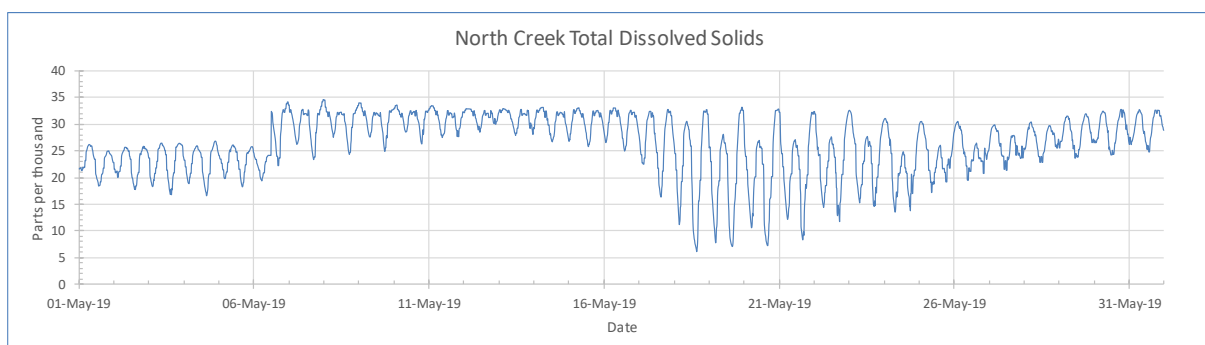
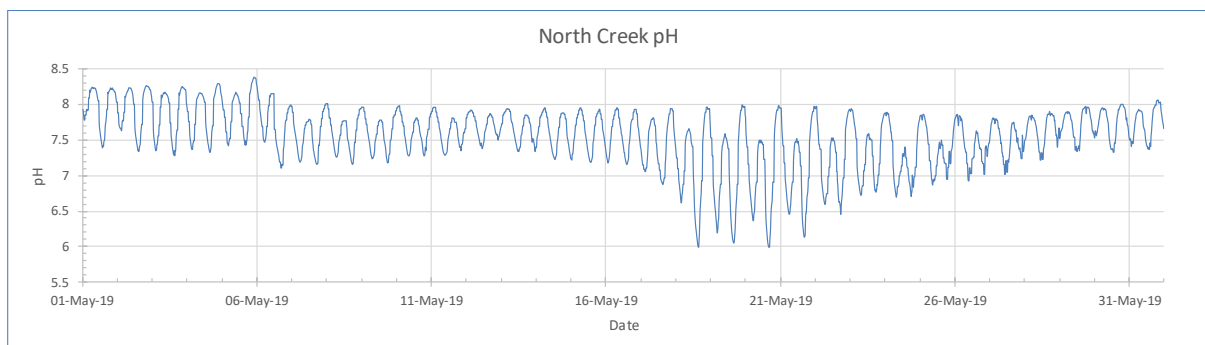
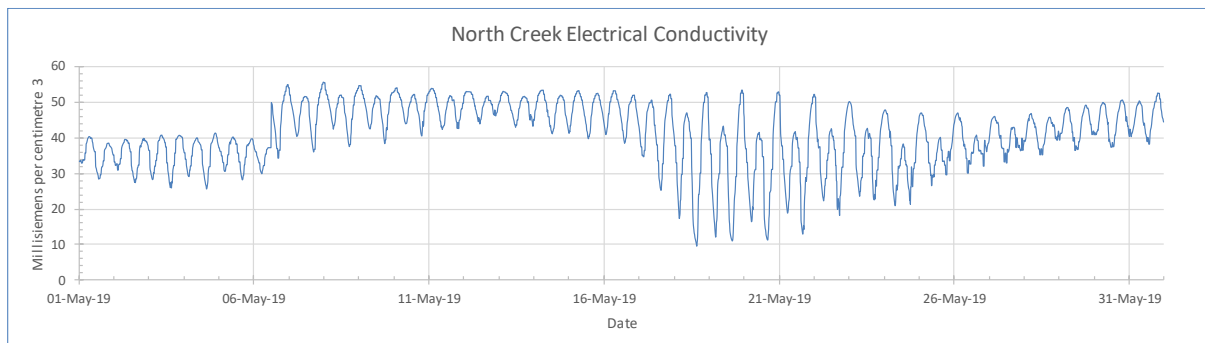
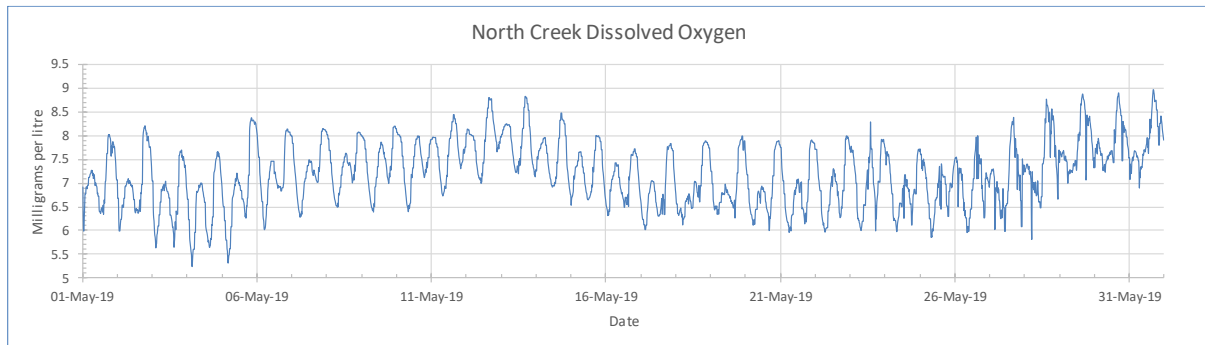
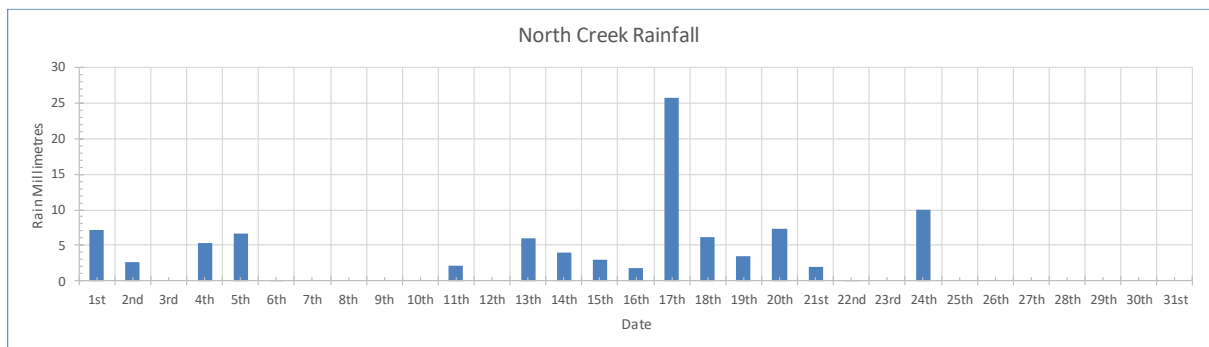
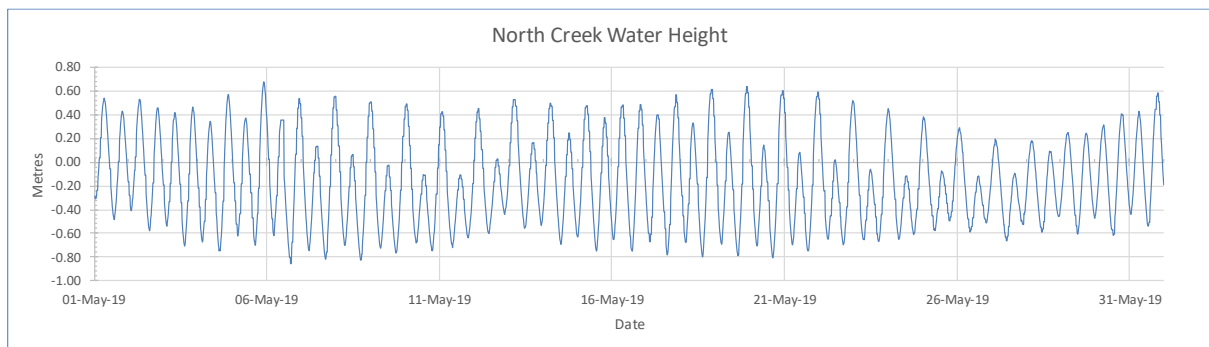
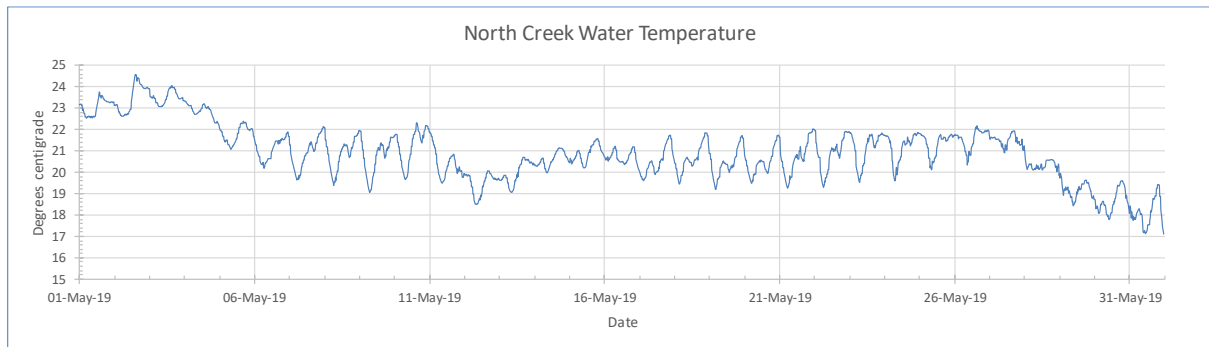
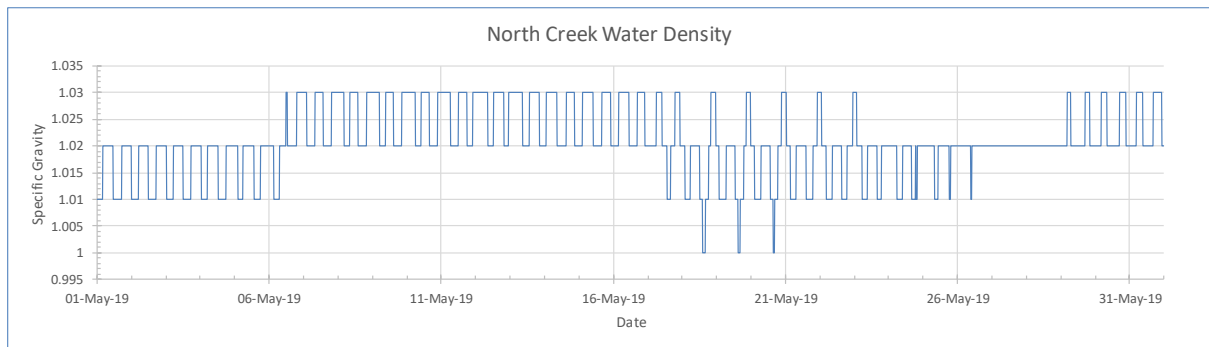


North Creek water quality – May 2019

Data logger located in North Creek near airport.





Interpretation

*Note – The sensor unit was cleaned and calibrated on 6th May.

- **Dissolved oxygen* (DO)** for May was recorded between 5.2 and 8.8 milligrams per litre (mg/L) with an average of 7.2 which is equal to the April average of 7.2. DO fell at low tide as drains discharged low DO water and rose at high tide as saline water entered the estuary. Levels below 3 mg/L are considered critical to fish, while between 3 and 6 mg/L is considered marginal and above 6 mg/L is optimal. DO is influenced by temperature, rainfall, tidal movement, chemical and biological oxygen demand. DO at North Creek is negatively influenced by runoff from drains following rain.
- **Electrical conductivity (EC)** for May was recorded between 9.5 and 55.5 millisiemens per cubic centimeter (ms/cm³) with a saline average of 41.0 which has risen compared to the April saline average of 37.3 ms/cm³ due to reduced rainfall. High EC corresponds to high tide as saline water enters the estuary. Levels below 1.8 ms/cm³ are considered freshwater, while from 1.8 to 4.8 is considered brackish and above 4.8 ms/cm³ saline with seawater equivalent to approximately 60 ms/cm³. EC is influenced by rainfall, runoff, temperature and tidal movement.
- **pH** for May was recorded between 6.0 and 8.4 with an average of 7.6 which is alkaline and compares to the April average of 7.7. Peaks of pH normally occur on high tide with increasing salinity while troughs occur on low tide as acid drains discharge. River water under normal conditions is generally near neutral (pH 7), while saline water moving upstream during high tides will be higher. pH is measured on a logarithmic scale with each consecutive whole number different by a factor of 10.
- **Total dissolved solids (TDS)** is a measure of the combined content of all inorganic and organic dissolved molecular, ionized or suspended micro-granular substances in the water, including minerals, salts or metals measured in parts per thousand (ppt). TDS was recorded in May between 6.2 and 34.5 ppt with an average of 26.4 which has increased compared to the April average of 24.2 ppt due to reduced rainfall. TDS is highest at high tide as salinity increases and lowest at low tide as freshwater is discharged from North Creek. TDS is influenced by tidal movement, rain and runoff.
- **Density** also called specific gravity (SG) is the ratio of the weight of a sample compared to that of fresh water at +4.0°C. For May density was recorded between 1.0 and 1.03 with an average of 1.021 which compares to the April average of 1.016. Fresh water is normally close to 1.0, while sea water is slightly denser at 1.027g/cm³, which leads to the formation of salt wedges and acid water is even denser (Sulfuric acid SG = 1.94 g/cm³). Density varies with temperature with maximum density occurring at +4.0°C, while tides, rainfall, runoff and acid discharges also affect density.
- **Water temperature** for May was recorded between 21.6 and 25.6 with an average of 20.9°C which compares to the April average of 23.4 which has decreased due to reduced air temperature and seasonal change. Water temperature is influenced by season, air temperature, solar radiation, cloud cover, day/night, turbidity, tidal movement and rainfall.
- **Water height** was recorded in May between -0.86m and +0.67 with an average of -0.15 which has fallen compared to the April average of -0.03 m. The highest tide of the month at 1.84 m occurred on 19th May at 9:02 pm at Ballina while the peak at the logger of 0.64 m was recorded at 9.45 pm giving a delay of 43 min. The delay in tidal peak along North Creek is caused by

restrictions in water entering North Creek due to width and depth, which also reduces the maximum tide height and range. The logger has not yet been surveyed in to the Australian Height Datum (AHD) so all heights are relative. Zero AHD approximates to mean sea level or a 0.925 m tide height and the readings have been adjusted to approximately AHD. Water height can be affected by river level, floods, tides, storm surge and rainfall and to a lesser extent temperature, wind and barometric pressure.

- **Rainfall** recorded during May at the Ballina Airport Automatic Weather Station (AWS) situated 1.8 km to the west of the North Creek logger was 94.0 mm falling over 17 days, which compares to the April rainfall of 158.8 mm over 21 days. The May average for Ballina Airport AWS is 155.7 mm therefore rainfall was below average. Peak May 24-hour rainfall of 25.8 mm was recorded between 9:00 am on 16th and 9:00 am on 17th. During May the Tuckean site 4 data logger located 19 km to the SW recorded 68.8 mm over 21 days, while the Rocky Mouth Creek data logger located 37 km to the south-west recorded 49.0 mm over 23 days.