Light Availability and Dissolved Oxygen in the IRL

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Objective

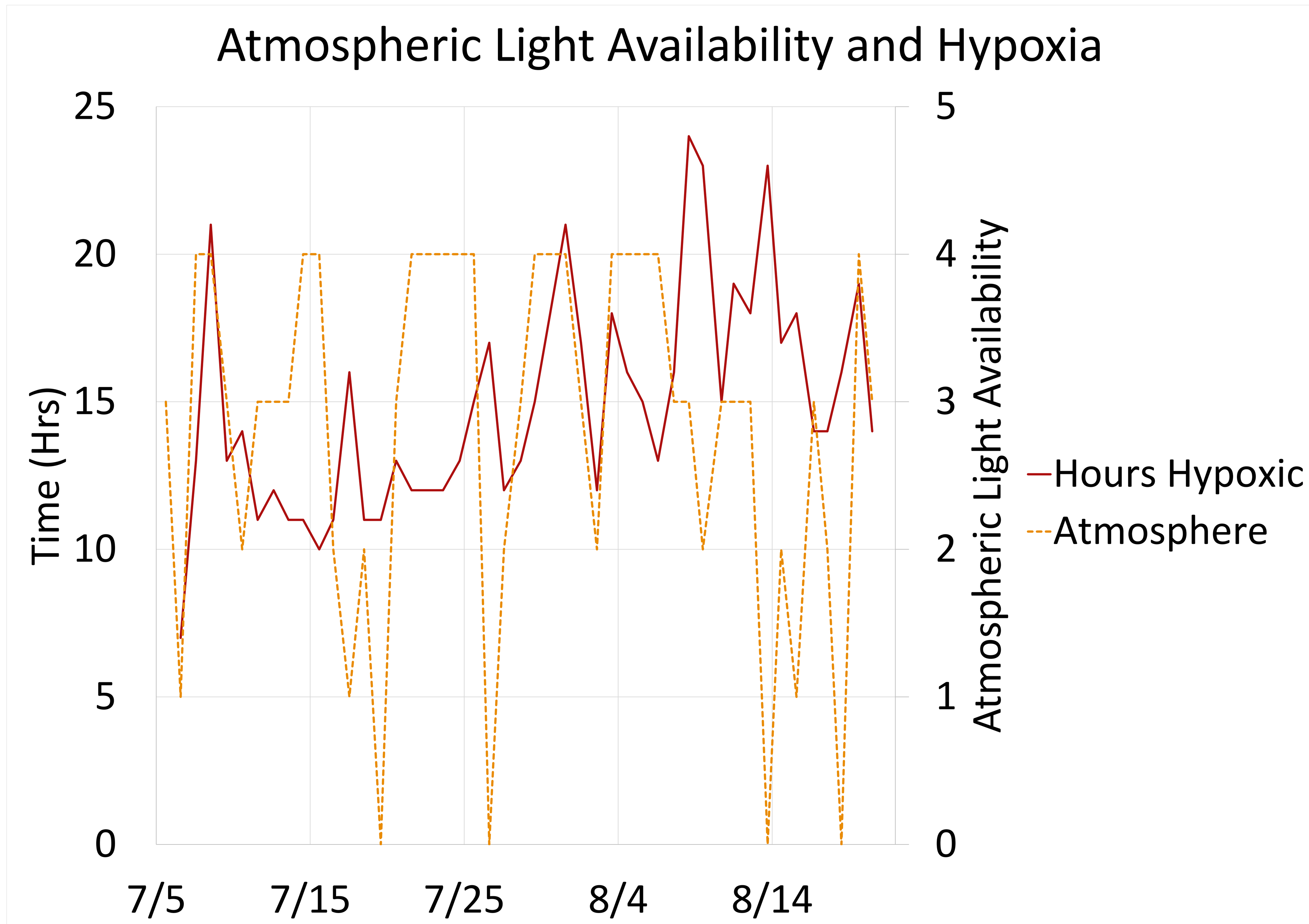
The objective of this study is to determine if there is a correlation between atmospheric light availability and hypoxia events and establish methodology for a long-term observation of light levels and DO within the IRL. Understanding this hypothetical relationship would make it easier to predict where and when hypoxia may occur as a result of weather, as well as the severity of the event and the potential consequences. If these predictions serve to be accurate, key areas may be identified that would benefit the most from future restoration projects in the IRL.

Methods

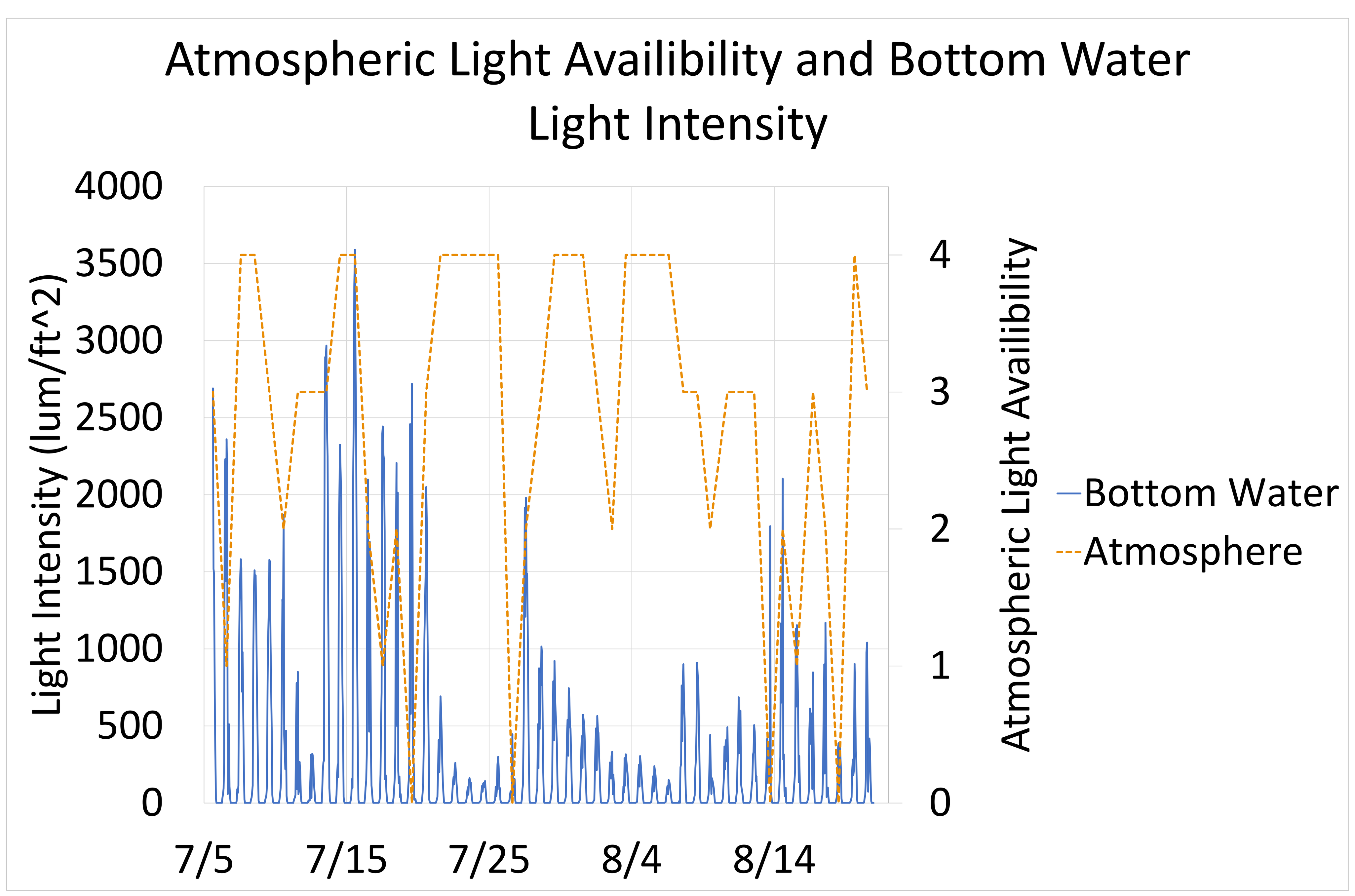
Sensors were deployed in the bottom water within the Samson Island Restoration Area on the Banana River for two months. Light intensity and DO concentration were measured once per hour and weather conditions were retrieved from a nearby Wunderground station.

Results

Seven days in the two-month period were reported as stormy or cloudy and determined to be low light days. Five of these days saw an increase in hypoxia duration from the previous day, and the remaining two days saw an increase in hypoxia duration on the following day. Many partly-cloudy and mostly-cloudy days saw a subsequent increase in hypoxia duration, but the data was not significant enough to establish a trend.



Above: Plotting the total hours of hypoxia recorded per day against the amount of available atmospheric light. Atmospheric light was quantified on a 5-tier system, with stormy, low light days given a value of 0 and fair, sunny days given a value of 4.



Above: A comparison of atmospheric light availability and measured light intensity in the bottom water. The light sensor had significant settling on the sensor face and was cleaned on 7/15.

Results Cont.

The bottom water light sensor did not reflect the same trends reported for atmospheric light. Causes for the variations could include turbidity, algal blooms, changes in water depth, or the presence of foreign matter on the sensor face.

For three out of four days categorized by storms, the bottom water light sensor recorded decreases in light intensity in the following days.

Conclusions

There is a potential relationship between hypoxia events and atmospheric light availability, but more data from a larger selection of sites is necessary to determine a trend.

The methodology faced several limitations with data collection. Water depth and turbidity data would have added to the data from the light sensor, aided by more frequent cleanings. A light sensor deployed above the water would have provided more quantitative data for atmospheric light.

This study will be expanded to multiple sites throughout the lagoon to determine the relative influence of general trends and site-specific factors.

Acknowledgements

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