

WHAT IS THE DATA TELLING US SO FAR?

Update for the period of January 2021 to March 2021

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 were similar between Cairn Beach and Tongue Bay in the period of January 2021 to March 2021. Temperatures at the sea floor stayed cooler than they did in February 2020.

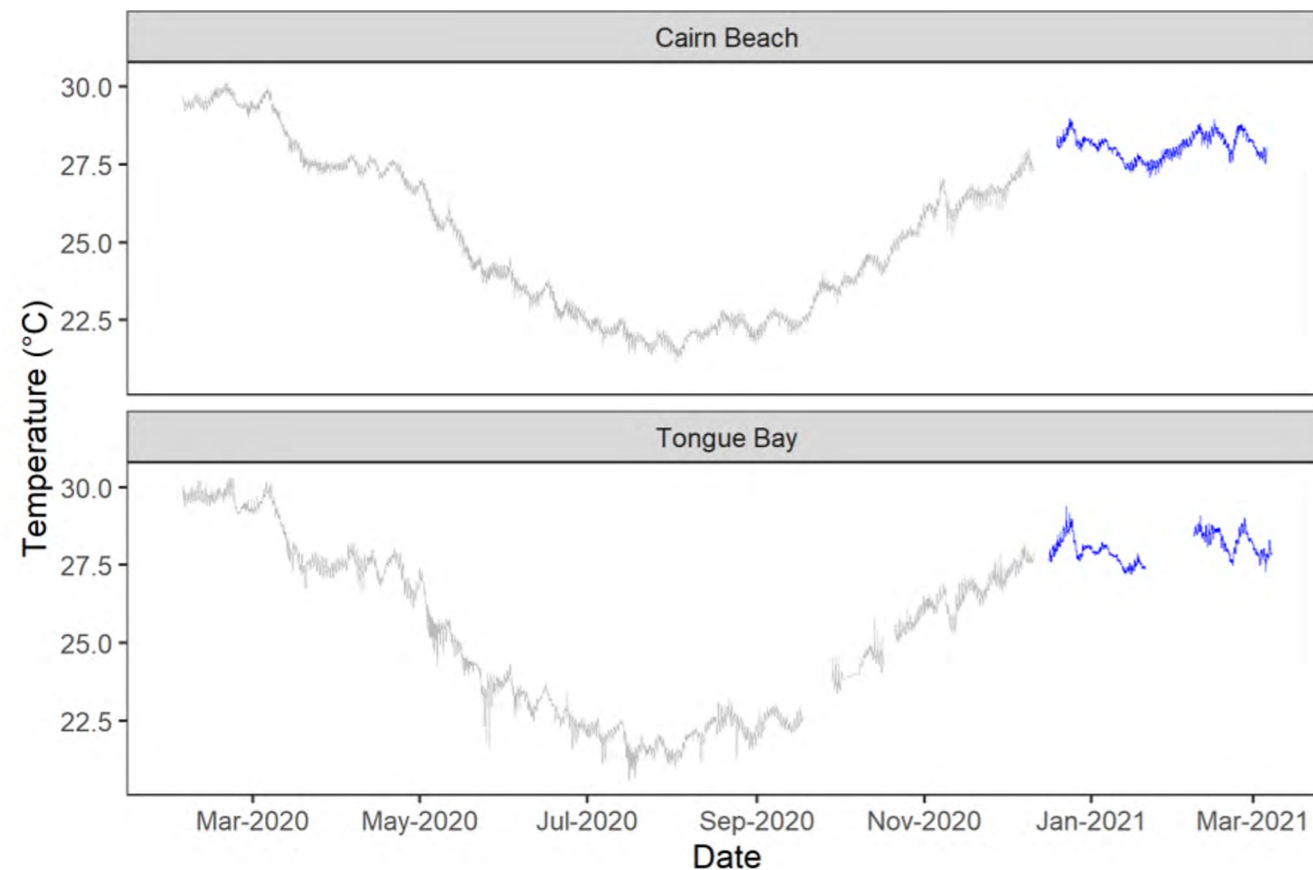


Figure 1. Temperature measured at Cairn Beach and Tongue Bay.

During the most recent logger deployment (January to March 2021), the average water depth of the deployed loggers was 7.2m at Cairn Beach compared to 10.4 and 8.5m at Tongue Bay. These changes in average depth at Tongue Bay 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. With less wave energy at Cairn Beach we expect that less sediments would be re-suspended from where they have settled on the ocean floor, although tidal currents likely also contribute to sediment resuspension throughout the Whitsundays.

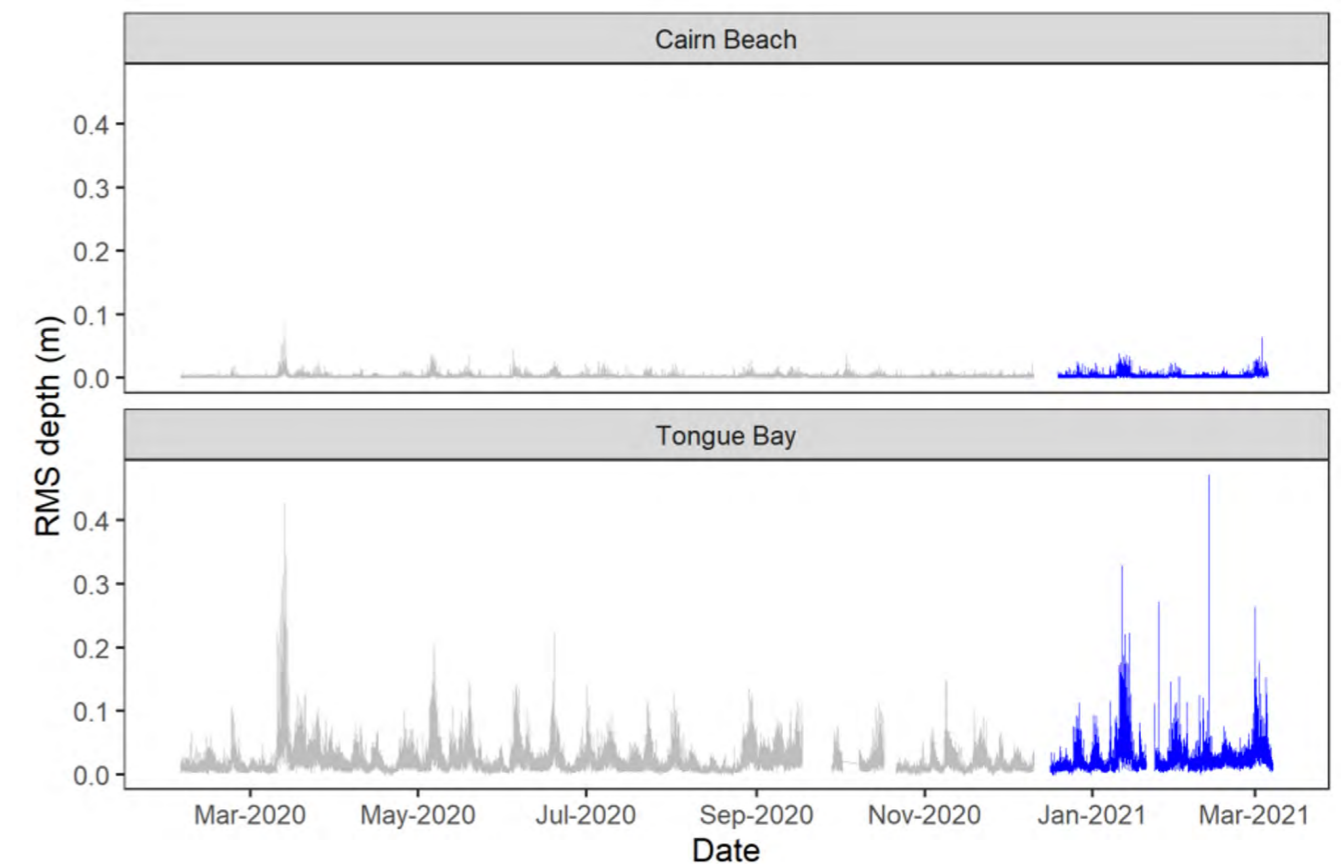


Figure 2 Wave height (RMS) measured at Carin Beach and Tongue Bay.

WHAT IS THE DATA TELLING US SO FAR?

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

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 (January 2021 to March 2021), however in the January period the sensor failed at Tongue Bay. Though on average over the entire period of data collection (February 2020 to March 2021), 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.

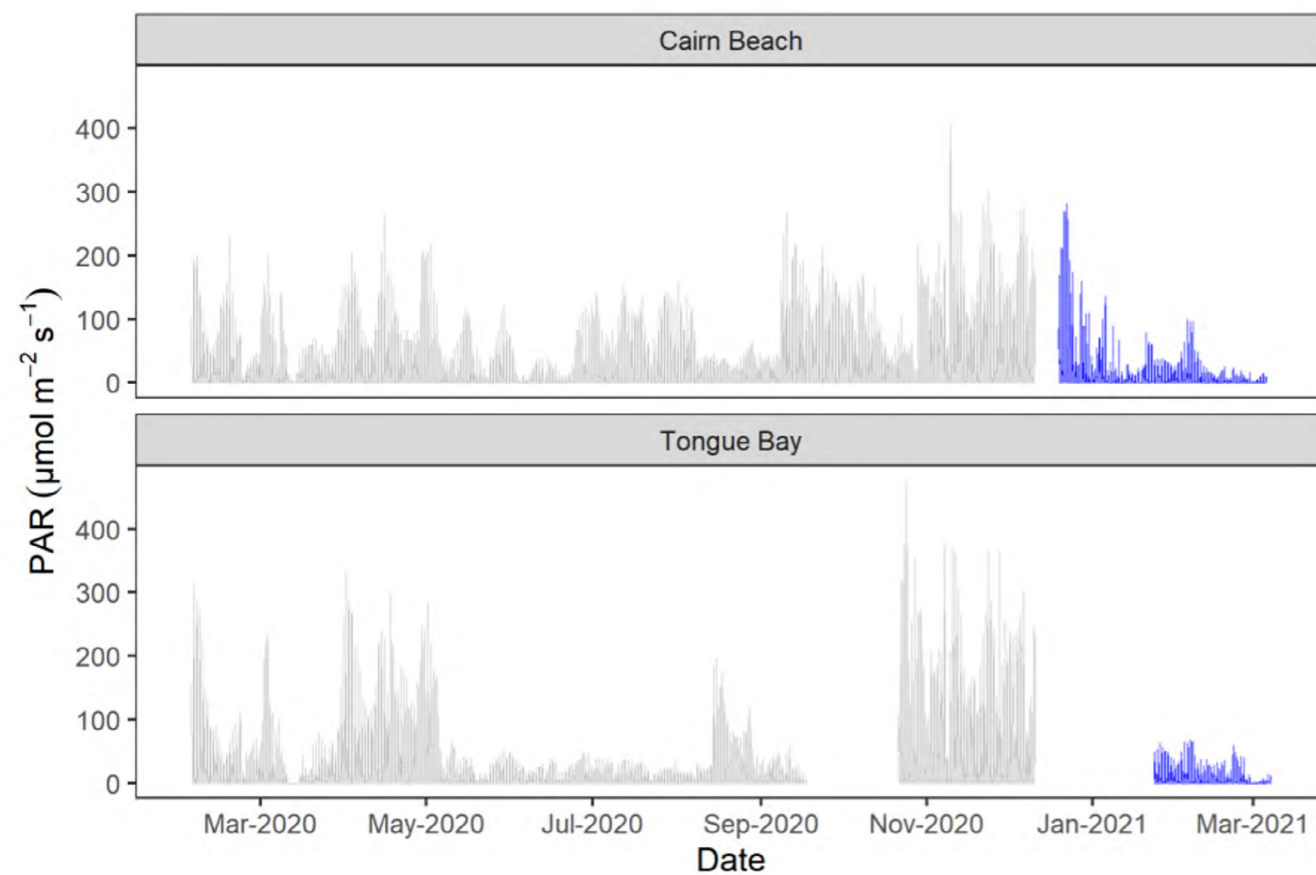


Figure 3 Light (PAR) reaching the seafloor at Cairn Beach and Tongue Bay

Turbidity sensors at the Tongue bay site continued to have issues with bio-fouling. This time during February/March 2021. 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.

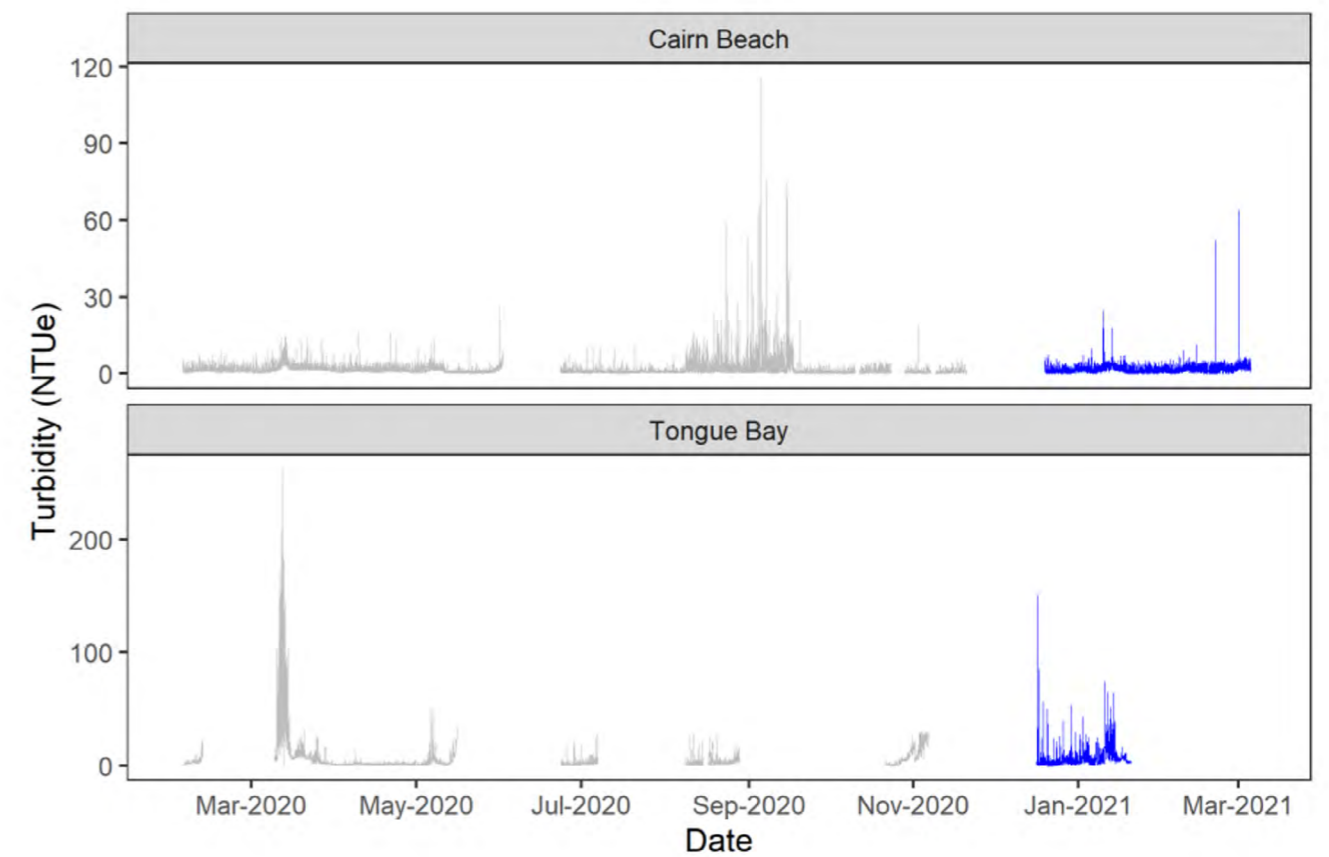


Figure 4 Water clarity (turbidity) at Cairn Beach and Tongue Bay (note the different y-axis scale). Data has been removed from the timeseries for periods where the sensor fouled.

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) tended to be higher at Cairn Beach during the January to March 2021 period, while concentrations of nitrogen and phosphorus dissolved in the water column (TDN and TDP) were similar between sites in this period.

Concentrations of total suspended solids and chlorophyll-a were similar between sites during the January to March 2021 period.

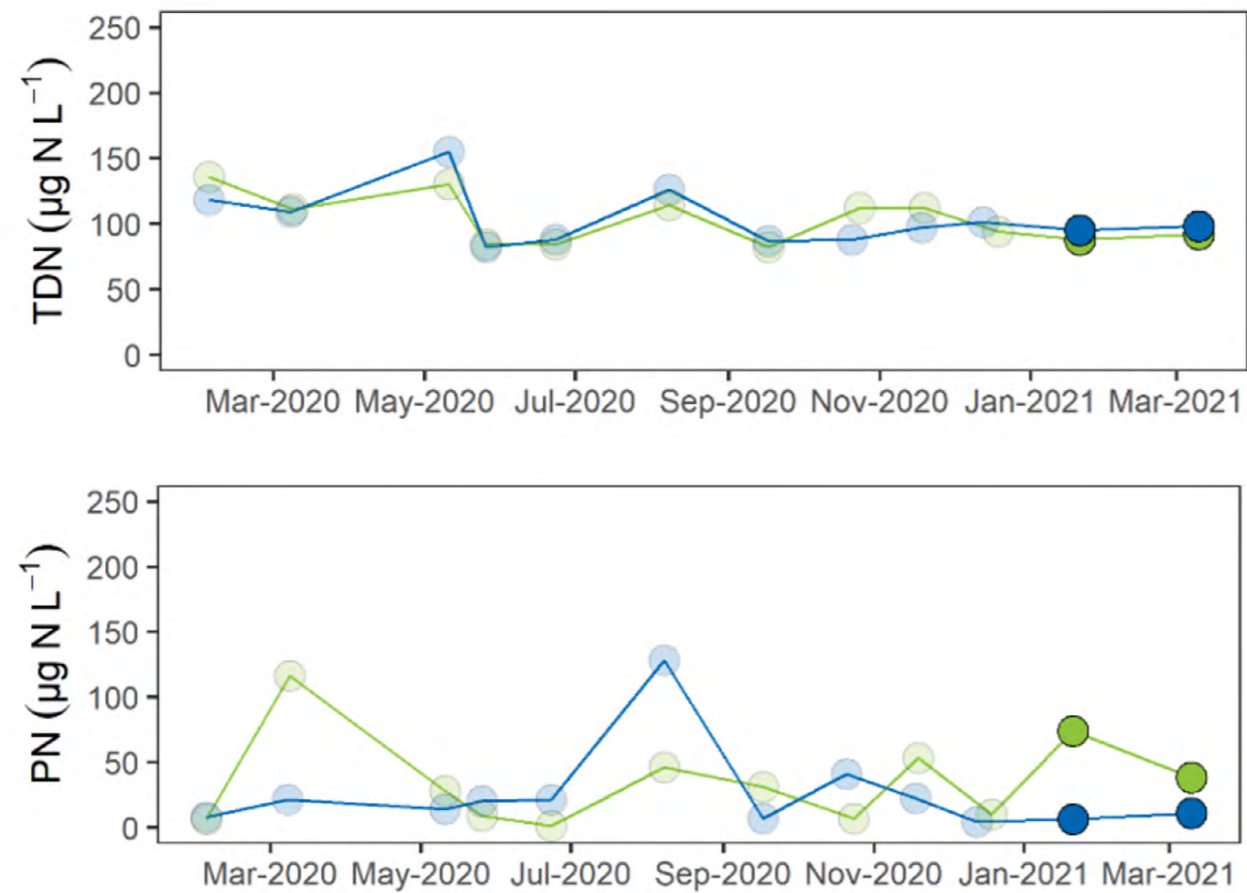


Figure 5. Nitrogen concentration between sites. Total dissolved nitrogen (TDN) and particulate nitrogen (PN).

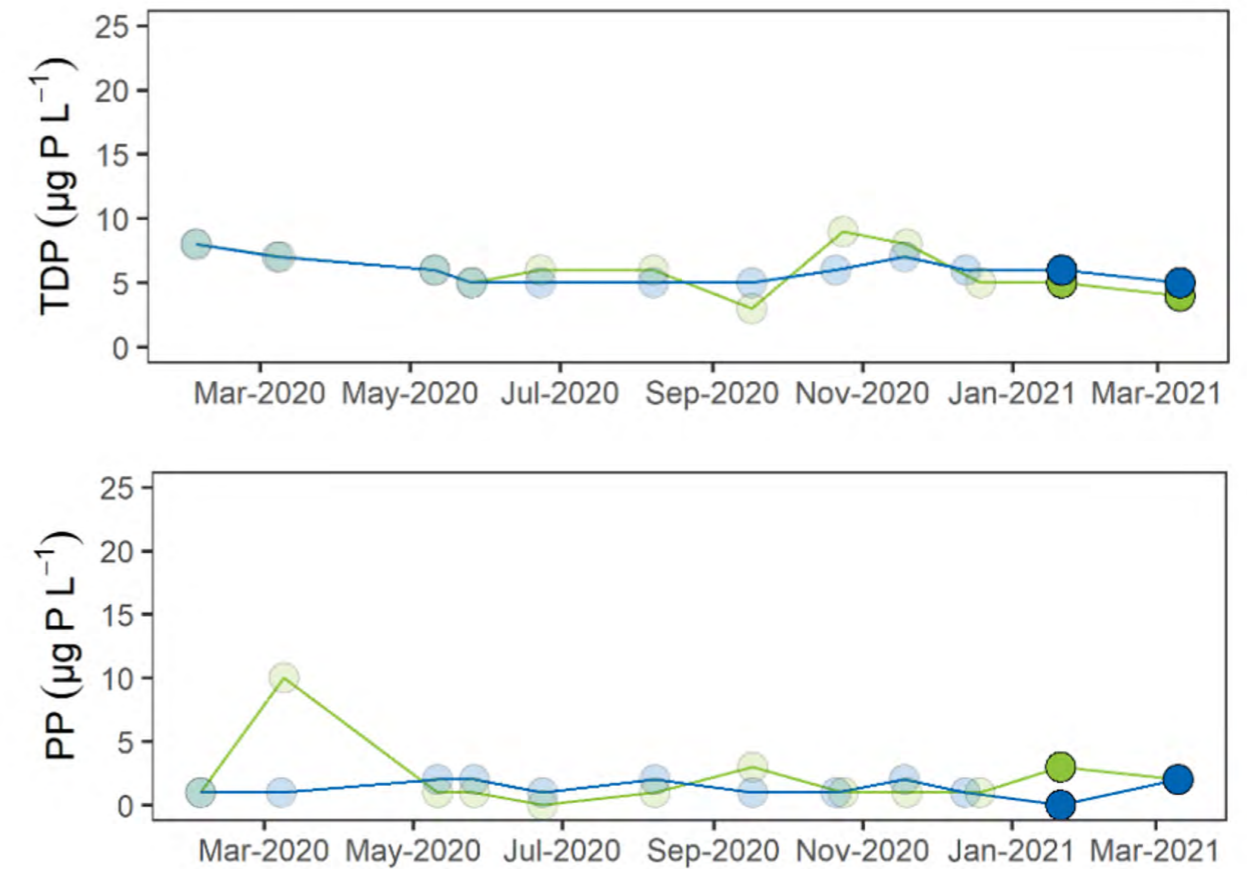


Figure 6. Phosphorus concentration between sites. Total dissolved phosphorus (TDP) and particulate phosphorus (PP).

WHAT IS THE DATA TELLING US SO FAR?

WATER SAMPLES TAKEN AT A DISCREET POINT IN TIME

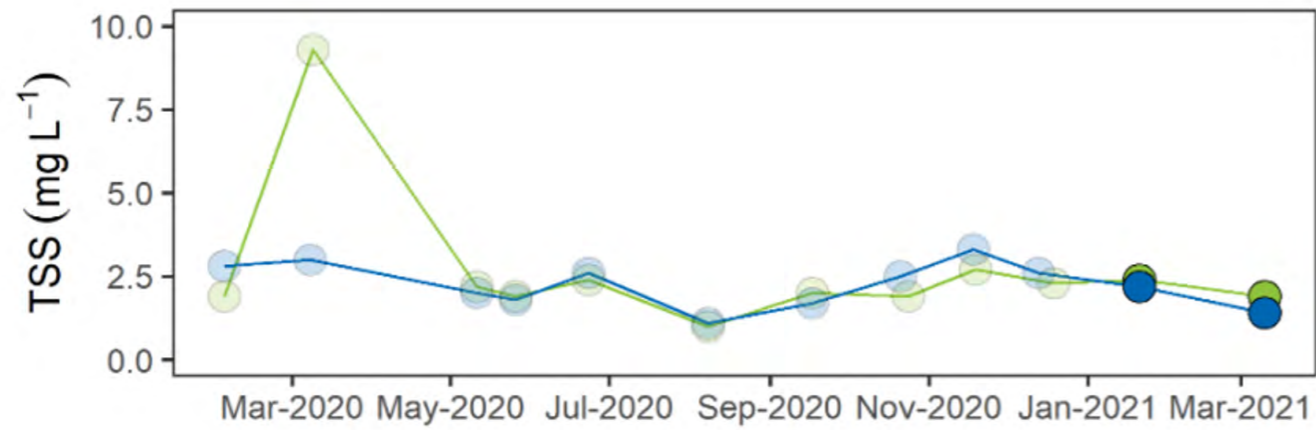


Figure 7. Total suspended solids concentrations between sites.

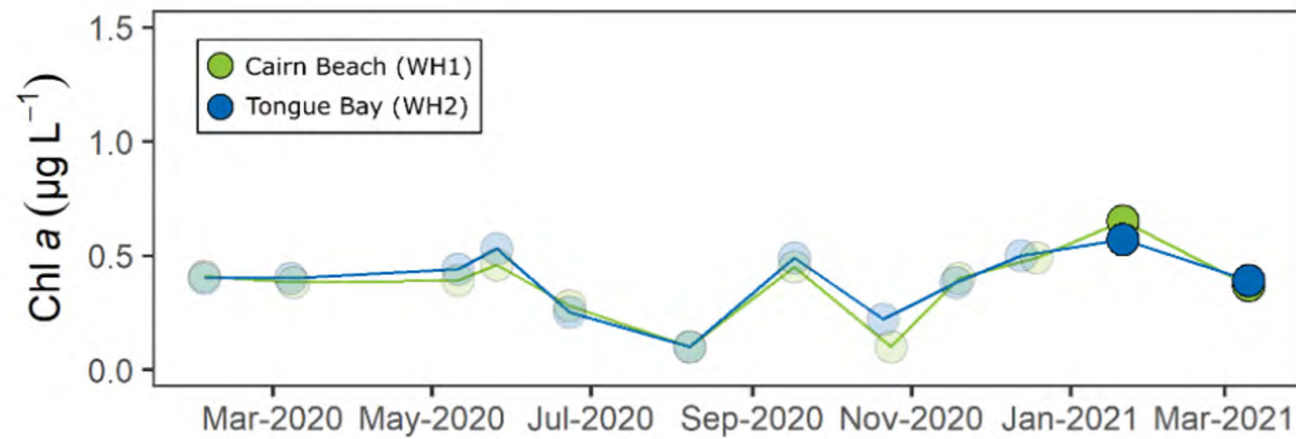


Figure 8. Chlorophyll-a concentrations between sites.

Supported by:



Great Barrier Reef Foundation



This project is funded by the partnership between the Australian Government's Reef Trust and the Great Barrier Reef Foundation, and North Queensland Bulk Ports Corporation, with support from Reef Catchments, Whitsunday Charter Boat Industry Association, James Cook University, Mackay Whitsunday Isaac Healthy Rivers to Reef Partnership and Whitsunday Bareboat Operators Association. Participating tourism operators are Ocean Rafting, Red Cat Adventures, Southern Cross Sailing Adventures and True Blue Sailing.

Information in this document is based on: Iles, JA & Waltham, NJ 2021, 'Whitsunday Water Quality Monitoring Blueprint for Tourism Operators: Quarterly update - April 2021', Centre for Tropical Water & Aquatic Ecosystem Research (TropWATER) Publication, James Cook University, Townsville, 21 pp.