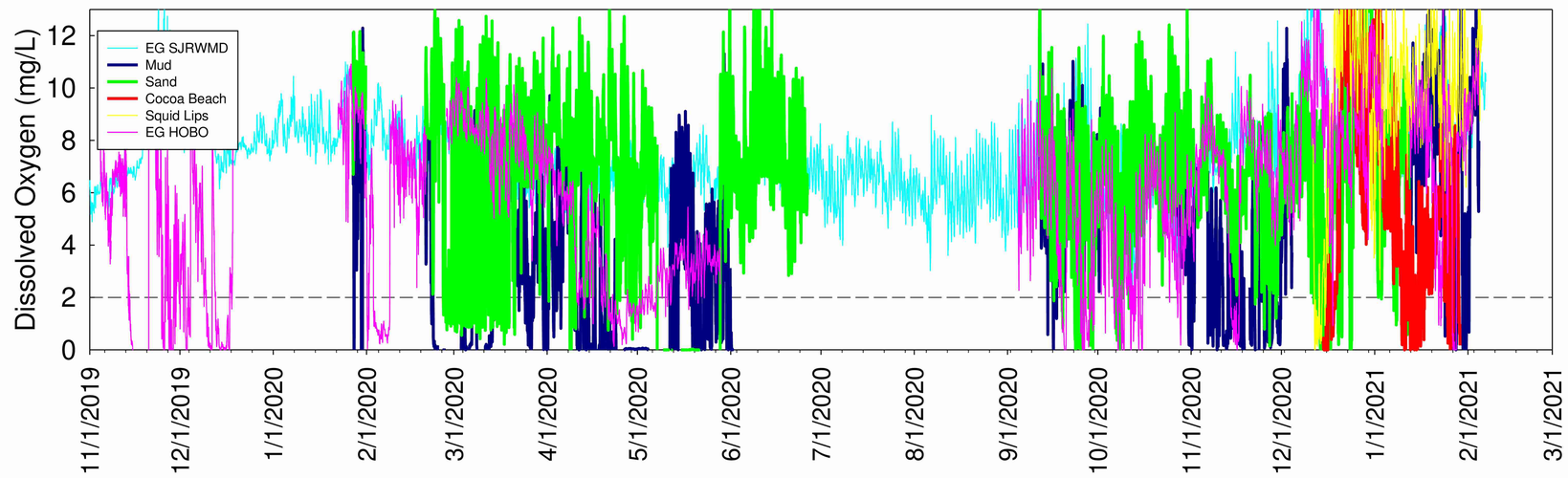

Figure 3: DO (mg/L) from November 2019 to January 2020 for all sensors.

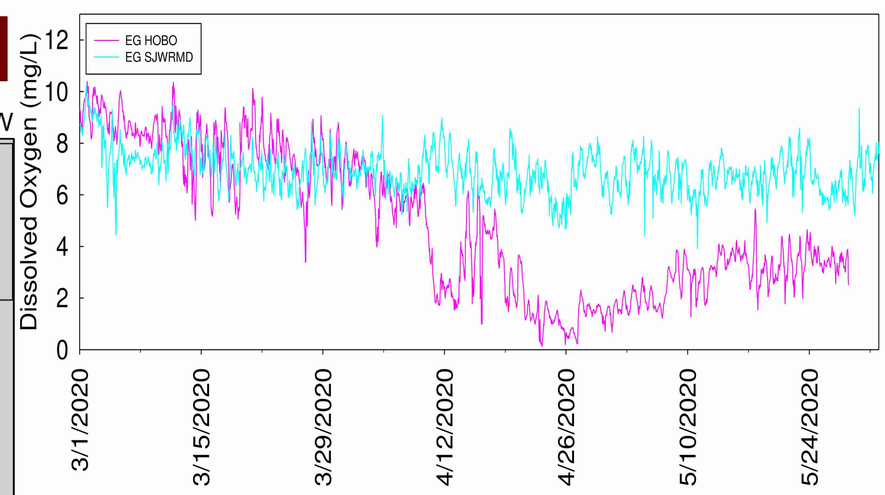

Figure 4: HOBO Bottom water sensor vs. SJRWMD Surface Sensor at Eau Gallie for March – May 2020

Bottom water over muck deposits was lower than spatially close sand sensors, consistent with the higher SOD of muck (-4300 µmoles/m^2/hr) vs. sand (-3200 µmoles/ m^2/hr) during winter months. (Figure 5)

While surface and bottom DO values were similar during colder months at the Eau Gallie site, warmer months showed lower DO concentrations in bottom water. (Figure 4)

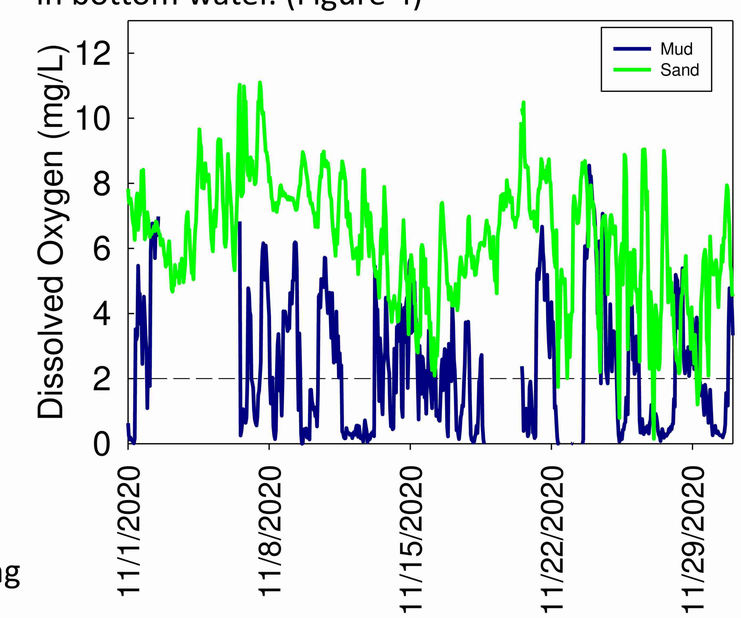

Figure 5: Pineda Site sand vs. muck for November 2020

Conclusion

- Areas with muck had lower bottom water DO than areas with sandy sediments.
- During summer months, bottom water DO was lower than values for surface water.
- Continuous DO data, even non-real time, will be essential to understanding and modeling nutrient cycling within the IRL.

Acknowledgements

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ONE COMMUNITY · ONE VOICE
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