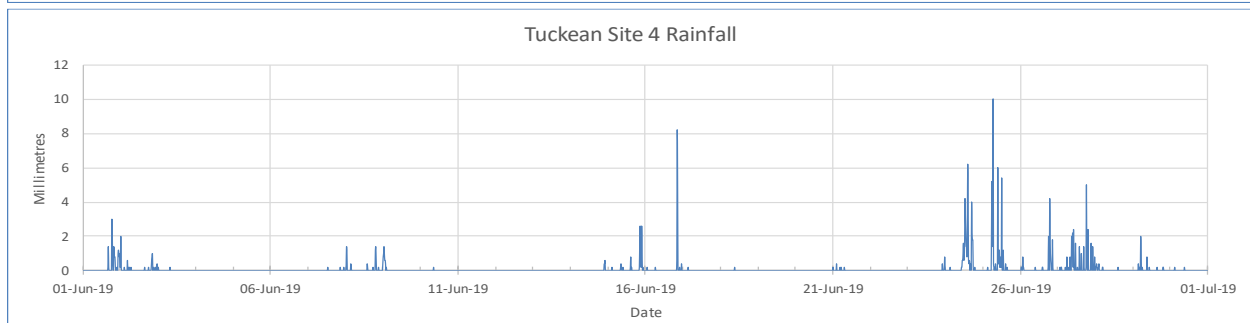
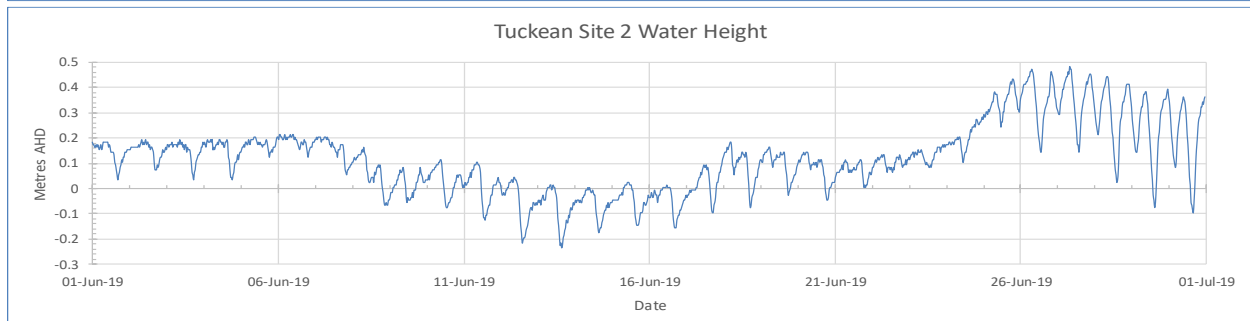
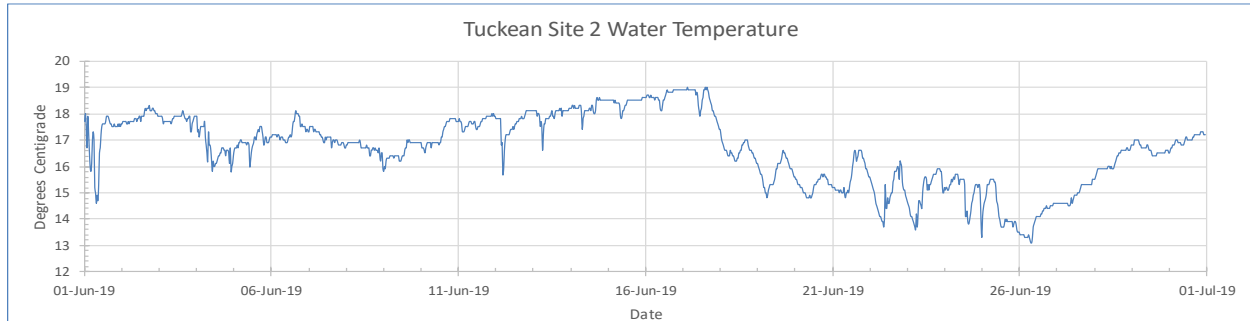
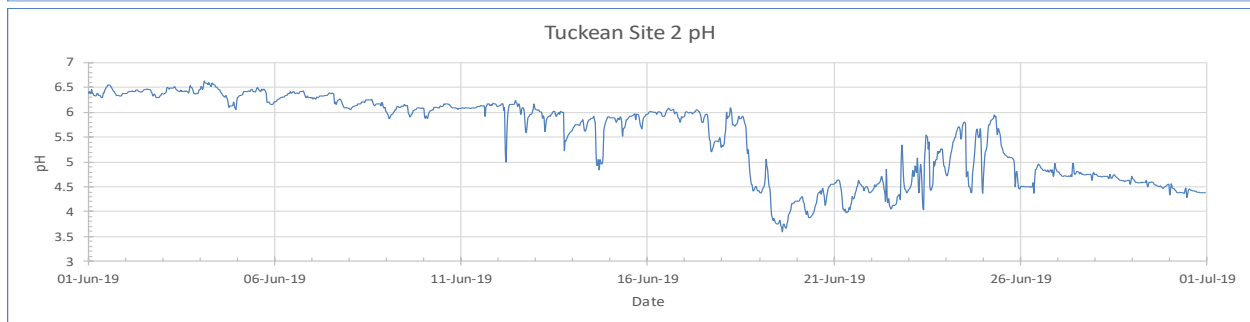
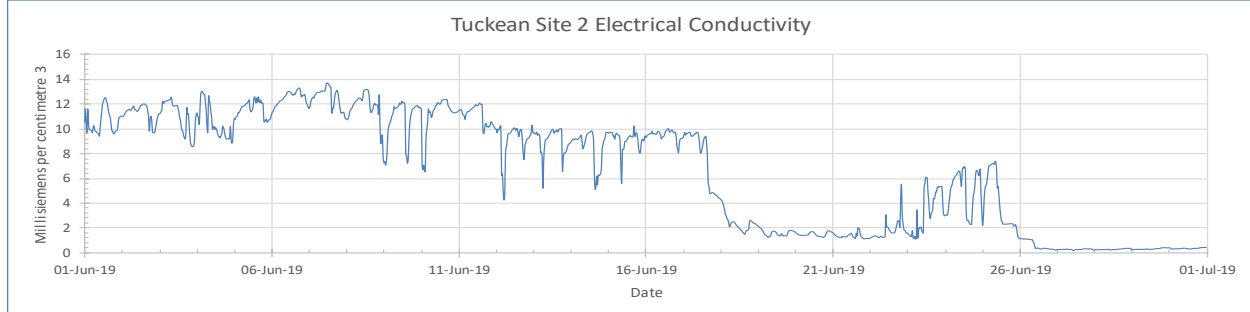
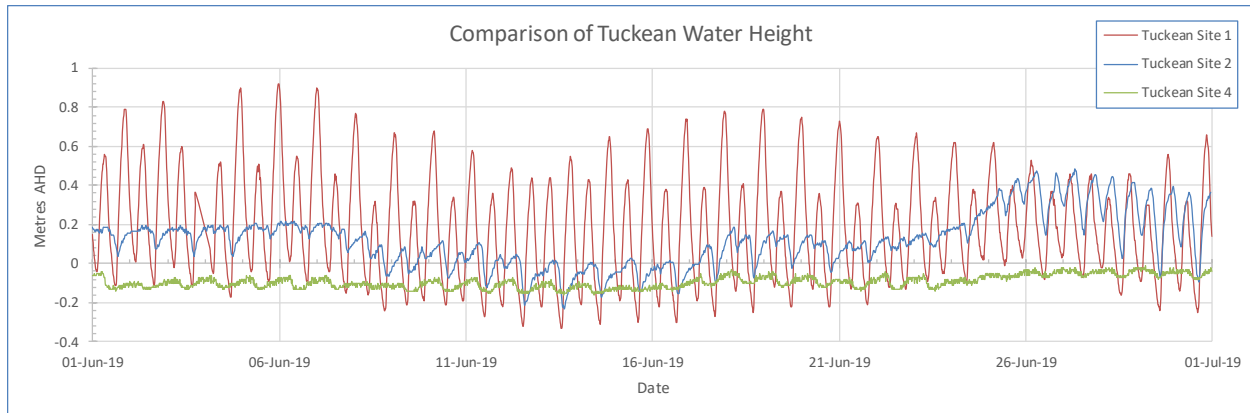


Tuckean site 2 water quality – June 2019

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





Interpretation

The logger was cleaned and calibrated on 11th June.

- Electrical conductivity (EC)** was recorded in June between 0.3 and 13.4 ms/cm³ averaging 6.7 ms/cm³ which is saline and has risen by 0.2 ms compared to the May saline average of 6.5 ms/cm³. Electrical conductivity was high during the first half of the month then fell in the second half due to 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 June between 3.6 and 6.6 with an average of 5.5 which has fallen by 0.6 equal to four times increased acidity when compared to the May average of 6.1. The fall in pH is due to increasing rainfall and acid discharge from drains particularly during the second half of the month. 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 June between 13.1 and 18.9 deg C averaging 16.7 which has fallen by 3.8° compared to the May average of 20.5°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 June ranged between -0.24 m and +0.48 m giving a range of 0.72 m and averaging 0.12 m which is 0.12 higher than the May average of 0.00 m. Water height rose at the end of the month due to catchment rainfall. 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 June the site 4 data logger situated 4 km to the north recorded 214.4 mm over 21 days which compares to 68.8 mm recorded over 21 days in May. Peak 15-minute rainfall of 10.0 mm was recorded between 6:15 am and 6:30 am on 25th June. The June 33-year average for this location is 165.5 mm therefore rainfall is above average for the first time in eight months. During June the Rocky Mouth Creek data logger located 19 km to the SSW recorded 191.0 mm over 24 days, while the Ballina AWS located 19 km to the NE recorded 268.2 mm over 15 days.
- Water height comparison**
 The June site 2 average of 0.12 m was 0.07 m lower than the site 1 average of + 0.19 m and 0.21 m higher than the site 4 average of -0.09 m. Due to restricted water entry at the barrage sluice gates, maximum daily tidal variation at site 2 was 0.47 m compared to 0.97 m at site 1. This compares to the maximum daily tidal variation of 0.1 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 lower than site 2 indicating drainage has practically ceased while drainage at site 2 only occurred during the whole tidal cycle at the end of the month when rainfall raised levels on the swamp. Although June rainfall is above average, groundwater levels remain low due to decreased rainfall since November 2018. 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.