Love Our Lakes

Gippsland Lakes Environment Report 2024

Water Quality Key Facts

Turbidity and seagrass

What is turbidity and why is it important?

Turbidity is a measure of the particulate matter suspended within the water column (i.e. the cloudiness). Turbidity comprises sediment particles, organic matter and phytoplankton. Turbidity is not only influenced by the amount of suspended matter in the water column, but the size, shape and composition of the particles. For example, small amounts of fine particles such as clay will result in a much higher cloudiness than an equivalent amount of sand particles.

Turbidity has the potential to affect wetland ecology in a number of ways such as:

- By decreasing the light penetration through the water column, high turbidity has the potential for lethal effects on rooted submergent plants (such as seagrass) and algae.
- High concentrations of suspended particles in the water column can also have a clogging effect on biological membranes of aquatic biota such as the gills of fish or the filtering organs of filter feeders such as mussels.
- Increased turbidity also results in reduced visibility in the water column, which can affect organisms that are visual feeders such as predator fish and fish-eating birds.

How do we measure turbidity?

Environmental Protection Authority (EPA) Victoria monitors water quality in the main lakes at five sites in Lakes Wellington, Victoria and Lake King. This includes measures of turbidity, total suspended sediments and secchi depth (the depth to which light penetrates the water column).

What influences turbidity in the Gippsland Lakes?

Turbidity in the Gippsland Lakes is influenced by the inflow of catchment derived sediments that flow into the system through the rivers, and the levels of phytoplankton in the water column. Sediment from agricultural lands have been estimated to comprise approximately two thirds of the sediments loads to the Gippsland Lakes. Lake Wellington is mostly turbid as a result of catchment derived sediments, wind generated resuspension of bottom sediments and the actions of European carp. High salinity, however, causes sediments to flocculate and fall to the bottom of the lakes. This usually occurs when water passes through McLennan Strait into Lake Victoria. For this reason, Lakes Victoria and King are largely clear.

Turbidity and seagrass

Low underwater light, high nutrient concentrations and periodic algal blooms influence seagrass extent and condition in the Gippsland Lakes. Seagrass in the Gippsland Lakes is sub-tidal, that is, it is always below the surface of the water. For this reason, adequate underwater light for photosynthesis is essential.

Seagrass in the Gippsland Lakes (and elsewhere) follows a seasonal pattern, with lower leaf density in winter, when freshwater inflows and turbidity are typically higher. Once water clarity improves in late spring / early summer, seagrass growth kicks in and extent and density of biomass increases.

During flood or high rainfall years, large river flows enter the main lakes. This brings not only large loads of sediments, but also fresher conditions, both of which act to increase turbidity. This occurred in 2020 – 2022, particularly in Jones Bay, where flushing of sediments is restricted by the silt jetties (Figure 1).

High turbidity was sustained over a long period of time, resulting in a decline in seagrass in this region. Seagrass in the clearer, more saline parts of the lakes such as southern Lake King was maintained.

High levels of turbidity can impact seagrass health and extent.

The decline in seagrass extent from 2019 to 2024 is not unprecedented in the Gippsland Lakes. There is anecdotal evidence of historical, large-scale changes in seagrass extent in the Gippsland Lakes, with an almost complete loss of seagrass reported between 1920 and 1950 (Roob and Ball 1997). A study of seagrass condition recorded a drop in biomass across sites in April 2012, coinciding with a decrease in salinity to 14 – 18 ppt (Warry and Hindell 2012). There was also a dramatic decline in seagrass extent from 2600 hectares in 1997 to 1600 hectares in 2016 (data from Roob and Ball 1997, Kitchingman 2016). This high variability is reflected in the Limit of Acceptable Change (LAC) for seagrass in the Gippsland Lakes, which requires sustained change over 20 years as an indicator of change in character.

While we expect that when conditions are improved, seagrass will return to Jones Bay, growth and recovery of seagrass is complex and influenced by a wide variety of factors. Temperature, water quality (clarity, nutrients), competition and predation all influence recovery. Once seagrass patches reach a critical size, seagrass can act to stabilise sediments and improve conditions for growth and colonisation. Therefore, as patch sizes increase, growth and expansion accelerate.

Figure 1 Aerial imagery of Jones Bay from January 2021 (left) and January 2023 (right). Google Earth.

What are we doing to manage turbidity and seagrass?

- Working with landholder to reduce nutrients and sediment loads into the lakes through on ground works such as fencing, revegetation, weed control, stock exclusion, bank stabilisation and off stream watering.
- Implementation of seagrass monitoring to inform future management and protection options.
- Improving boating infrastructure to protect seagrass, water quality and aquatic life.
- Seasonally restrict boat speeds and access near important seagrass meadows.
- Investigation into restoration techniques for seagrass within the Gippsland Lakes.
- Installation of a new water quality monitoring station in Jones Bay.

Seagrass meadows provide nursery important habitat for a range of fish and crustacean species and are a critical component of the Gippsland Lakes Ramsar Site.

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loveourlakes.net.au

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Acknowledgement of Country: We acknowledge the Gunaikurnai people, Traditional Owners and custodians of the land and waters of the Gippsland Lakes region, and pay our respects to their Elders past and present. In particular, we pay tribute to the Brayakaulung, Brabralung and Tatungalung clans, whose custodianship is a vital part of the heritage, knowledge and future management of the Gippsland Lakes.