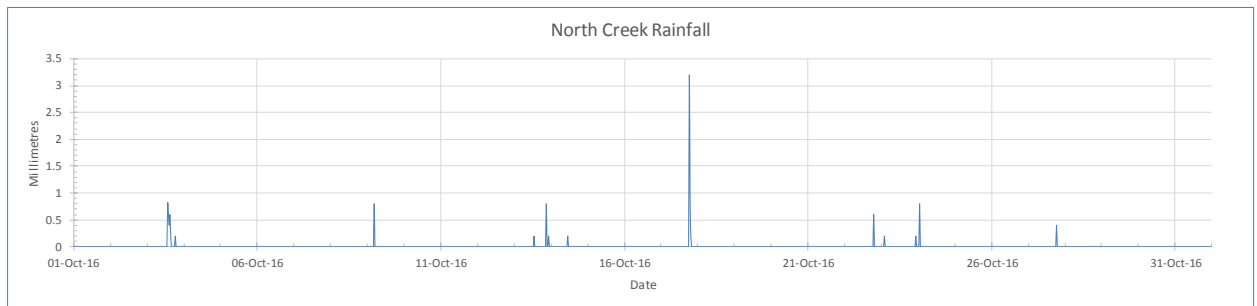
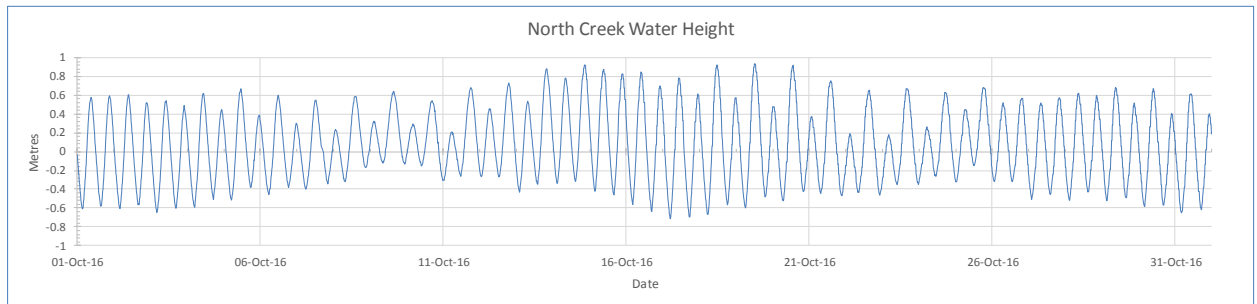
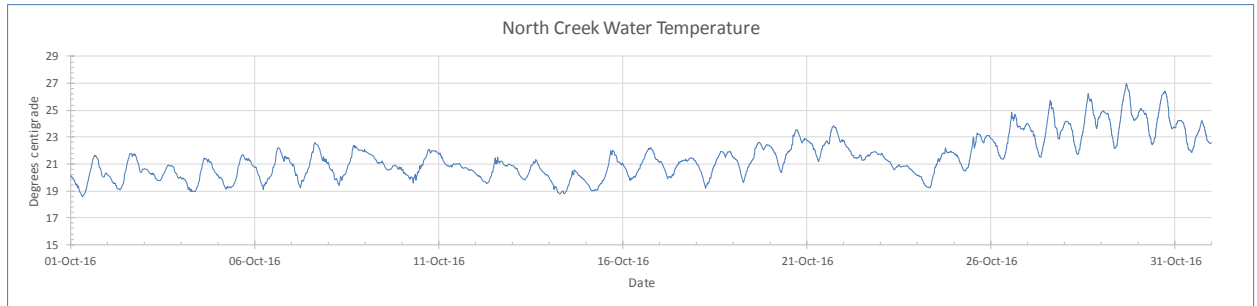


## North Creek water quality – October 2016

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 (DO)** was recorded from 3.3 to 9.6 mg/L in October with an average reading of 6.8, which has increased from last month's 6.0. DO was higher due to lower rainfall and runoff from floodplain drains and showed a tidal response. 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 October ranged from 38.4 to 52.8 ms/cm and averaged 48.6 ms/cm, which is considered saline and has increased from last month's saline average of 36.9 ms/cm due to lower October rainfall and increased tidal exchange. 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 October ranged from 7.3 to 8.1 and averaged 7.8, which is alkaline and 0.3 pH units or twice the alkalinity of last month's average of 7.5 due to lower rainfall and increased tidal exchange. 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 October ranged from 25.0 to 34.6 averaging 31.6 ppt, which has increased from last month's 24.0 ppt due to lower October rainfall and increased tidal exchange. 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 October density ranged between 1.018 and 1.025g/cm<sup>3</sup> averaging 1.02 g/cm<sup>3</sup>, 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<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 October was recorded from 18.6° to 26.9°C giving a range of 8.3° and averaging 21.4°C, which has increased by 1.1°C compared to last month's 20.3°C due to seasonal change. Water temperature is influenced by season, air temperature, solar radiation, cloud cover, day/night, turbidity, tidal movement and rainfall.
- **Water height\*** for October ranged between -0.71 m and +0.93 m giving a range of 1.64 m and averaging +0.07 m, which is 0.06 m higher than last month's adjusted average of +0.01 m. The highest tides of the month at 1.86 m occurred on 18<sup>th</sup> at 10:35 am at the Ballina River entrance with the corresponding peak at the logger of 0.92 m on 18<sup>th</sup> at 11:15 am resulting in a delay of 40 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 October at the Ballina Airport Automatic Weather Station (AWS) situated 1.8 km to the west of the North Creek logger was 11.4 mm falling over 9 days, which compares to September rainfall of 26 mm over 10 days. Peak rainfall of 3.2 mm was recorded on the 17<sup>th</sup> October over 30 minutes between 6:00 pm and 6:30 pm. During October the Tuckean site 4 data logger located 19 km to the SW recorded 30.0 mm over 13 days, while the Rocky Mouth Creek data logger located 37 km to the south-west recorded 38.8 mm over 12 days.