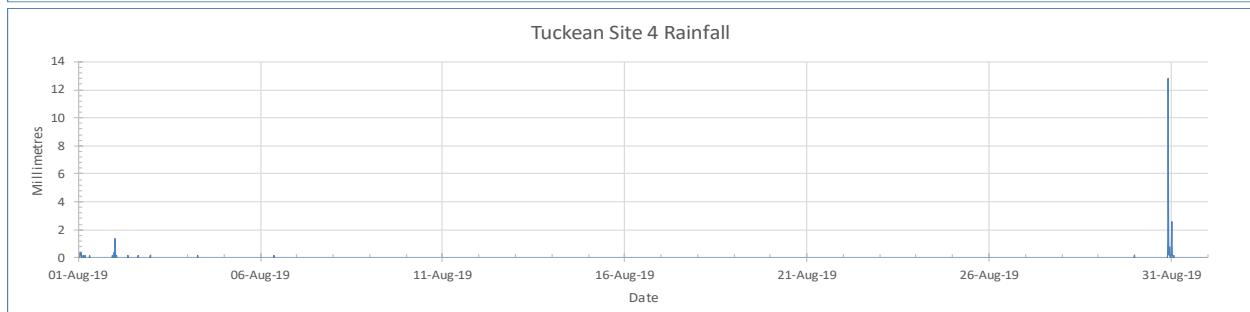
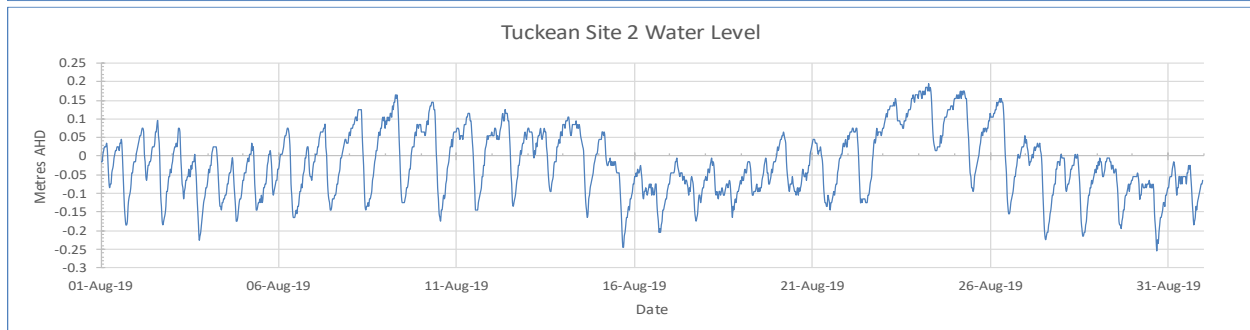
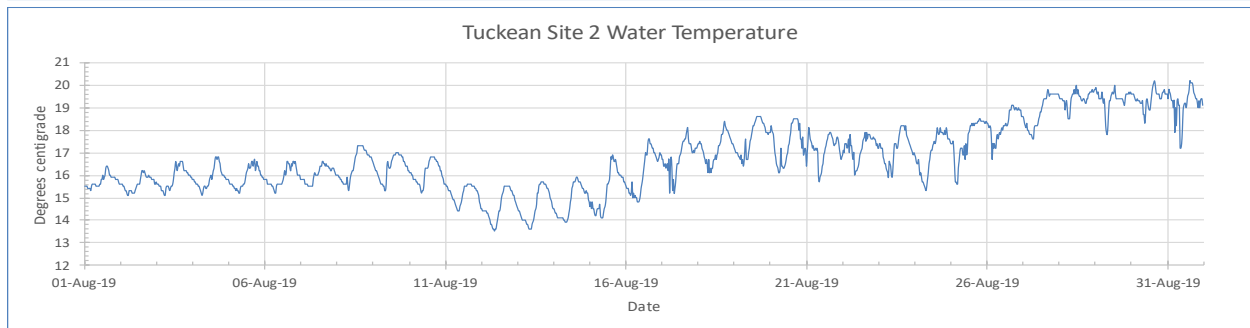
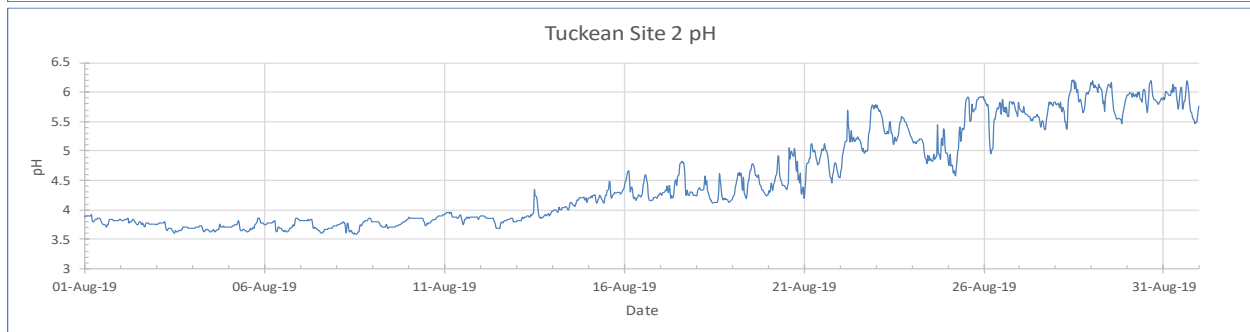
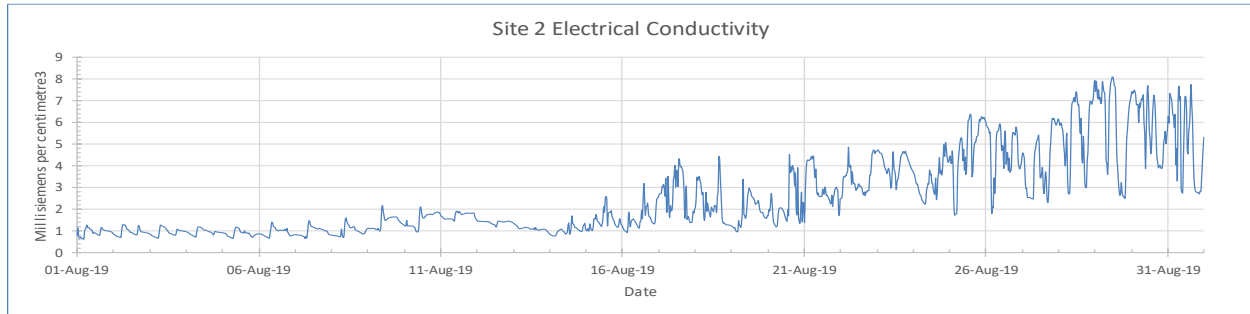
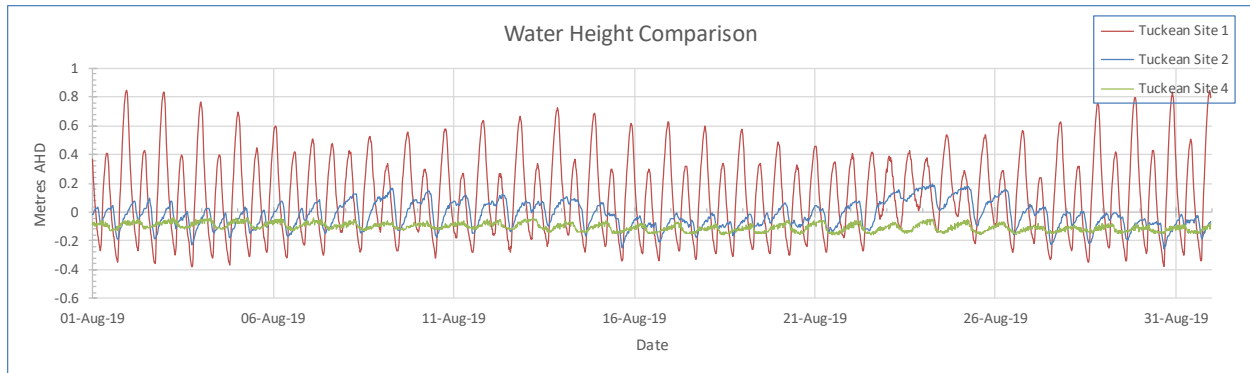


Tuckean site 2 water quality – August 2019

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





Interpretation

The logger was cleaned and calibrated on 13th August.

- Electrical conductivity (EC)** was recorded in August between 0.61 and 7.93 ms/cm³ averaging 2.5 ms/cm³ which is brackish and has risen by 2.0 ms compared to the July freshwater average of 0.5 ms/cm³. Electrical conductivity rose throughout the month due to reduced rainfall. 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 August between 3.6 and 6.6 with an average of 4.5 which has risen by 0.6 equal to 4 times reduced acidity when compared to the July average of 3.9. The rise in pH is due to decreased rainfall in August resulting in reduced 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 August between 13.5 and 20.2 deg C averaging 16.8 which has risen by 1.6° compared to the July average of 15.2°C due to increasing 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 August ranged between -0.24 m and +0.39 m giving a range of 0.63 m and averaging -0.02 m which has fallen by 0.14 m compared to the July average of 0.12 m. Water height fell due to reduced rainfall and limited tidal exchange. 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 August the site 4 data logger situated 4 km to the north recorded 30.4 mm over 6 days which compares to 92.6 mm recorded over 18 days in July. Peak 15-minute rainfall of 12.8 mm was recorded between 10:00 pm and 10:15 pm on 30th August during a thunder storm. The August 33-year average for this location is 74.1 mm therefore monthly rainfall is below average. During

August the Rocky Mouth Creek data logger located 19 km to the SSW recorded 19.2 mm over 11 days, while the Ballina AWS located 19 km to the NE recorded 52.0 mm over 5 days.

- **Water height comparison**

The August site 2 average of -0.02 m was 0.14 m lower than the site 1 average of + 0.12 m and 0.09 m higher than the site 4 average of -0.11 m. Due to restricted water entry at the barrage sluice gates, maximum daily tidal variation at site 2 was 0.31 m compared to 1.17 m at site 1.

This compares to the maximum daily tidal variation of 0.11 m at site 4, which is 6.6 km upstream as a result of restrictions in the drains. With decreasing water in the drains site 2 drainage occurred mostly during the lower third of the tidal cycle. With below average rainfall during August groundwater levels in areas surrounding the swamp have remained below average. Low groundwater on the swamp has exposed acid sulfate soils which have oxidised to form sulfuric acid. With the soil in lower areas still saturated heavy rain could wash acid into drains resulting in an acid event capable of killing fish and causing red spot disease.