WHAT IS THE DATA TELLING US SO FAR?

Update for the period of October 2020 to December 2020

FOR THE WHITSUNDAYS WATER QUALITY BLUEPRINT FOR TOURISM PROJECT

DATA LOGGERS ARE ANCHORED UNDER WATER AND CONTINUOUSLY COLLECT DATA ON A RANGE OF INDICATORS.

1. DATA FROM IN-SITU LOGGERS

Data loggers anchored on the seafloor continuously collect data on:

- Water temperature
- Water depth and wave height (by measuring pressure)
- Water clarity (by measuring turbidity)
- Light (by measuring PAR)

Water temperatures have continued to warm as we come into summer, with a similar pattern between Cairn Beach and Tongue Bay in the period October 2020 to December 2020.

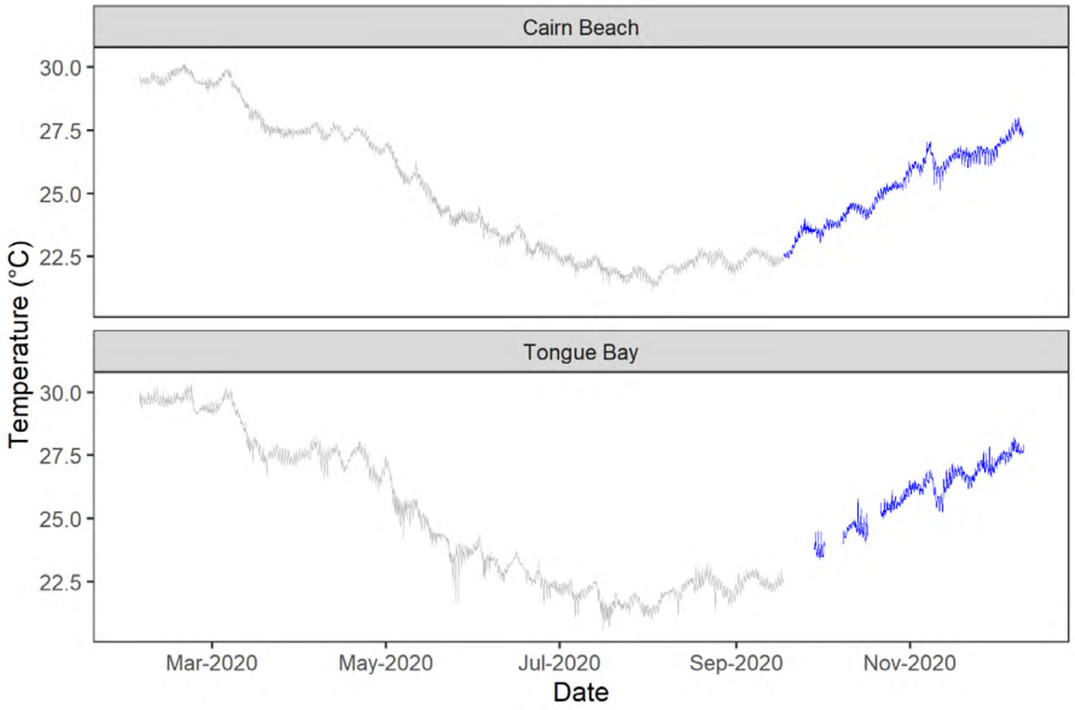

Figure 1. Temperature measured at Cairn Beach and Tongue Bay.

During the most recent logger deployment (October to December 2020), the average water depth of the deployed loggers was between 10.3 and 10.0m at Cairn Beach compared to 8.4m at Tongue Bay. The changes in average depth at Cairn Beach are due to the placement of loggers in slightly different positions following their redeployment by tourism crews.

Data continues to show that the Cairn Beach site is more sheltered compared to the Tongue Bay site. This is seen in lower wave height values at Cairn Beach on average, which indicates the force of the water at the seafloor is lower. This was expected, since Cairn Beach is generally more sheltered from the wind and open ocean due to its position between two islands.

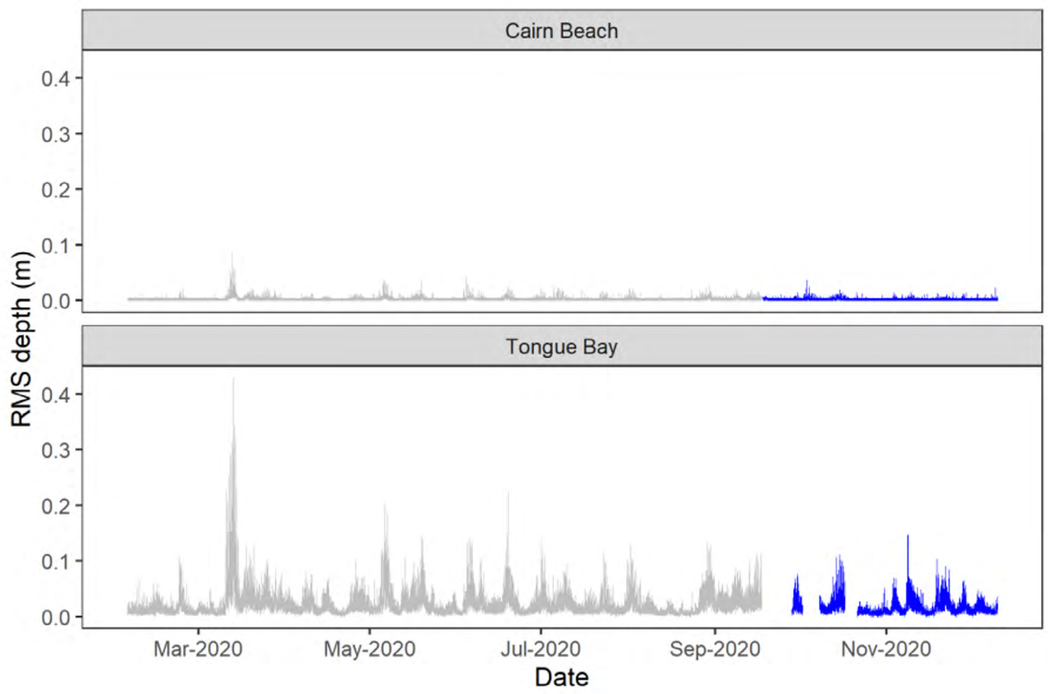

Figure 2 Wave height (RMS) measured at Cairn Beach and Tongue Bay.

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DATA FROM IN-SITU LOGGERS

Light measurements (PAR) at the seafloor were on average higher at the Cairn Beach site than at Tongue Bay over the most recent deployment period (October to December 2020), however in the October period the sensor failed at Tongue Bay. Though on average over the entire period of data collection (October to December 2020), light levels are similar between sites.

A number of factors can influence light at the seafloor including water depth (less light at deeper sites), weather (less light on cloudy days) and/or water clarity (less light with more turbid water). Light measurements are assuming the logger frame is sitting upright and not on an angle. If the PAR sensor is tilted off horizontal it may give lower PAR readings than actual.

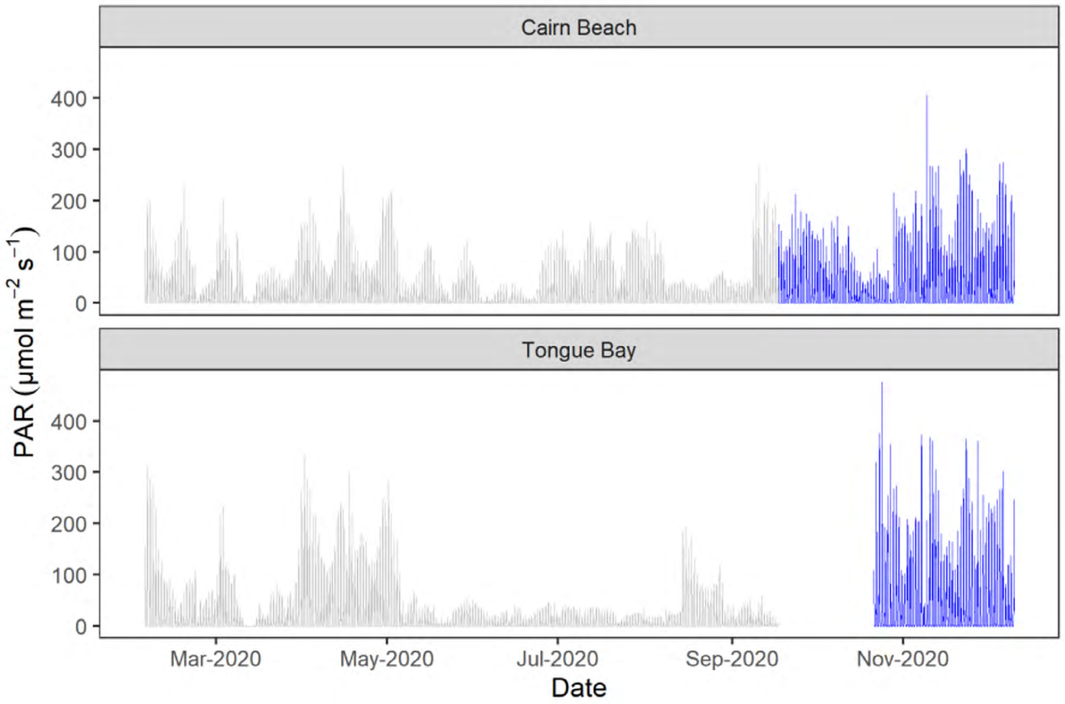

Figure 3 Light (PAR) reaching the seafloor at Cairn Beach and Tongue Bay

Turbidity sensors at the Tongue bay site continued to have issues with bio-fouling. This time during October and December 2020. Based on the available data, turbidity has been higher on average at the Tongue Bay site compared to Cairn Beach. This aligns with the higher wave action seen at Tongue Bay.

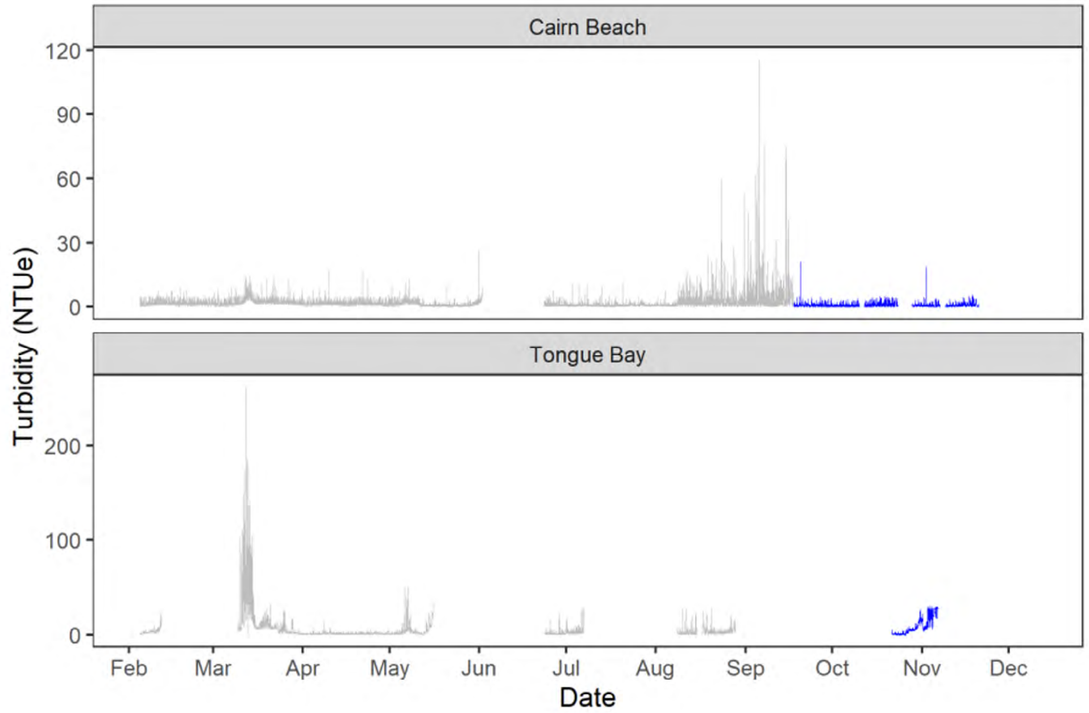

Figure 4 Water clarity (turbidity) at Cairn Beach and Tongue Bay (note the different y-axis scale). Data has been removed from the timeseries for periods where the sensor fouled.

WHAT IS THE DATA TELLING US SO FAR?

WATER SAMPLES TAKEN AT A DISCREET POINT IN TIME

Water samples are taken by tourism operators and sent to JCU for laboratory analysis of range of indicators:

- Nutrients: Nitrogen and Phosphorus (attached to particles or dissolved in water)
- Water clarity (total suspended solids)
- Phytoplankton (by measuring chlorophyll-a)

The graphs below show the spread of the data from samples taken at Cairn Beach and Tongue Bay sites.

Concentrations of nitrogen and phosphorus attached to particles (PN and PP) did not show a consistent pattern between sites, nor did concentrations of nitrogen and phosphorus dissolved in the water column (TDN and TDP) during the October 2020 to December 2020 period.

Concentrations of total suspended solids and chlorophyll-a were similar between sites during the October 2020 to December 2020 period.

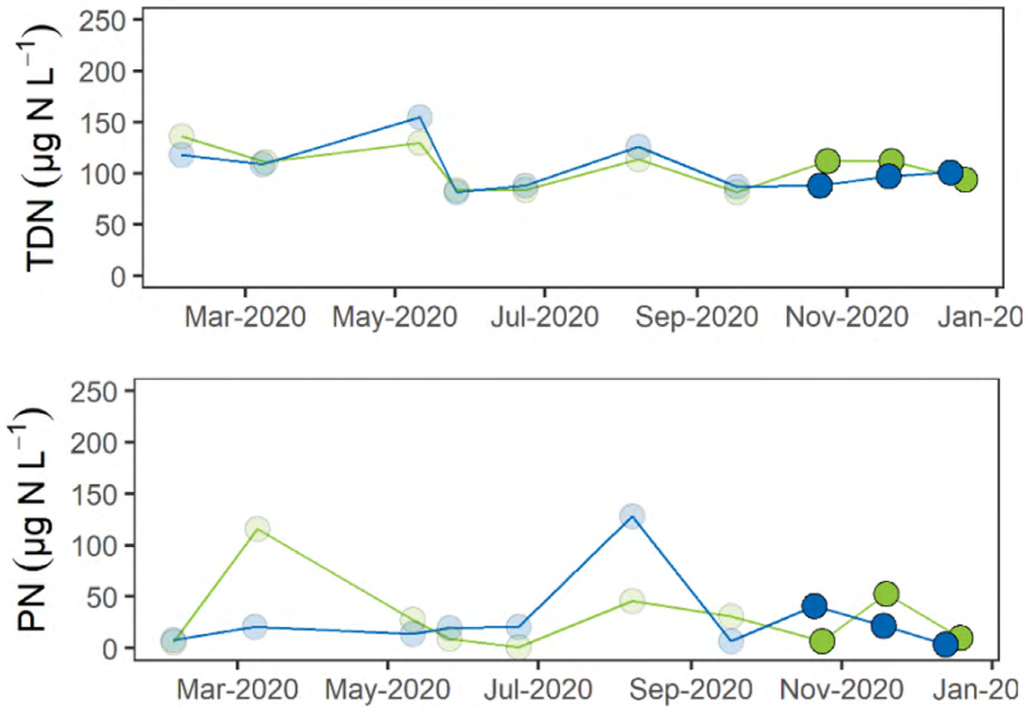

Figure 5. Nitrogen concentration between sites. Total dissolved nitrogen (TDN) and particulate nitrogen (PN).

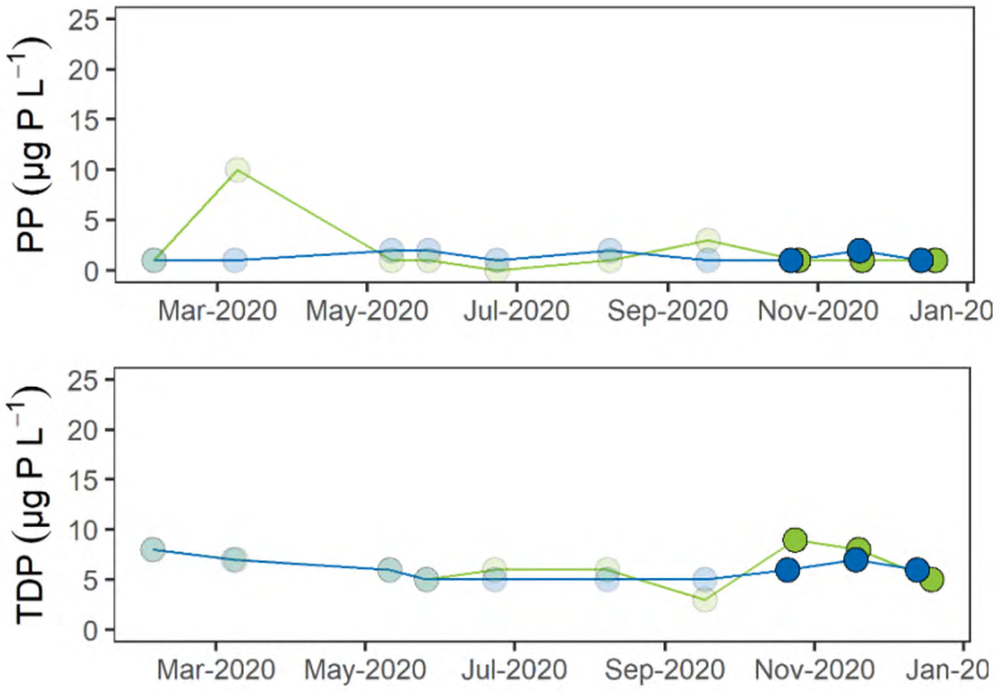

Figure 6. Phosphorus concentration between sites. Total dissolved phosphorus (TDP) and particulate phosphorus (PP).

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WATER SAMPLES TAKEN AT A DISCREET POINT IN TIME

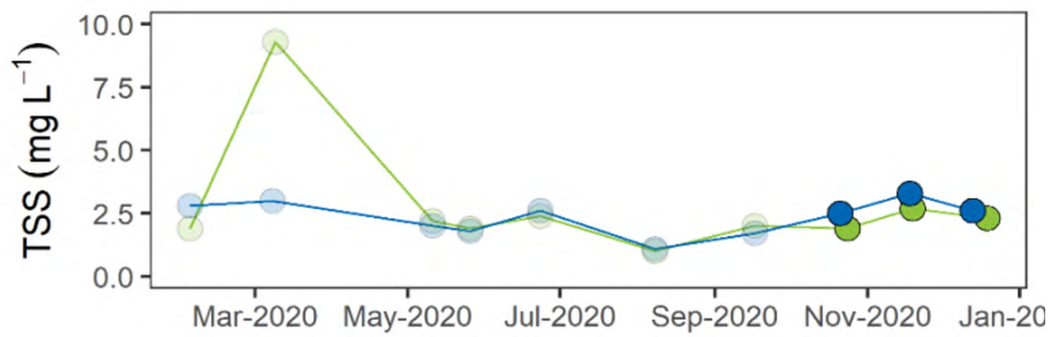

Figure 7. Total suspended solids concentrations between sites.

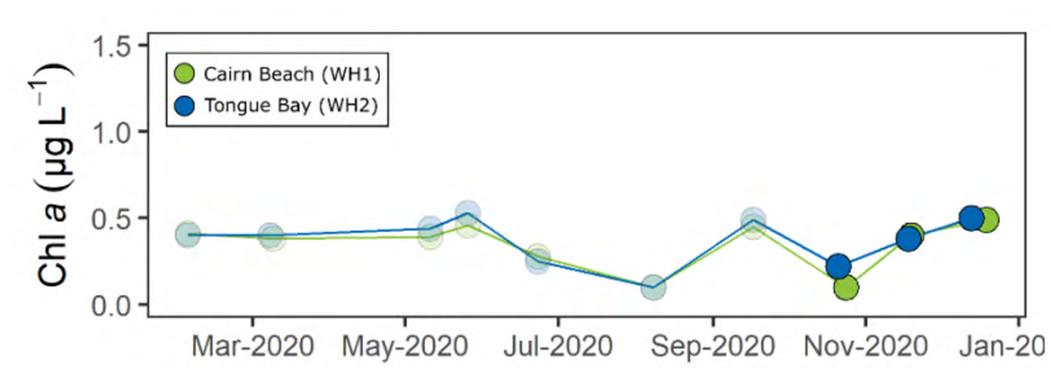

Figure 8. Chlorophyll-a concentrations between sites.

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