



# Thermal Pollution in the Indian River

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## INTRODUCTION

Thermal pollution, the increasing of water temperatures as a result of artificial processes, can have significant negative effects on local aquatic life. Power plants have been known to increase the local water bodies they surround by using their water as a coolant fluid. A lot of data is available on the water temperatures of large bodies of water thanks to remote sensing technology, but there is a shortage of data on more local differences. Given the water quality issues seen in Florida's waters, including algae blooms and poor sea grass growth, specific data on the temperature differences in the vicinity of power plants may be useful to researchers studying the impact that power plants have on the environment.

## ABSTRACT

The FPL Cape Canaveral Power Plant and the OUC Indian River Plant are two gas-fired power plants that are located on and use the Indian River as a coolant source. To evaluate the temperature difference between the waters near these power plants and the surrounding waters, a pair of oceanographic survey buoys were developed and stationed at select locations in the Indian River. These buoys were equipped with an array of thermometers and sampled temperatures above and below the water surface. The preliminary survey found that on average, water temperatures near the power plants were around 1.38° C higher than the surrounding waters with minimal differences in surface temperatures.

Figure 1: OUC Indian River Plant (Top) & FPL Cape Canaveral Power Plant (Bottom)



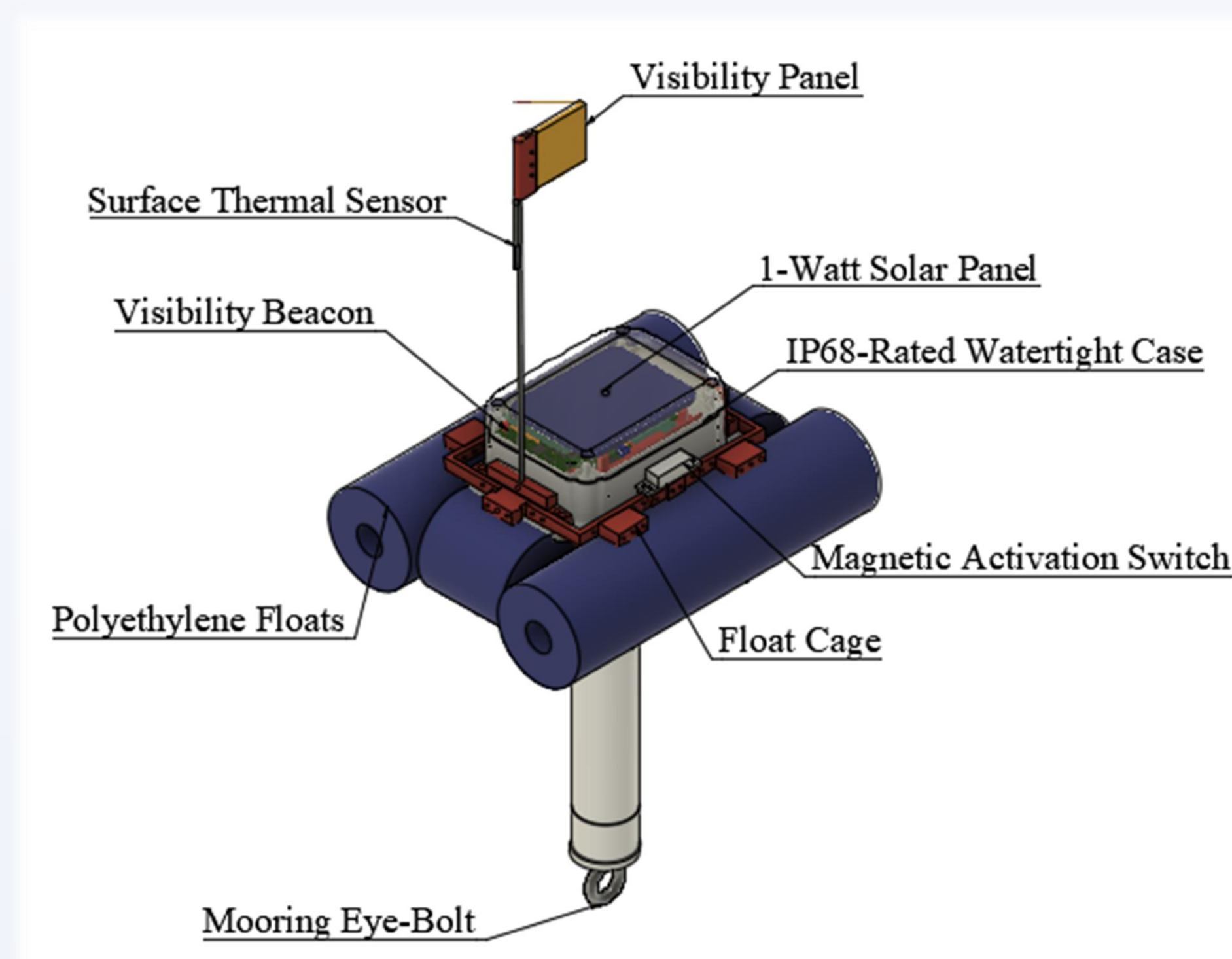
## SURVEY EQUIPMENT

Two oceanographic survey buoys were designed and built for this research survey. The buoys carried the following equipment for the following purposes:

- Battery & solar panel- extended operation time
- 2 thermal sensors- surface and water temperatures
- Real time clock & SD card- data storage
- Microcontroller & timer- data collection & power management
- Beacon- night-time visibility

The buoys were moored with a 35-lb anchor and were moored with a 12" by 7" by 7" yellow marking to increase its visibility to traffic.

Figure 2: Exterior Diagram of TPS Buoy



## SURVEY DESIGN

Both buoys were deployed and retrieved in the Indian River at the same time. Each buoy was allowed to operate for one week and collected data once every 5 minutes. The following data was collected:

- Date & time to the nearest minute
- Atmosphere and water temperature
- Internal temperature and humidity

Buoy 1 was used to serve as a control unit, and was positioned far from the power plants, while Buoy 2 was positioned close to the power plants.

- Both devices operated from February 26, 2022 until March 5, 2022
- Buoy 1 placed 4 miles upstream of both power plants near NASA Causeway Bridge
- Buoy 2 placed within 0.3 miles of both power plants

## RESULTS

The mean difference in water temperature between Buoy 1 and Buoy 2 was 1.38° C, with the warmer waters being found near the power plants. Surface temperatures for both buoys were very similar, but the peak daily temperature was consistently higher near the power plant. The water temperature measured by Buoy 2 was always greater than the temperature than Buoy 1.

Figure 3: Water Temperatures Recorded By Each Buoy

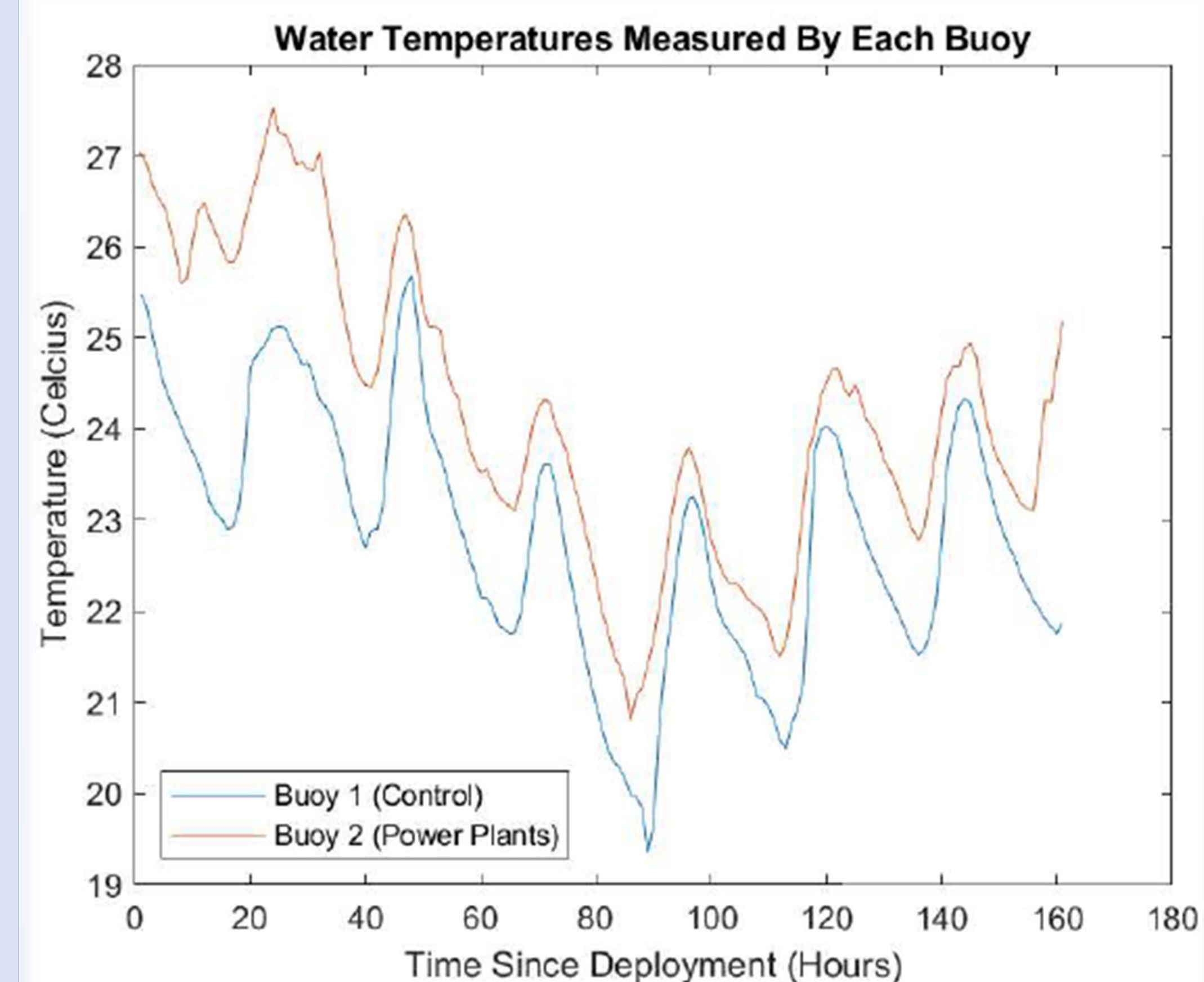
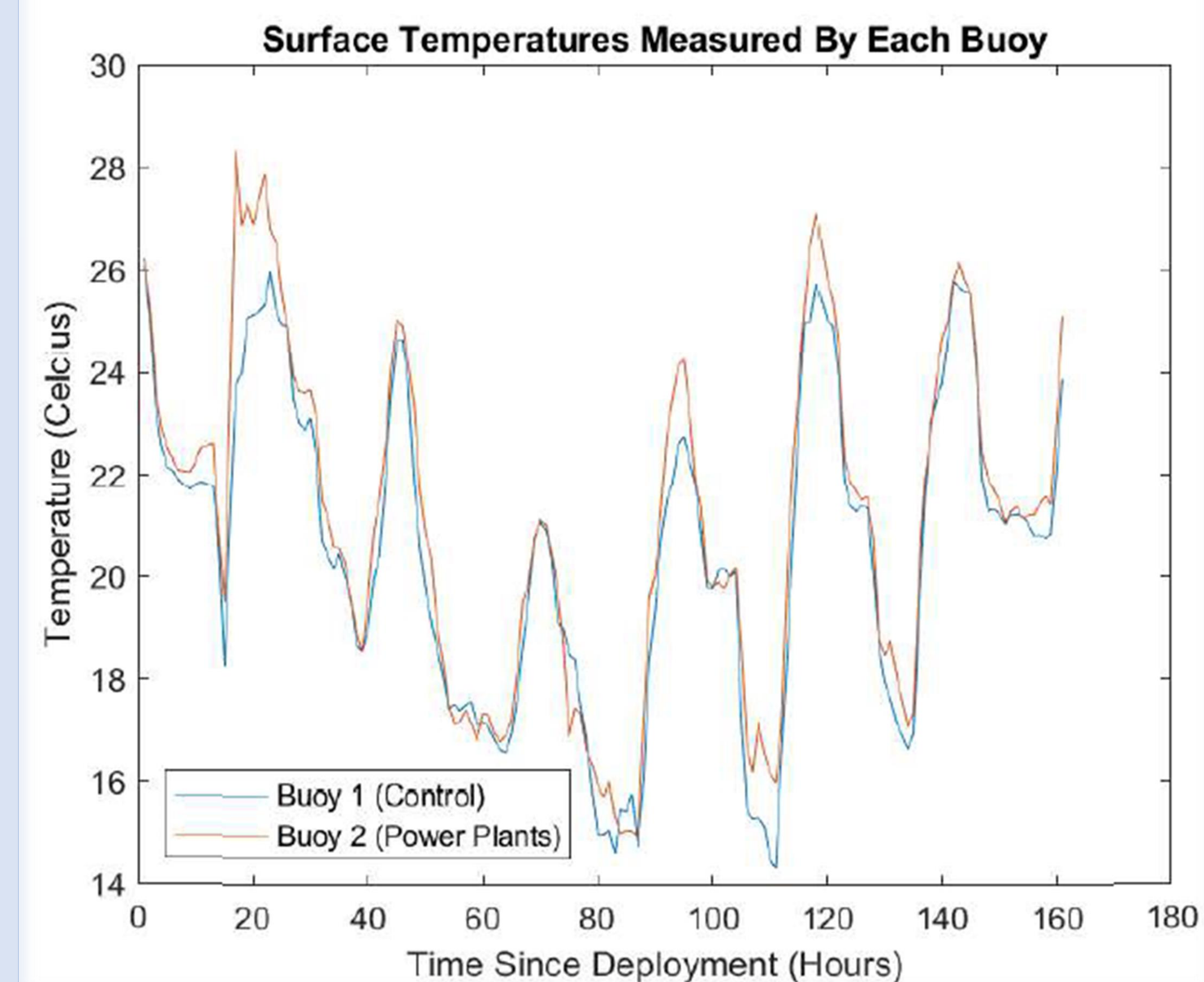


Figure 4: Surface Temperatures Recorded By Each Buoy



## RECOMMENDATIONS & FUTURE WORK

The initial deployment of the research buoys indicates that there are increased temperature levels surrounding the two power plants discussed earlier. More data is needed though to more conclusively state that there is a significant increase in local water temperature surrounding these power plants, since only a single control location was used. Plans were created to redeploy the survey buoys in other locations in the Indian River over the course of a month, which would allow for a more comprehensive evaluation of the situation by the power plants.

Figure 5: Past & Potential Mooring Locations



The extra data collection periods were unable to be accomplished due to insufficient resources. If further funding can be made available, the pursuit of these deployments would be a logical path to more thoroughly understand the thermal pollution in the Indian River.

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