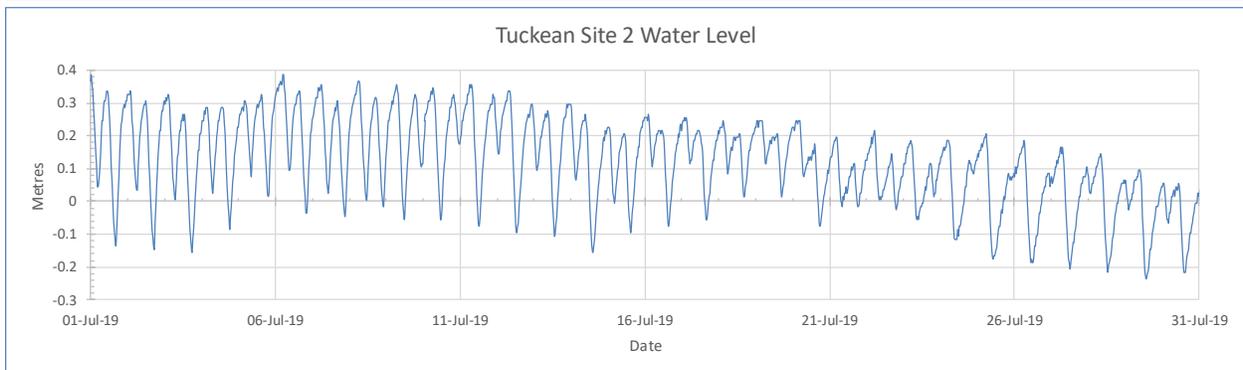
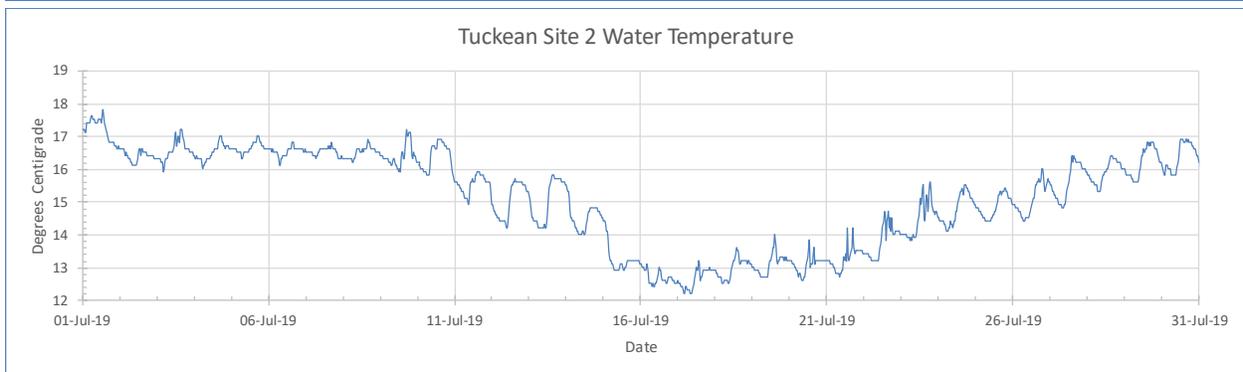
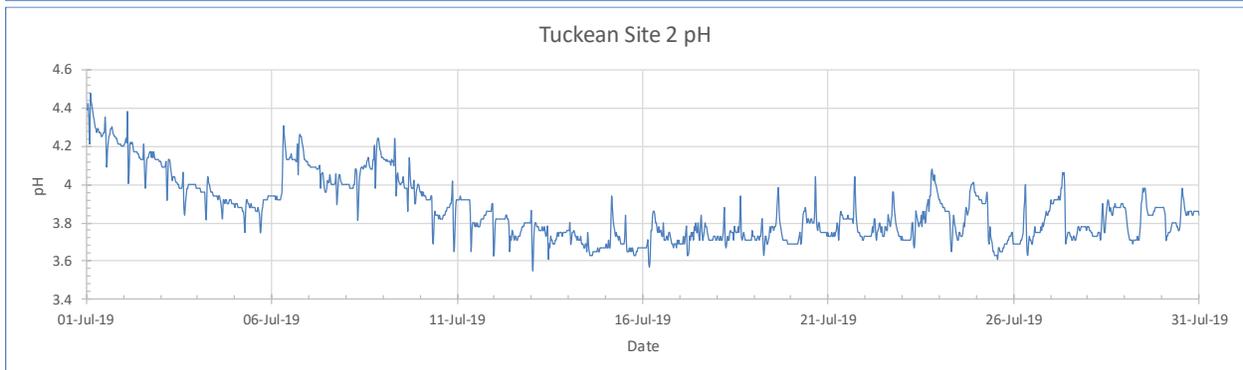
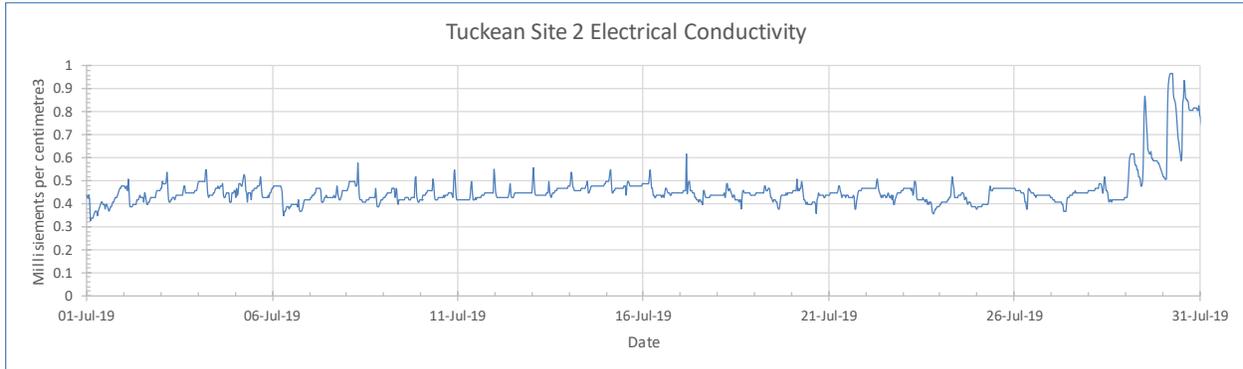
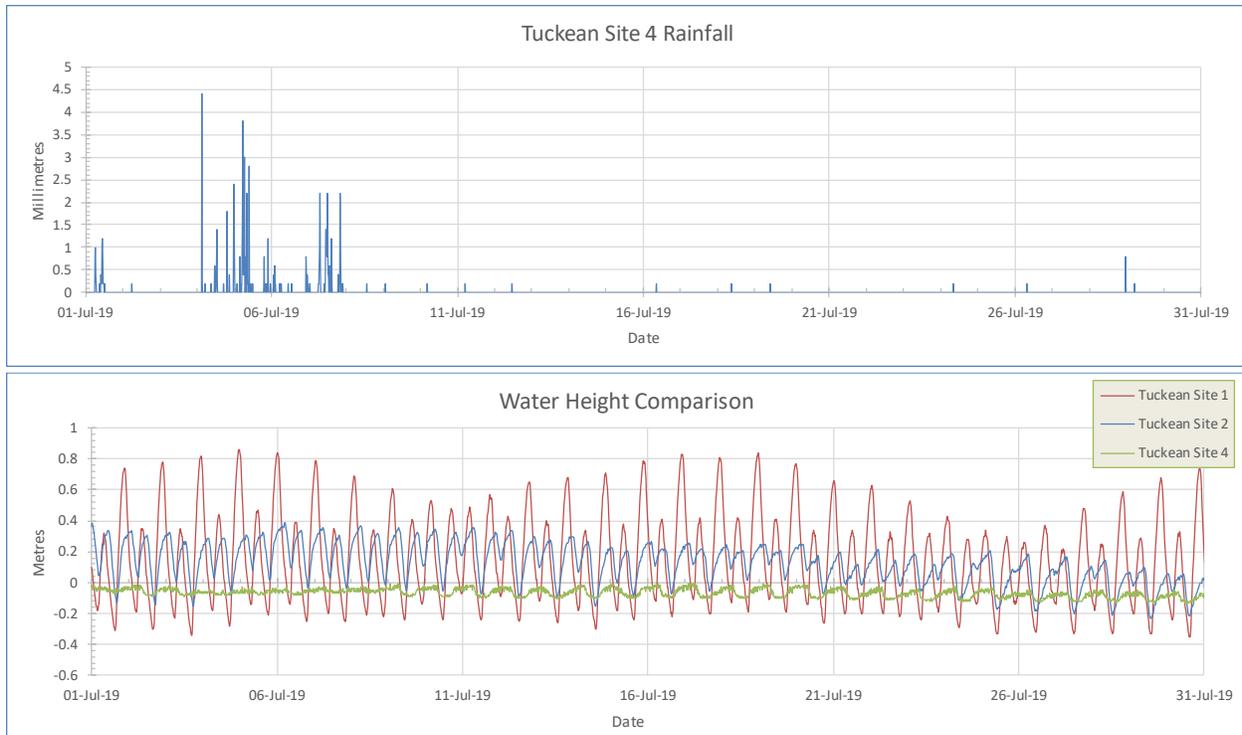


Tuckean site 2 water quality – July 2019

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





Interpretation

The logger was cleaned and calibrated on 9th July.

- Electrical conductivity (EC)** was recorded in July between 0.34 and 0.97 ms/cm³ averaging 0.5 ms/cm³ which is freshwater and has fallen by 6.2 ms compared to the June saline average of 6.7 ms/cm³. Electrical conductivity was low during most of the month due to above average rainfall in June and the first half of July then rose in late July due to decreased 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 July between 3.6 and 6.6 with an average of 3.9 which has fallen by 1.6 equal to 39.8 times increased acidity when compared to the June average of 5.5. The fall in pH is due to above average rainfall in June and the first half of July causing 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 July between 13.1 and 18.9 deg C averaging 15.2 which has fallen by 1.5° compared to the June average of 16.7°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 July ranged between -0.24 m and +0.39 m giving a range of 0.63 m and averaging 0.12 m which is equal to the June average of 0.12 m. Water height fell through the second half of the month due to reduced 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 July the site 4 data logger situated 4 km to the north recorded 92.6 mm over 18 days which compares to 214.4 mm recorded over 21 days in June. Peak 15-minute rainfall of 4.4 mm was recorded between 2:30 am and 2:45 am on 4th July. The July 33-year average for this location is 79.4 mm therefore monthly rainfall is above average for the second time this year. During July the Rocky Mouth Creek data logger located 19 km to the SSW recorded 69.8 mm over 21 days, while the Ballina AWS located 19 km to the NE recorded 74.8 mm over 14 days.
- **Water height comparison**
The July site 2 average of +0.12 m was 0.03 m lower than the site 1 average of + 0.15 m and 0.19 m higher than the site 4 average of -0.07 m. Due to restricted water entry at the barrage sluice gates, maximum daily tidal variation at site 2 was 0.46 m compared to 1.15 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. With increased water in the drains site 2 drainage occurred approximately once site 1 tidal levels fell below the mean tide height of 0.2m AHD. Above average rainfall in June and the first half of July have helped to recharge groundwater levels however across the swamp levels are still below average. Low groundwater on the swamp exposes acid sulfate soils which oxidise to form sulfuric acid. With the soil in lower areas now saturated heavy rain could wash acid into drains resulting in an acid event capable of killing fish and causing red spot disease.