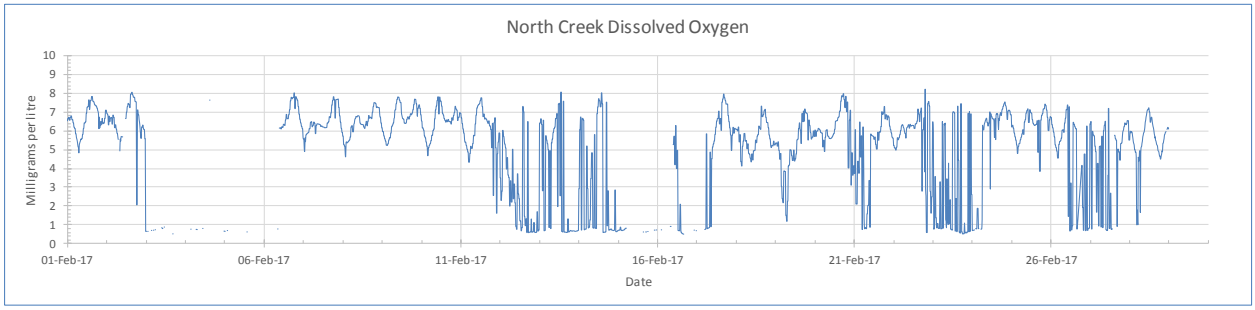
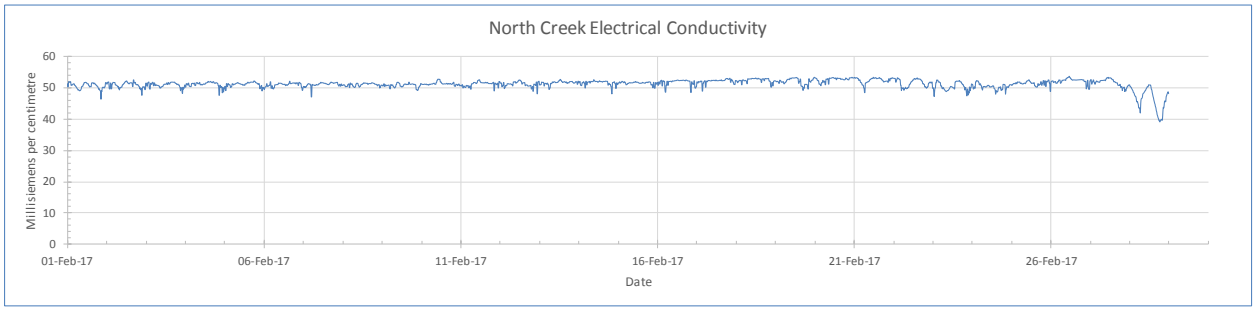
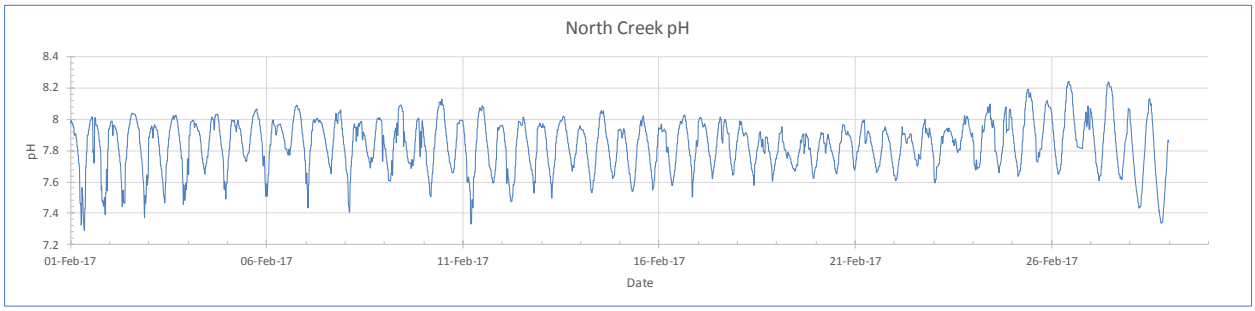
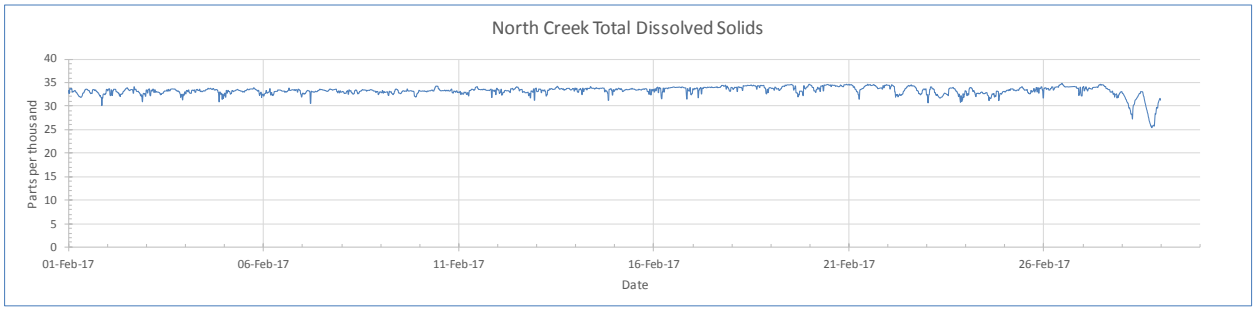
North Creek water quality – February 2017

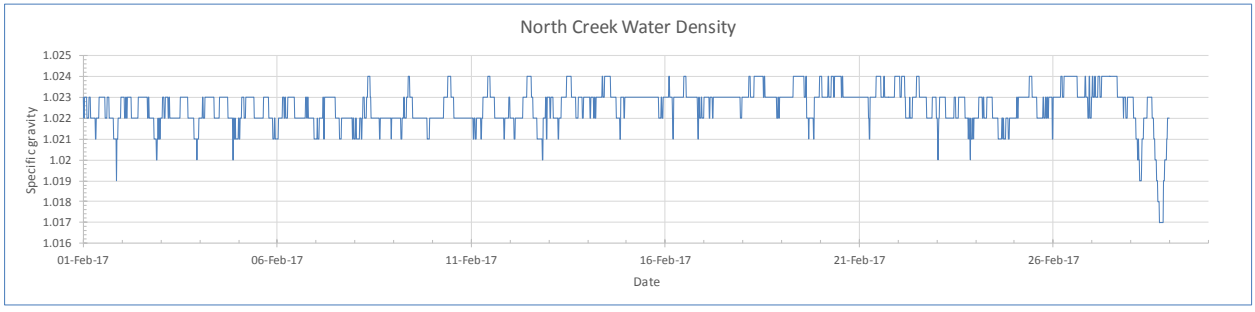
Data logger located in North Creek near airport.

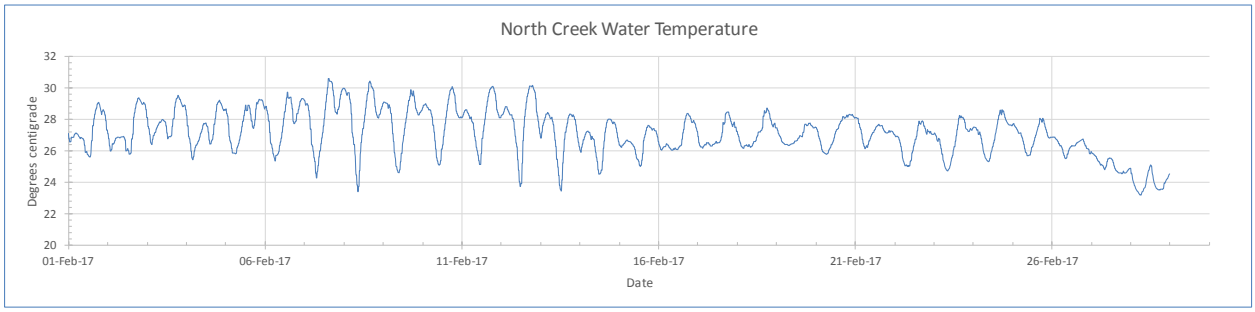


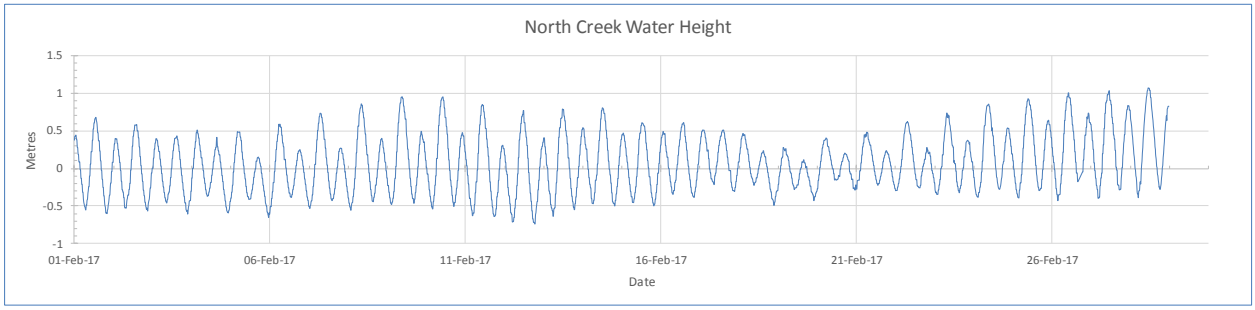


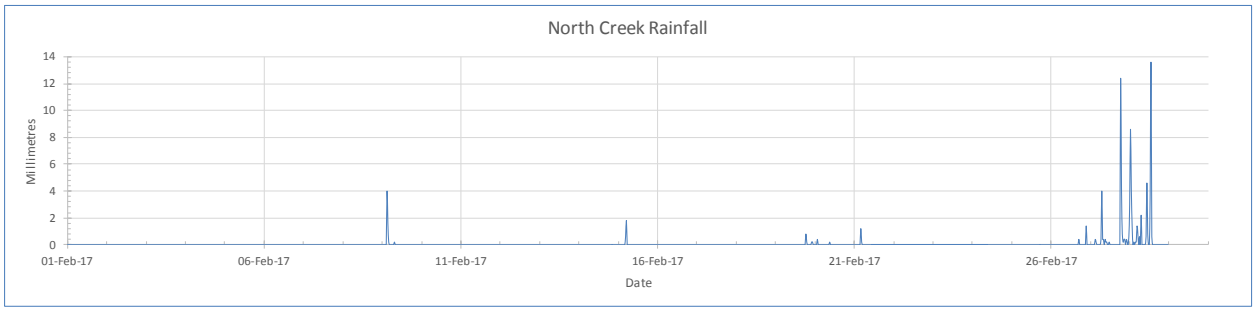












Interpretation

*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 0.6 to 8.0 mg/L in February with an average reading of 5.1 mg/L, which has decreased by 1.1 from last month's 6.2. The dropouts indicate unreliable data due to an equipment 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 February ranged from 39.6 to 53.2 ms/cm and averaged 51.2 ms/cm, which is considered saline and has increased from last month's saline average of 47.5 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 February ranged from 7.3 to 8.2 and averaged 7.8, which is alkaline and 0.2 units or 1.58 times more alkaline than last month's average of 7.6. 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 February ranged from 25.7 to 34.5 averaging 33.3 ppt, which has increased from last month's 30.9 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^{o}C. During February density ranged between 1.017 and 1.024g/cm^{3} averaging 1.02 g/cm^{3} equal to last month's reading of 1.02. Fresh water is normally close to 1.0, while sea water is slightly denser at 1.027g/cm^{3}, which leads to the formation of salt wedges and acid water is even denser (Sulfuric acid SG = 1.94 g/cm^{3}). Density varies with temperature with maximum density occurring at +4.0^{o}C, while tides, rainfall, runoff and acid discharges also affect density.

- **Water temperature** for February was recorded from 23.2° to 30.6°C giving a range of 7.4^{o} and averaging 27.1°C, which has increased by 0.1°C compared to last month's 27.0°C due to hot weather and reduced rainfall. Water temperature is influenced by season, air temperature, solar radiation, cloud cover, day/night, turbidity, tidal movement and rainfall.

- **Water height*** for February ranged between -0.74 m and +1.07 m giving a range of 1.81 m and averaging +0.07 m, which is 0.03 m higher than last month's adjusted average of +0.04 m. The highest tides of the month at 1.84 m occurred on 11th at 9:32 am at the Ballina River entrance with the corresponding peak at the logger of 0.85 m on 11th at 10:15 am, resulting in a delay of 43 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 February at the Ballina Airport Automatic Weather Station (AWS) situated 1.8 km to the west of North Creek logger was 86.8 mm falling over 8 days, which compares to January rainfall of 89.4 mm over 16 days. Peak rainfall of 13.6 mm was recorded on the 28th February over 30 minutes between 12:30 pm and 1:00 pm. During February the Tuckean site 4 data logger located 19 km to the SW failed to record, however a nearby station recorded 143.4 mm over 9 days, while the Rocky Mouth Creek data logger located 37 km to the south-west recorded 161.0 mm over 11 days.