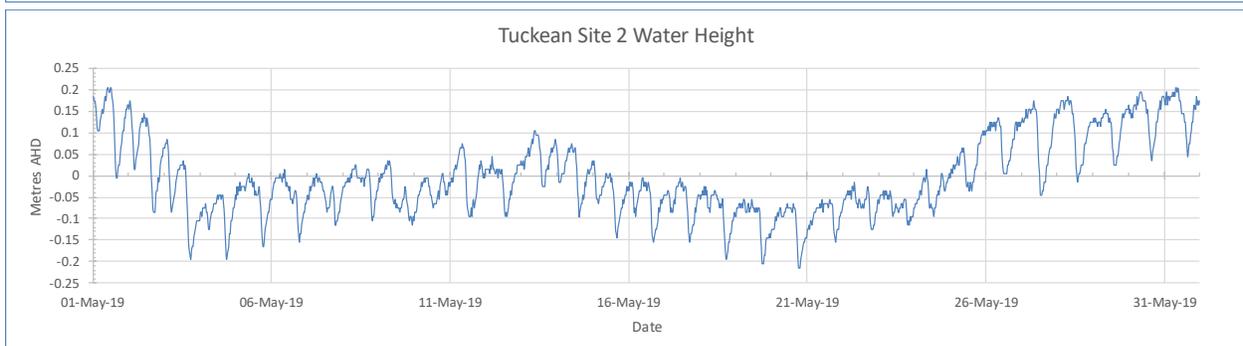
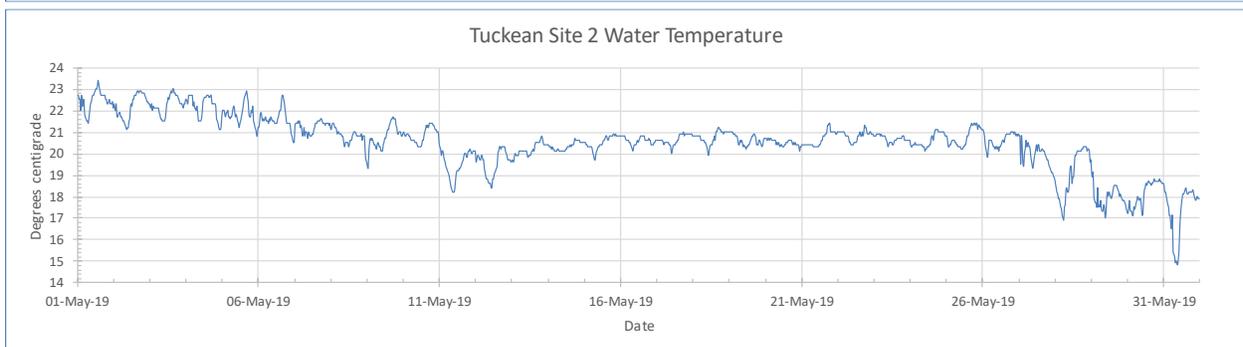
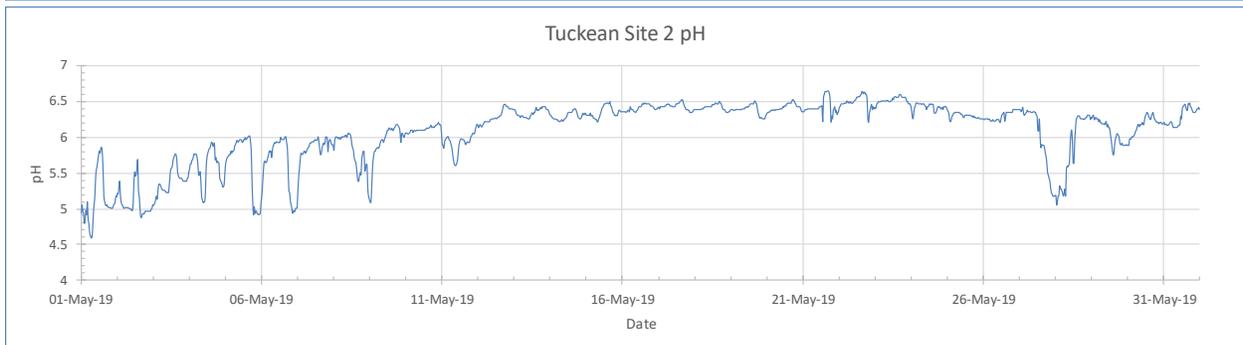
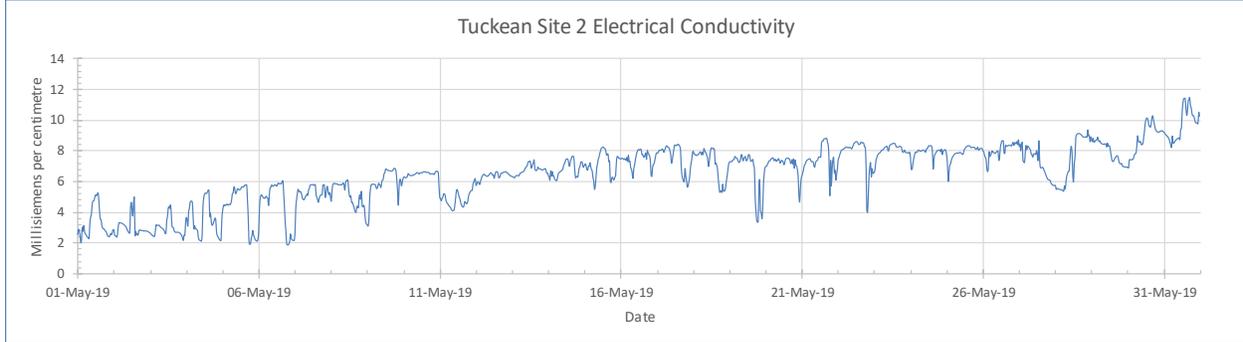
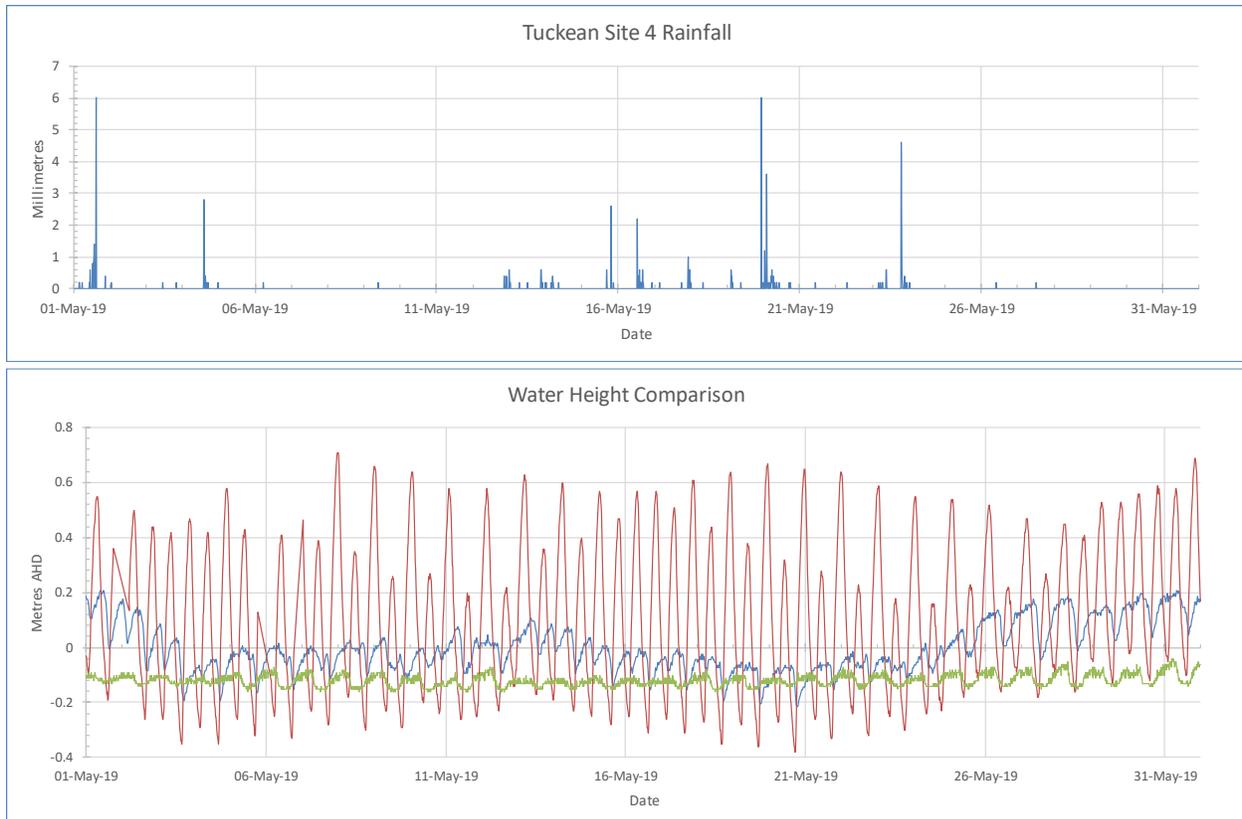


Tuckean site 2 water quality – May 2019

Data logger located upstream of Bagotville Barrage, Tuckean Swamp, NSW





Interpretation

The logger was cleaned and calibrated on 21st May and the sluice gate which had been raised to 500 mm on 24th April was lowered to 250 mm on 3rd May.

- Electrical conductivity (EC)** was recorded in May between 2.0 and 11.0 ms/cm³ averaging 6.5 ms/cm³ which is saline and has risen by 2.4 ms compared to the April brackish average of 4.1 ms/cm³ due to reduced rainfall and increased tidal influence. EC is directly related to salinity and is the inverse of electrical resistance in ohms. Water is considered fresh if below 1.8 ms/cm, brackish from 1.8 – 4.8 and saline above 4.8 with seawater approximately 60 ms/cm.
- pH** was recorded in May between 4.6 and 6.6 with an average of 6.1 which has risen by 0.7, which is equal to five times less acidity than the April average of 5.4 due to reduced rainfall and acid discharge from drains. On the pH scale neutral is at pH 7 and for every consecutive whole number below 7 acidity increases by ten times on a logarithmic scale. The Tuckean Swamp is an acid sulfate environment therefore pH is affected by surface and groundwater level, drainage, rainfall, runoff and tidal exchange.
- Water temperature** was recorded in May between 14.8 and 23.2 deg C averaging 20.5 which has fallen by 2.6° compared to the April average of 23.1°C due to decreasing air temperature and seasonal change. Water temperature normally peaks in the late afternoon as air temperature and solar radiation decreases. Temperature variations can be caused by a combination of factors

including solar radiation, air temperature, tidal exchange, day /night, riparian shade, turbidity and rainfall.

- **Water level** recorded in May ranged between -0.22 m and +0.19 m giving a range of 0.41 m and averaging 0.00 m which is 0.03 lower than the April average of +0.03 m. Levels are yet to be surveyed in to Australian Height Datum (AHD). Water height at site 2 fluctuates with tides, barrage leakage, degree of sluice gate opening, river height, rainfall in the catchment and to a lesser extent temperature, wind and barometric pressure.
- **Rainfall:** In May the site 4 data logger situated 4 km to the north recorded 68.8 mm over 21 days which compares to 164.6 mm recorded over 23 days in April. Peak 15-minute rainfall of 6.0 mm was recorded between 10:15 pm and 10:30 pm on 19th May. The May 33-year average for this location is 152.5 mm therefore rainfall is below average. During May the Rocky Mouth Creek data logger located 19 km to the SSW recorded 49.0 mm over 23 days, while the Ballina AWS located 19 km to the NE recorded 94.0 mm over 17 days.
- **Water height comparison**
The May site 2 average of 0.00 m was 0.12 m lower than the site 1 average of + 0.12 m and 0.12 m higher than the site 4 average of -0.12 m. Due to restricted water entry at the barrage sluice gates maximum daily tidal variation at site 2 was 0.17 m compared to 1.0 m at site 1. This compares to the maximum daily tidal variation of 0.09 m at site 4, which is 6.6 km upstream as a result of restrictions in the drains. The water height at site 4 is mostly lower than site 2 indicating drainage has practically ceased while drainage at site 2 only occurs within approximately 400 mm of low tide. Although rainfall has decreased in May, groundwater levels remain low due to low 2019 rainfall and high evaporation and transpiration. Low groundwater on the swamp exposes acid sulfate soils which oxidise to form sulfuric acid. If the soil becomes saturated from heavy rainfall, mobilised acid can be washed into drains resulting in an acid event capable of killing fish and causing red spot disease.