Water quality parameters

A wide range of water quality parameters are monitored within the Lower Lakes with key parameters reported herein being pH, alkalinity, salinity, turbidity, nutrients (total nitrogen and total phosphorus), chlorophyll *a* and metals (aluminium and iron). A brief description of these parameters and typical historical (pre-drought) levels are provided below:

- pH is an indicator of acidity or alkalinity. pH is a logarithmic scale and an increase or decrease of one pH unit is a 10 fold change. Neutral water has a pH of 7, acidic solutions have values between 0-6 and alkaline solutions have values between 8-14. Prior to the current drought, the pH in the region was typically between 7 and 9.
- Alkalinity is a measure of the buffering capacity of water, or the capacity of the water to neutralise acids and resist pH change. Alkalinity within water bodies is consumed as acid is released from acid sulfate soils. Adding limestone contributes alkalinity to waters, helping to neutralise any acid released from the sediments. Historically, alkalinity levels within this region have been between 80 and 250 mg/L as $CaCO_3$.
- Salinity is a measure of the amount of dissolved salts in the water. Saline water conducts electricity more readily than freshwater, so electrical conductivity (EC) is routinely used to measure salinity. As salinity increases, it may become toxic to native freshwater organisms. Prior to drought conditions, salinity was on average less than 700 (EC) µS/cm in Lake Alexandrina (at Milang) and less than 1600 (EC) µS/cm in Lake Albert (at Meningie). Seawater has a salinity of approximately 55,000 (EC) µS/cm.
- Turbidity is a measure of the cloudiness or haziness in water caused by suspended solids (eg sediment, algae). Turbidity is expressed in Nephelometric Turbidity Units (NTU) and is measured using a relationship of light reflected from a given sample. Turbidity is very variable in the Lower Lakes and influenced primarily by wind events. Prior to drought conditions, turbidity was on average about 60 NTU in Lake Alexandrina (at Milang), 8 NTU in the tributaries (at Goolwa), and 89 in Lake Albert (at Meningie).
- Nutrients–Total nitrogen (TN) and total phosphorus (TP) are the total amount of nitrogen and phosphorus present in the water body. Nitrogen can be present in different forms (e.g. organic nitrogen in plant material, ammonia, nitrate and nitrite). Phosphorus can also be present in different forms (eg organic phosphorus, phosphate). High concentrations of phosphorus and nitrogen can result in excessive growth of aquatic plants such as cyanobacteria, phytoplankton, macrophytes and filamentous algae. Prior to drought conditions, TN was on average about 1.2 mg/L in Lake Alexandrina (at Milang), 1.5 in the tributaries (at Goolwa) and 1.6 mg/L in Lake Albert (at Meningie) with TP on average about 0.15 mg/L in Lake Alexandrina (at Milang) and in Lake Albert (at Meningie).
- Chlorophyll *a* is the main photosynthetic pigment in green algae. The concentration of chlorophyll gives an indication of the volume of aquatic plants

present in the water column. Levels in excess of 15 µg/L are considered very high ('hyper-eutrophic') and nuisance algae and plant growth can occur. Prior to drought conditions, chlorophyll was on average about 24 µg/L in Lake Alexandrina (at Milang) and 35 µg/L in Lake Albert (at Meningie).

- Metal concentrations in the Lower Lakes allow us to determine what processes are proceeding within sediments. During concentration events (ie evaporation and low inputs) the concentration of metals are expected to increase, alternatively during flooding events the volume of metals will be diluted and expected to reduce. In addition to this, where acid sulfate soils are present, as the sediments acidify and the pH is reduced, metals that have been previously unavailable and bound up within sediment are liberated. This increase in metal concentration can be used as an indicator of acid sulfate soil impacts.