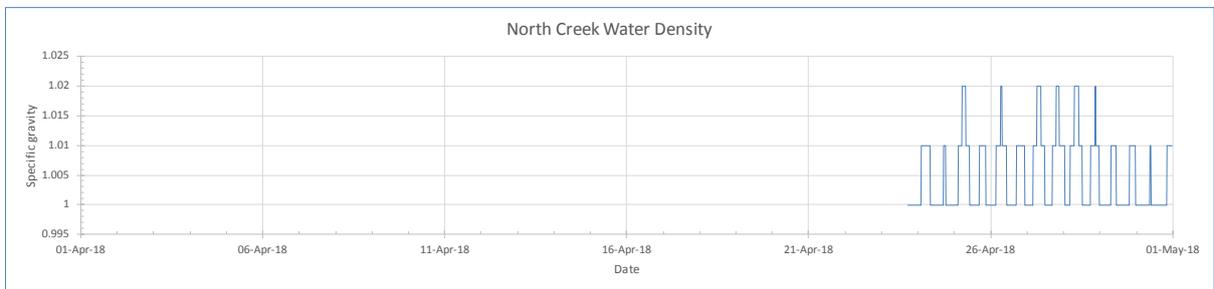
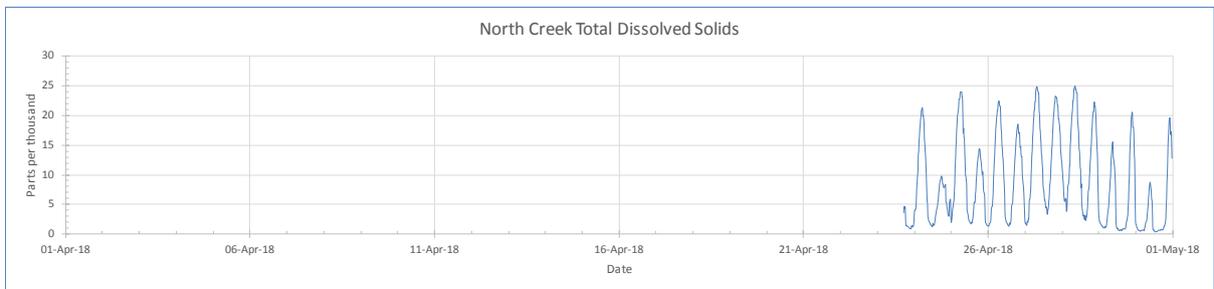
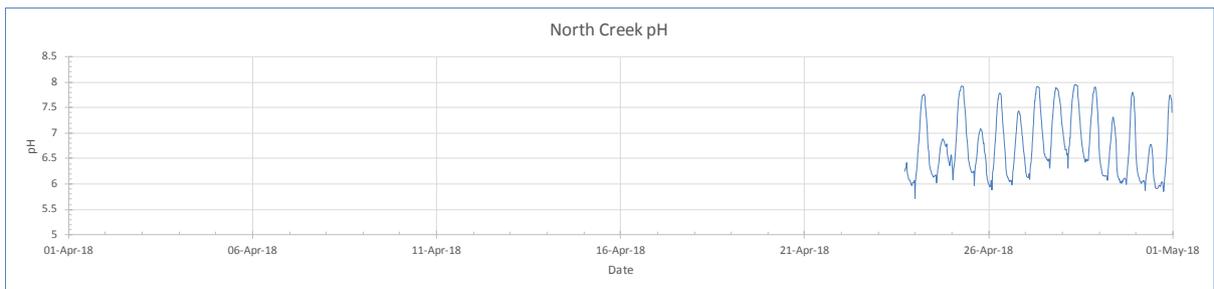
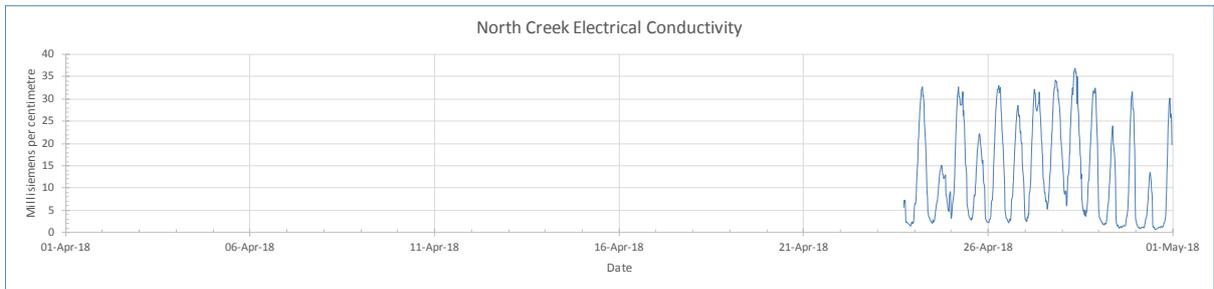
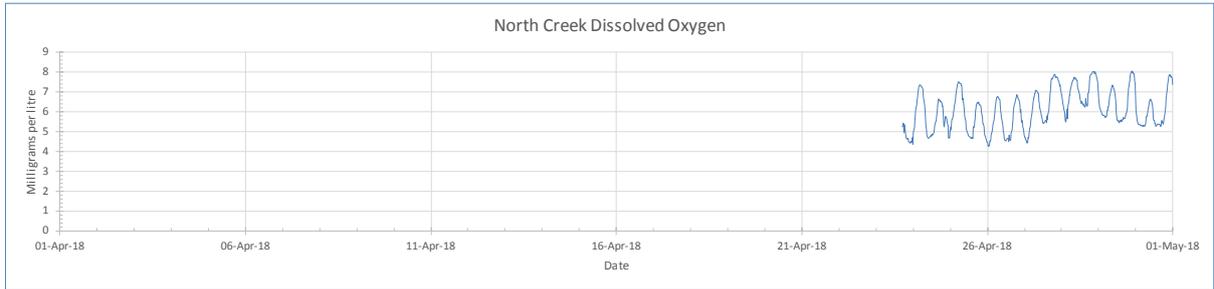
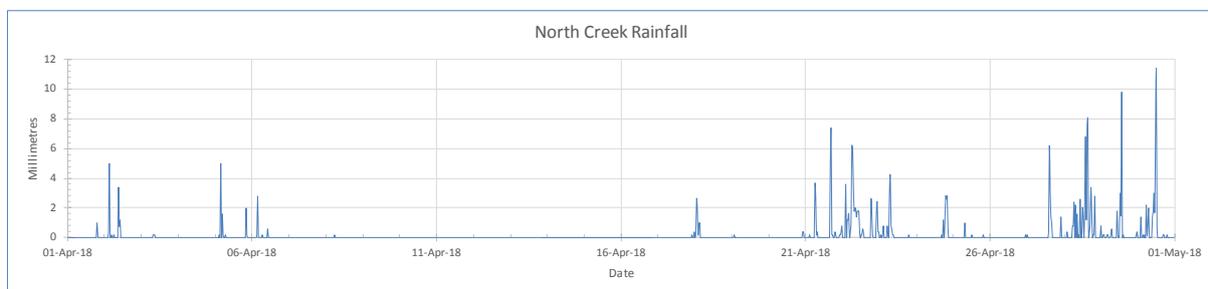
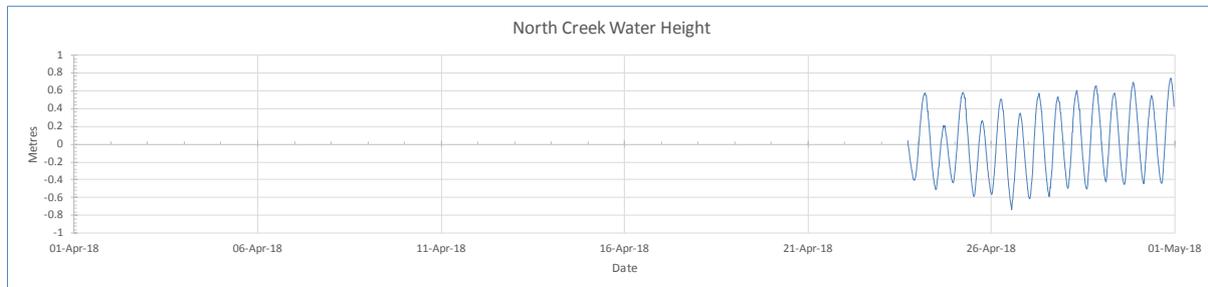
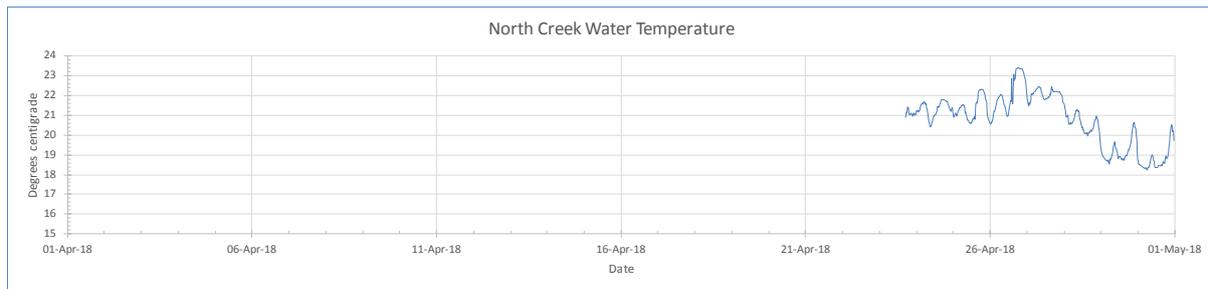


North Creek water quality – April 2018

Data logger located in North Creek near airport.





Interpretation

*Note –The modem associated with the North Creek logger required repair during March and then additional calibration and testing throughout April before reliable results were available. The upgrade was complete and reliable results were obtained at North Creek from 23rd April 2018 onwards.

- **Dissolved oxygen* (DO)** was recorded from April 23rd from 4.28 to 7.90mg/L with an average of 6.10mg/L. 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 and chemical and biological oxygen demand.
- **Electrical conductivity (EC)** from April 23rd was recorded between 0.72 and 35.85 ms/cm averaging 13.41ms/cm. Levels below 1.8 ms/cm are considered freshwater, while from 1.8 to 4.8 is considered brackish and above 4.8 ms/cm saline with seawater equivalent to approximately 60 ms/cm. EC is influenced by rainfall, runoff, temperature and tidal movement.
- **pH** from April 23rd was recorded between 5.9 and 7.9 with an average of 6.8. 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

from 23rd April between 0.47 and 24.3 ppt averaging 8.91 ppt. TDS is highest on high tide as salinity increases and lowest on 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. From April 23rd density was recorded between 1.0 and 1.02 with an average of 1.0. 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** from April 23rd was recorded between 18.21 and 23.26°C averaging 20.77 deg C. Water temperature is influenced by season, air temperature, solar radiation, cloud cover, day/night, turbidity, tidal movement and rainfall.
- **Water height** was recorded from April 23rd between -0.74 and +0.72 and averaging 0.02m however barnacles within the housing are preventing correct seating of the sensors so the height has been adjusted to approximate AHD. The highest tide of the month at 1.72 m occurred on 18th April at 10:10 pm at the Ballina River entrance while the peak at the logger was not recorded. A delay of approximately one hour normally occurs at the logger. 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 North Creek logger was 248.4 mm falling over 20 days, which compares to the March rainfall of 119.2 mm over 16 days. Peak rainfall of 11.4 mm was recorded on the 30th April over 30 minutes between 11:30 am and 12:00 pm. During April the Tuckean site 4 data logger located 19 km to the SW failed to record, however a nearby station recorded 142.4 mm over 19 days, while the Rocky Mouth Creek data logger located 37 km to the south-west recorded 114.6 mm over 23 days.