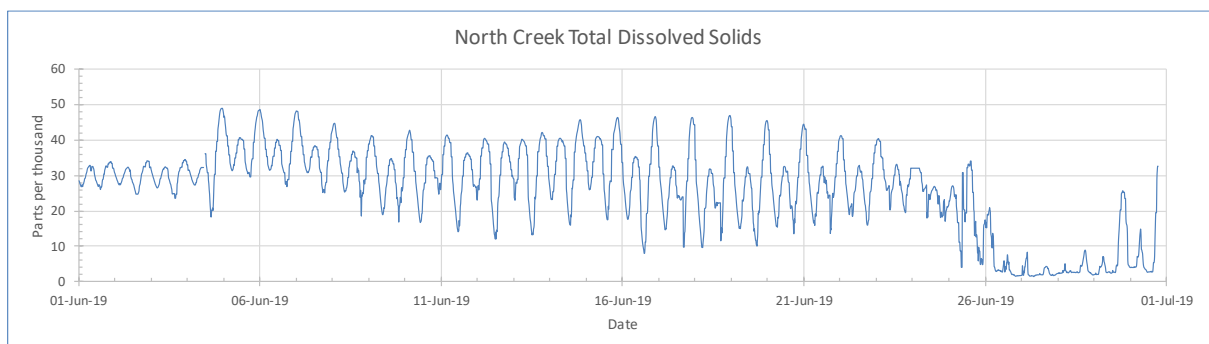
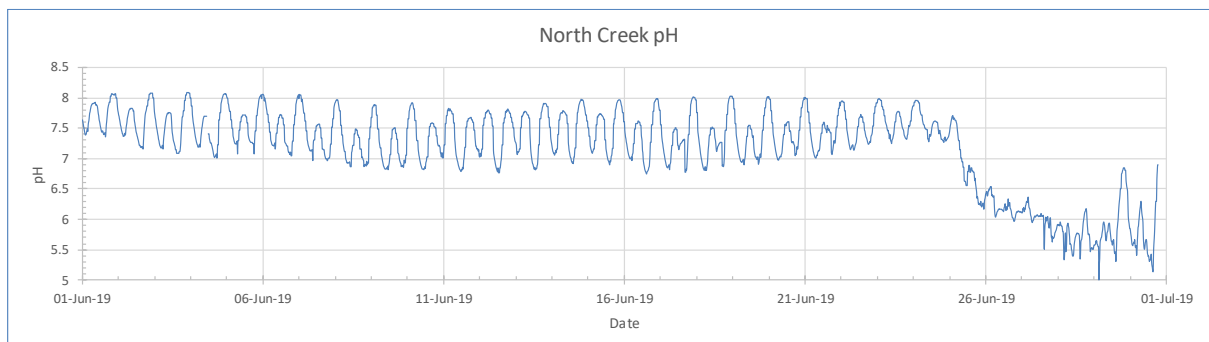
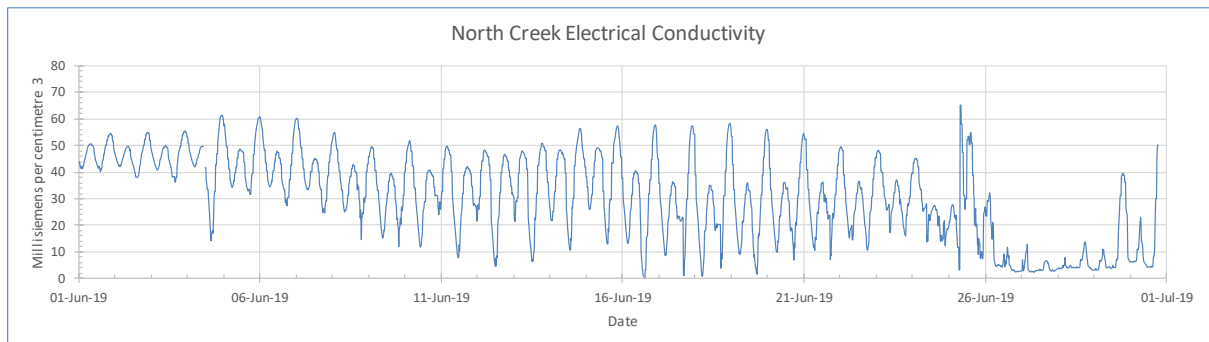
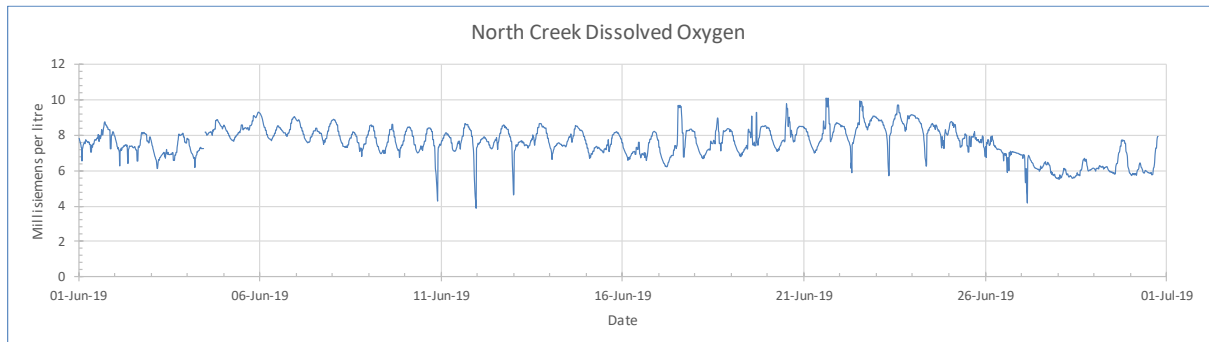
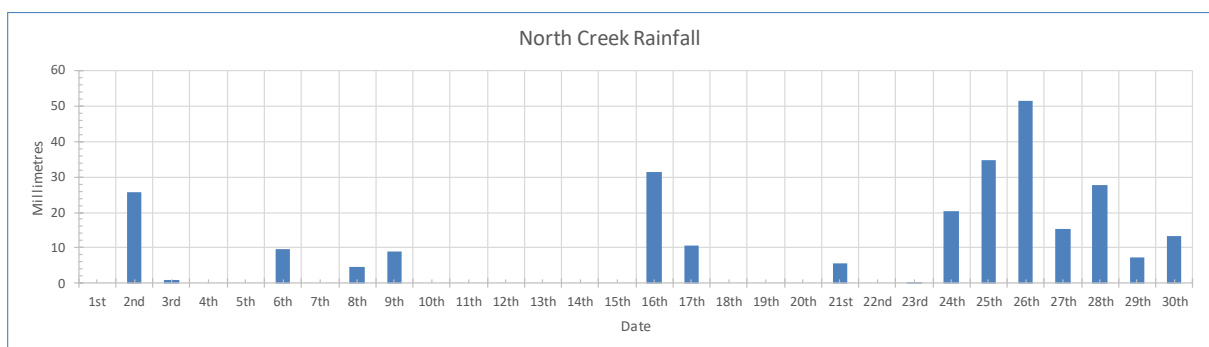
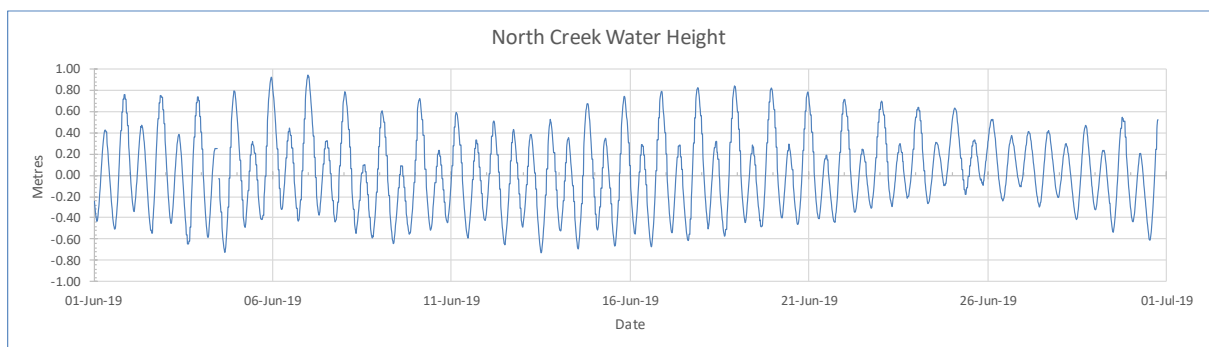
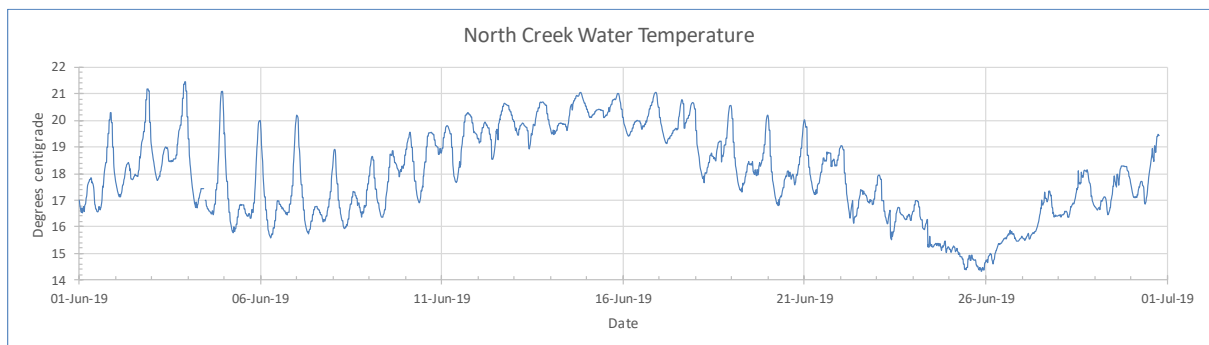
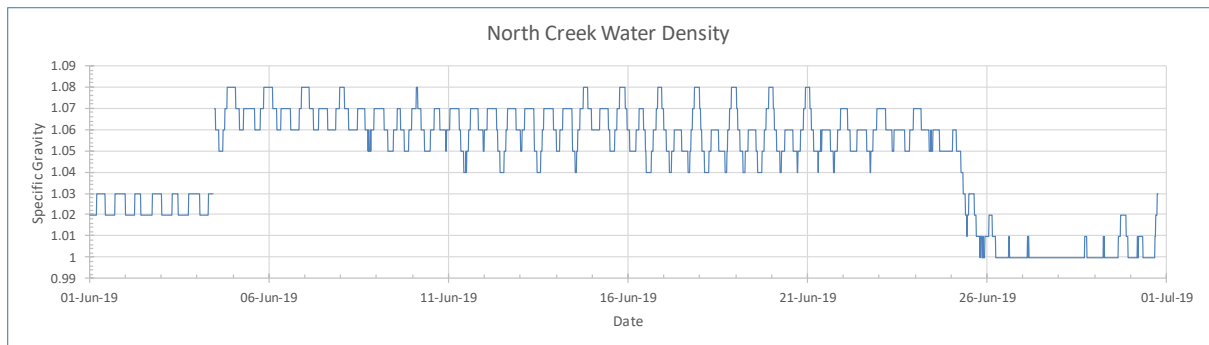


North Creek water quality – June 2019

Data logger located in North Creek near airport.





Interpretation

*Note – The sensor unit was cleaned and calibrated on 4th June.

- **Dissolved oxygen* (DO)** for June was recorded between a spike of 3.8 and 9.8 milligrams per litre (mg/L) with an average of 7.6 which has increased by 0.4 above the May 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. Dissolved oxygen fell at the end of the month due to rainfall resulting in organic and inorganic blackwater discharge from drains. 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 June was recorded between 0.1 and 65.0 millisiemens per cubic centimeter (ms/cm³) with a saline average of 30.8 which has fallen compared to the May saline average of 41.0 ms/cm³ due to above average 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 June was recorded between 5.0 and 8.0 with an average of 7.2 which is alkaline and has fallen by 0.4 when compared to the May average of 7.6 due to above average rainfall. 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 June between 1.6 and 48.0 ppt with an average of 26.2 which has decreased slightly compared to the May average of 26.4 ppt due to increased 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 June density was recorded between 1.0 and 1.08 with an average of 1.05 which has risen compared to the May average of 1.021. 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 June was recorded between 14.4 and 21.4 with an average of 18.0°C which has decreased compared to the May average of 20.9 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 June between -0.73m and +0.91 with an average of +0.03 which has increased by 0.18 m compared to the May average of -0.15 m. The highest tide of the month at 1.88 m (0.96 m AHD) occurred on 5th June at 10:05 pm at Ballina while the peak at the logger of 0.92 m was recorded at 10.45 pm giving a delay of 40 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 June at the Ballina Airport Automatic Weather Station (AWS) situated 1.8 km to the west of the North Creek logger was 268.2 mm falling over 15 days, which compares to the May rainfall of 94.0 mm over 17 days. The June average for Ballina Airport AWS is 209.9 mm therefore rainfall was above average. Peak June 24-hour rainfall of 51.4 mm was recorded between 9:00 am on 25th and 9:00 am on 26th. During June the Tuckean site 4 data logger located 19 km to the SW recorded 214.4 mm over 21 days, while the Rocky Mouth Creek data logger located 37 km to the south-west recorded 191 mm over 22 days.