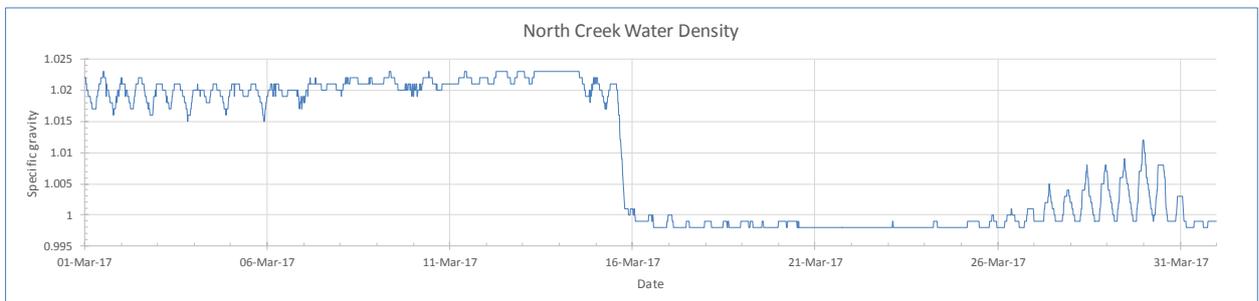
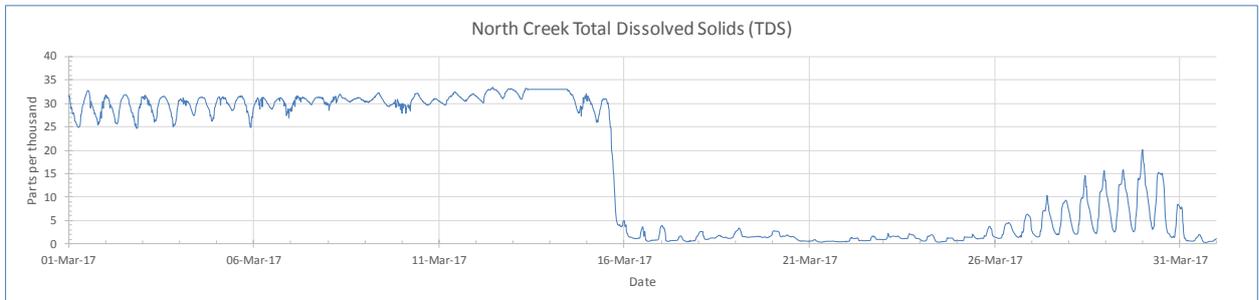
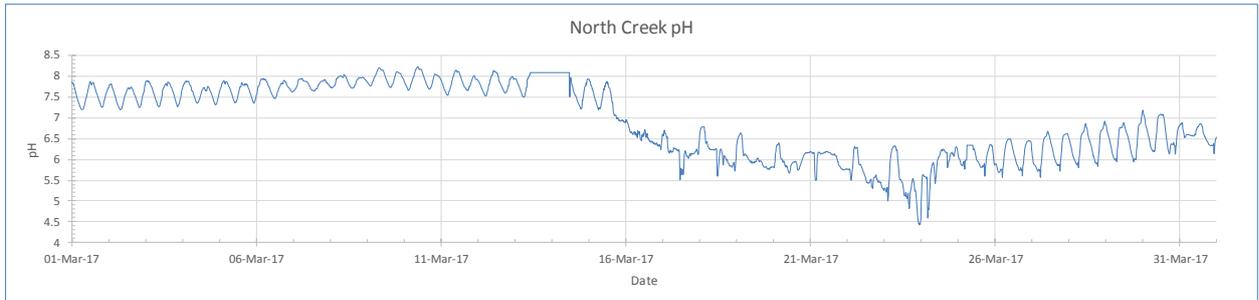
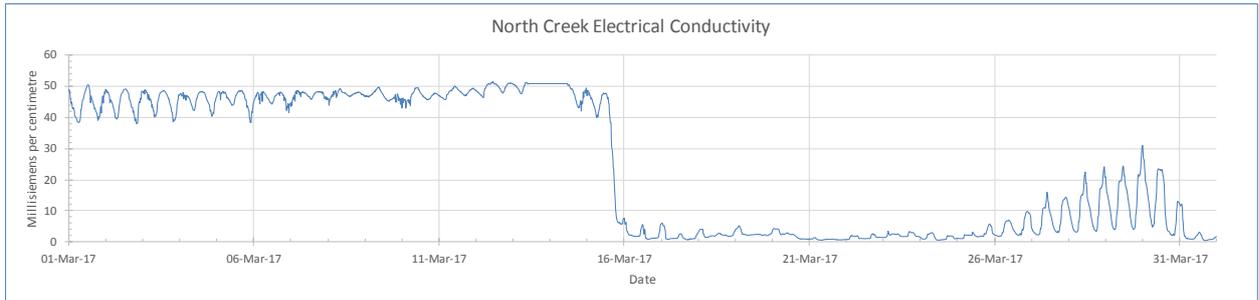
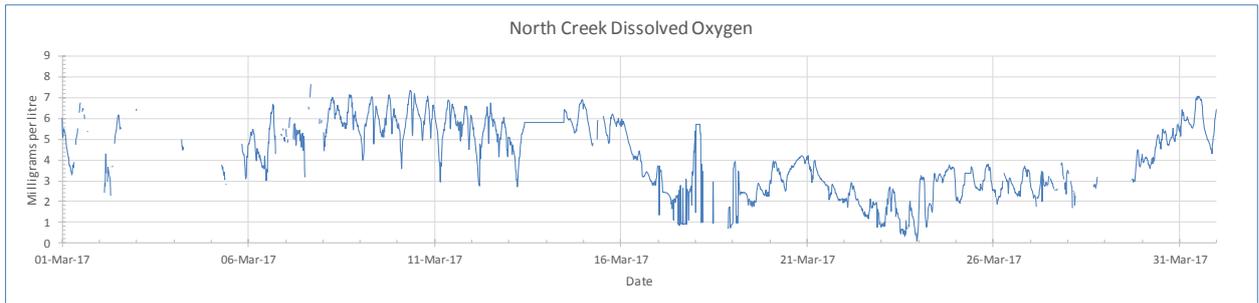
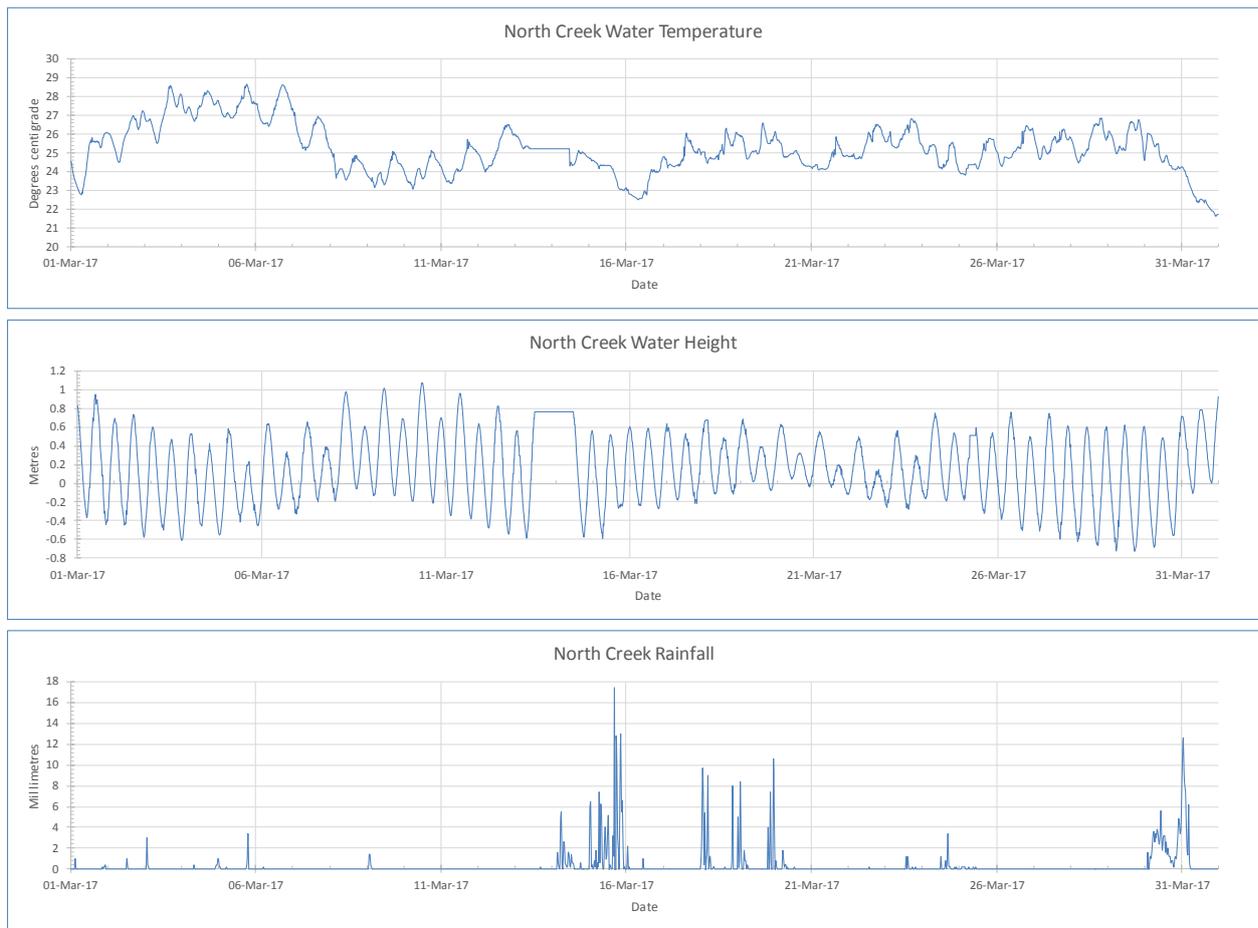


North Creek water quality – March 2017

Data logger located in North Creek near airport.





Interpretation

*Note – Water height was adjusted in July to approximate AHD levels by deducting 0.75 m from data logger readings. This adjustment will remain until the logger can be surveyed in to AHD. Dissolved oxygen data was experiencing dropouts probably due to sensor fouling and some of the worst affected data has been removed.

- Dissolved oxygen* (DO)** was recorded from dropouts of 0.2 to 7.3 mg/L in March with an average reading of 4.1 mg/L, which has decreased by 1.0 from last month's 5.1. The dropouts indicate unreliable data due to a sensor fault. 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)** for March ranged from 0.5 to 51.5 ms/cm and averaged 24.6 ms/cm, which is considered saline and has decreased from last month's saline average of 51.2 ms/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** in March ranged from 4.4 to 8.2 and averaged 6.9, which is slightly acid and 0.9 units or 7.9 times less alkaline than last month's average of 7.8. 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 recorded in March ranged from 0.3 to 33.5 averaging 16.0 ppt, which has more than halved from last month's 33.3 ppt. TDS was 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. During March density ranged between 0.998 and 1.023g/cm³ averaging 1.01 g/cm³, which is 0.01 lower than last month's reading of 1.02. 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 March was recorded from 21.6° to 28.6°C giving a range of 7.0° and averaging 25.2°C, which has decreased by 1.9°C compared to last month's 27.1°C due to high rainfall and reduced air temperatures. Water temperature is influenced by season, air temperature, solar radiation, cloud cover, day/night, turbidity, tidal movement and rainfall.
- **Water height*** for March ranged between -0.72 m and +1.07 m giving a range of 1.79 m and averaging +0.16 m, which is 0.09 m higher than last month's adjusted average of +0.07 m. The highest tides of the month at 1.79 m occurred on 30th at 11:19 pm at the Ballina River entrance with the corresponding peak at the logger of 0.72 m on 31th at 12.00 am, resulting in a delay of 41 minutes. 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 March at the Ballina Airport Automatic Weather Station (AWS) situated 1.8 km to the west of North Creek logger was 432.2 mm falling over 20 days, which compares to February rainfall of 86.8 mm over 8 days. Peak rainfall of 15.6 mm was recorded on the 15th March over 30 minutes between 4.00 pm and 4:30 pm. During March the Tuckean site 4 data logger located 19 km to the SW failed to record, however a nearby station recorded 710.5 mm over 23 days, while the Rocky Mouth Creek data logger located 37 km to the south-west recorded 702.0 mm over 28 days.