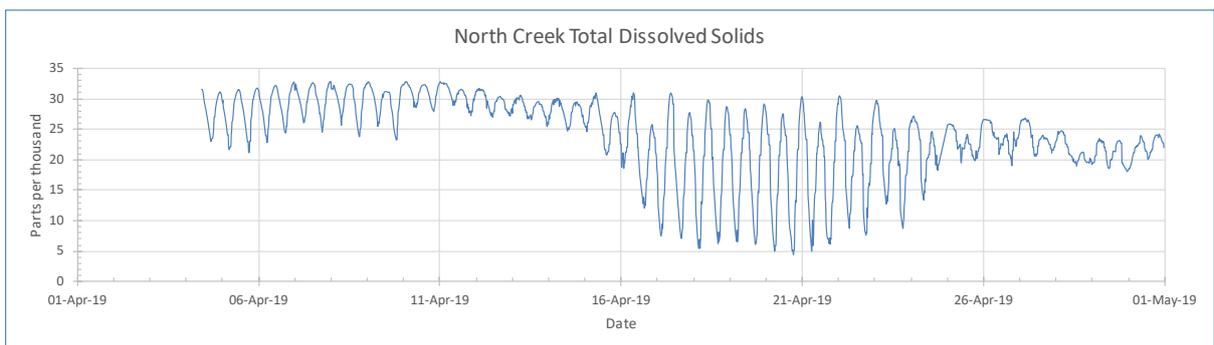
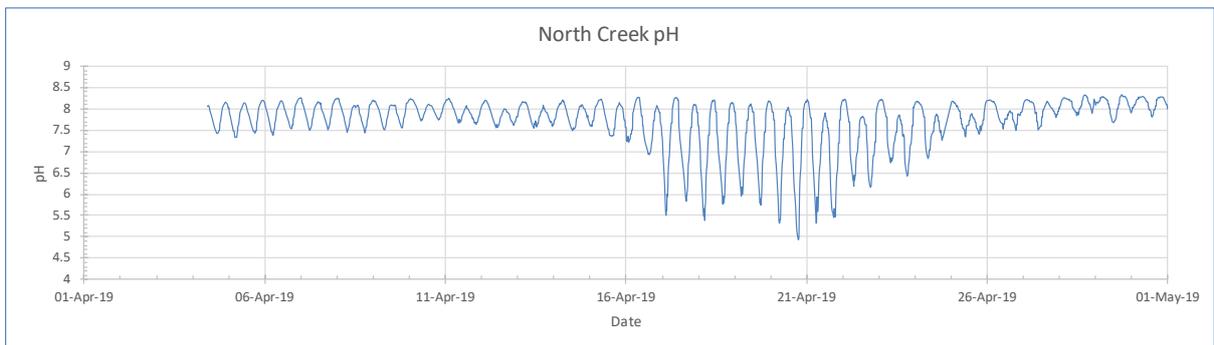
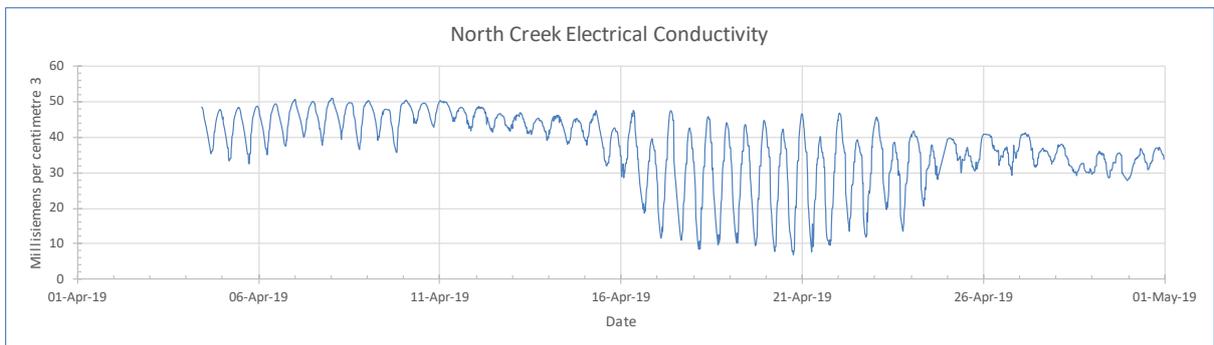
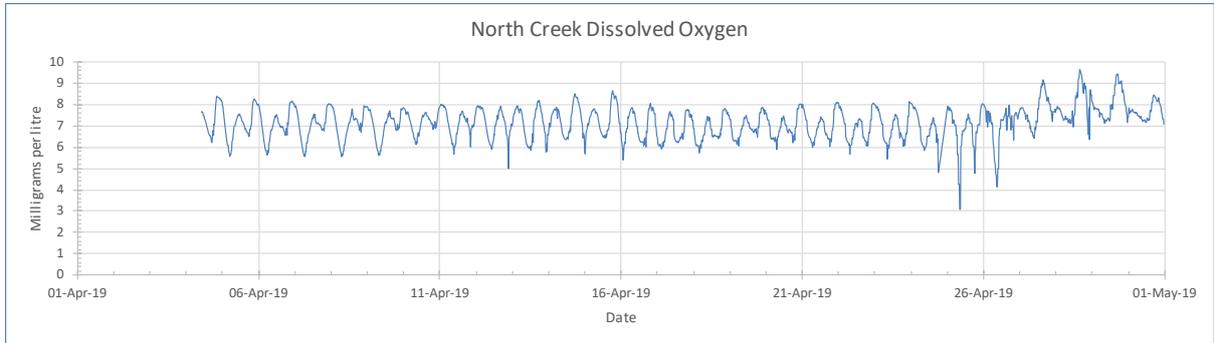
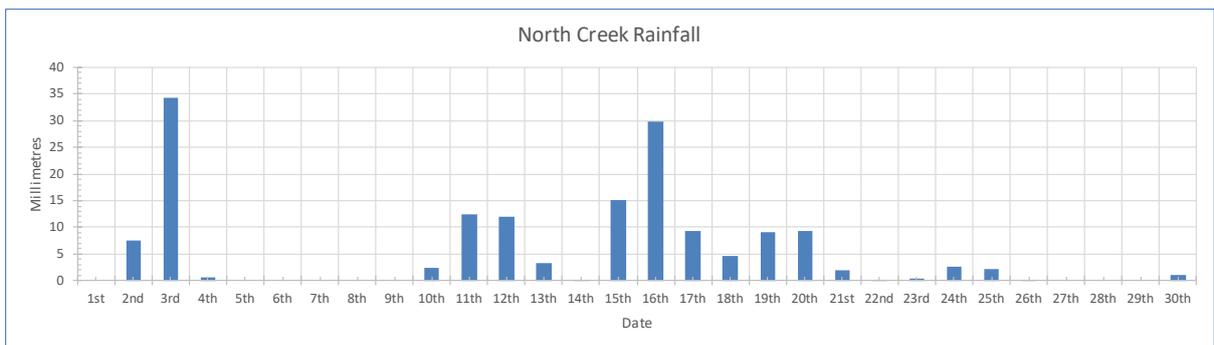
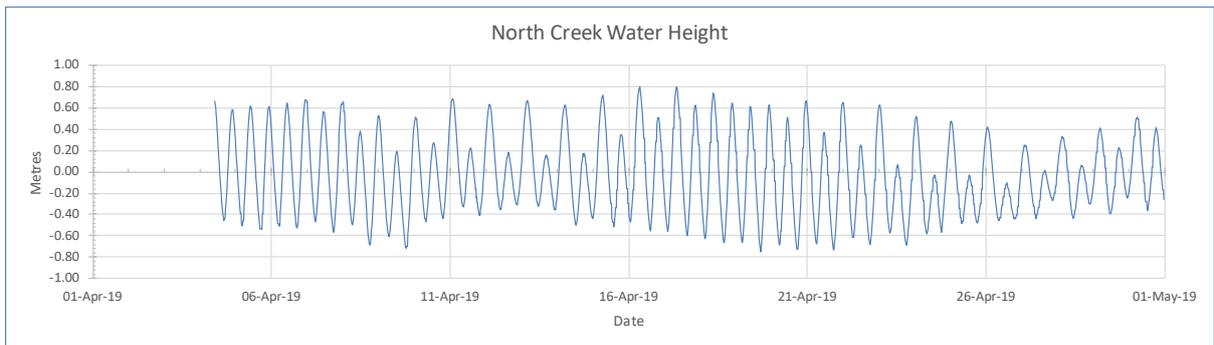
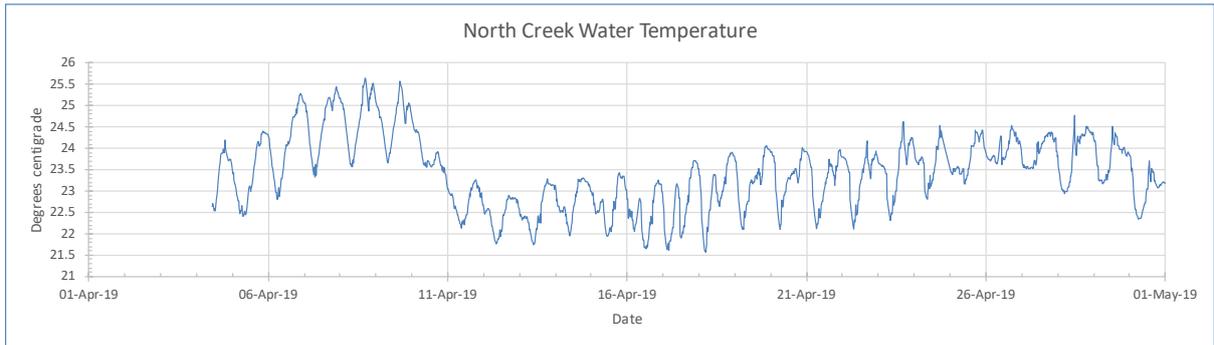
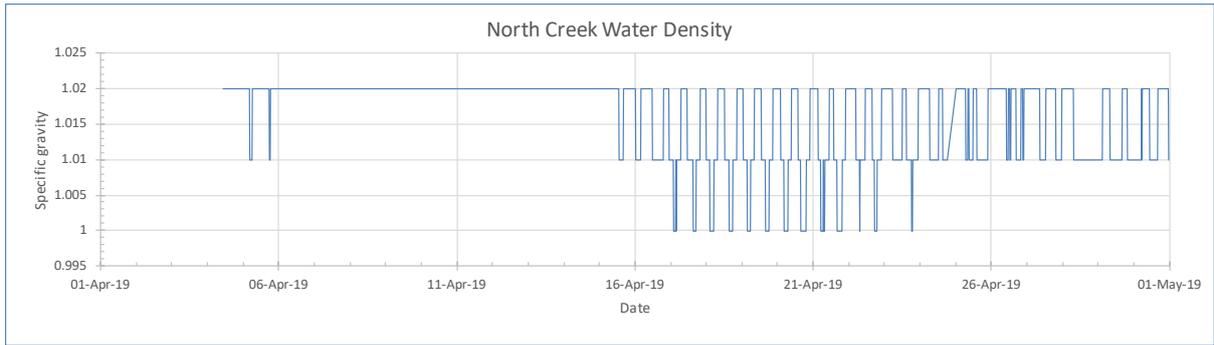


## North Creek water quality – April 2019

Data logger located in North Creek near airport.





## Interpretation

\*Note – The sensor unit was reinstalled on 4<sup>th</sup> April following factory repairs.

- **Dissolved oxygen\* (DO)** for April was recorded between a spike of 3.1 and 9.6 milligrams per litre (mg/L) with an 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 April was recorded between 6.9 and 50.8 millisiemens per cubic centimeter (ms/cm<sup>3</sup>) with a saline average of 37.3 ms/cm<sup>3</sup>. High EC corresponds to high tide as saline water enters the estuary. Levels below 1.8 ms/cm<sup>3</sup> are considered freshwater, while from 1.8 to 4.8 is considered brackish and above 4.8 ms/cm<sup>3</sup> saline with seawater equivalent to approximately 60 ms/cm<sup>3</sup>. EC is influenced by rainfall, runoff, temperature and tidal movement.
- **pH** for April was recorded between 4.9 and 8.2 with an average of 7.7 which is alkaline. 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 April between 4.5 and 32.1 ppt with an average of 24.2 ppt. 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 April density was recorded between 1.0 and 1.02 with an average of 1.016. Fresh water is normally close to 1.0, while sea water is slightly denser at 1.027g/cm<sup>3</sup>, which leads to the formation of salt wedges and acid water is even denser (Sulfuric acid SG = 1.94 g/cm<sup>3</sup>). 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 April was recorded between 21.6 and 25.6 with an average of 23.4. Water temperature is influenced by season, air temperature, solar radiation, cloud cover, day/night, turbidity, tidal movement and rainfall.
- **Water height** was recorded in April between -0.75m and +0.78 with an average of -0.03 m. The highest tide of the month at 1.75 m occurred on 17<sup>th</sup> April at 6:35 am and 18<sup>th</sup> at 7:24 am at Ballina while the peak at the logger was recorded at 8.30 and 9:00 am giving a delay of 1hr 55 min and 1hr 36 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 April at the Ballina Airport Automatic Weather Station (AWS) situated 1.8 km to the west of the North Creek logger was 158.8 mm falling over 21 days, which compares to the March rainfall of 139.2 mm over 18 days. The April average for Ballina Airport AWS is 187.3 mm therefore rainfall was below average. Peak April 24-hour rainfall of 34.4 mm was recorded between 9:00 am on 2<sup>nd</sup> and 9:00 am on 3<sup>rd</sup>. During April the Tuckean site 4 data logger located 19 km to the SW recorded 164.6 mm over 23 days, while the Rocky Mouth Creek data logger located 37 km to the south-west recorded 211.8 mm over 23 days.