

# Water quality snapshot: Torbay 2021

Through Healthy Estuaries WA, the Department of Water and Environmental Regulation monitors water quality monthly in Lake Powell, Torbay Inlet and the surrounding Torbay catchment.

This snapshot provides some insights from our water quality monitoring in 2021, when high winter rainfall caused the highest discharge measured into Torbay Inlet since measurements began in 1997.

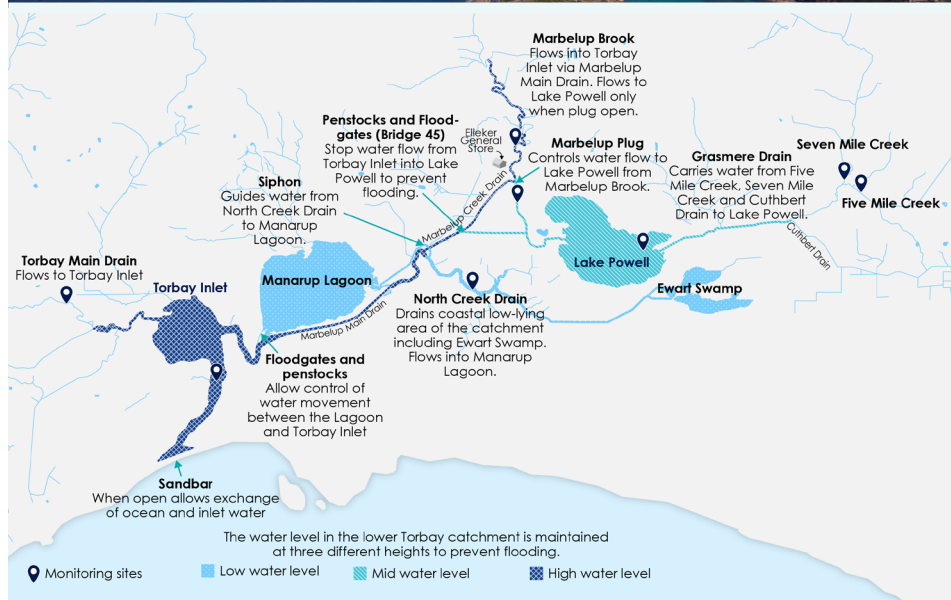
**Understanding estuary condition and monitoring for change helps to guide how we manage our estuaries**

Torbay Inlet, Lake Powell and the rivers and drains that flow into them tend to have high nutrient concentrations and are prone to algal blooms. The high rainfall during winter 2021 caused nutrient concentrations to increase and remain high for a longer period than usual. Nutrient concentrations had returned to the typical patterns by January 2022.

## About the Torbay catchment

The Torbay catchment is highly modified, and the large waterbodies within the catchment are linked by a network of creeks and drains managed by Water Corporation to prevent flooding of the low-lying areas around the lakes and lagoon. Torbay Inlet exchanges water with the ocean at times when the sandbar is open.

The water level in the lower Torbay catchment is maintained at three different heights to prevent flooding. A system of floodgates and penstocks controls the movement of water between the inlet, Lake Powell and Manarup Lagoon. This prevents the water from the inlet and ocean moving up to Lake Powell and Manarup Lagoon, which would cause flooding. However, in times of high rainfall, if water levels in Lake Powell and Manarup Lagoon become higher than the inlet, the floodgates and penstocks can be opened to relieve flooding.



## Rainfall and flows

In 2021 the rainfall in Torbay was 1,100 mm – well above the long-term average of 800 mm. In higher rainfall years, more rainwater flows into rivers because the ground is already soaked, which makes it easier for rainwater to run off the land.

Above average rainfall in 2021 caused a large amount of water to flow into Torbay Inlet and Lake Powell.

While the rainfall in 2021 was nearly double that of 2019 (600 mm), the volume of water discharged by the rivers was a lot higher than that; for example, Marbelup Brook discharged 3.5 times more water in 2021 than in 2019. These high discharge volumes led to more nutrients being carried into Lake Powell and Torbay Inlet.

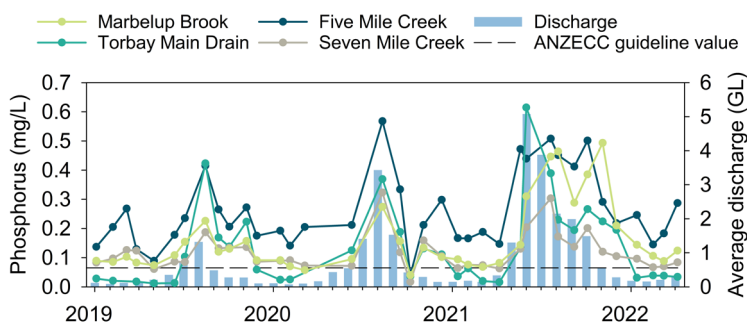
## Nutrients

We monitor nutrient concentrations because excess phosphorus and nitrogen can promote algal growth. While algae are a natural part of aquatic ecosystems, excessive algal growth can make waterways unsightly and smelly and can have negative impacts on aquatic life such as fish.

### In the catchment

Concentrations of phosphorus and nitrogen in the tributaries (creeks and drains) of the Torbay catchment are often high.<sup>1</sup> Rainfall washes nutrients and organic matter from the surrounding land into the waterways, so we normally find higher nutrient concentrations after winter rains. This was the case in 2021, where all the creeks and drains had high concentrations of nutrients that lasted 2–3 months longer than in a typical year.

Five Mile Creek usually has the highest nutrient concentrations, particularly of phosphorus, although all the tributaries have poor water quality. Torbay Main Drain has the lowest nutrient concentrations of all the tributaries, especially during summer.



Wading out to the sampling site at Lake Powell

### In Lake Powell and Torbay Inlet

Both Lake Powell and Torbay Inlet tend to have high nutrient concentrations and poor water quality all year round. Nutrient concentrations are particularly high in winter when excessive amounts of nitrogen and phosphorus flow in from the rivers. For example, in Torbay Inlet during winter, average concentrations are double the guideline value for total nitrogen and six times greater for total phosphorus.

In Lake Powell, nitrogen concentrations are not only high in winter, but also regularly in summer. Summer nitrogen levels are high because of blooms of cyanobacterial species that can access nitrogen from the air to help them grow.

In Torbay Inlet, when the sandbar is open, exchange of water with the ocean results in some periods of lower nutrient concentrations. However, even with these slightly lower concentrations, the water quality is classed as poor.

Like in the tributaries, the nutrient concentrations in Lake Powell and Torbay Inlet remained high for about 2–3 months longer than usual in 2021 because of all the extra nutrients that came with the heavy rainfall.

## Algal productivity

In Torbay Inlet, we find the highest densities of algae when the rivers begin to flow strongly, carrying nutrients with them. This usually occurs in late winter and spring.

In Lake Powell and North Creek Drain, the algal densities are typically highest during the summer. This is because warm weather, plenty of sunlight and a good supply of nutrients create ideal conditions for algae to grow.

North Creek Drain has the highest algal productivity among our monitoring sites. This is because it has very high levels of nutrients and its confined and stagnant environment helps algae thrive.

### Summary

Water quality in the catchment, Torbay Inlet and Lake Powell remains poor because of the long-lasting legacy of past land management practices, including catchment modification. This has led to the accumulation of nutrients in the sediment as well as the continuing nutrient inputs from the catchment. Efforts in the catchment to reduce the nutrient loads entering the inlet through fertiliser management and on-farm waterway rehabilitation remain essential to ensure the water quality in Torbay Inlet and its tributaries does not deteriorate further.

<sup>1</sup> Nutrient concentrations are compared with ANZECC and ARMCANZ (2000) water quality guidelines for estuaries in south-west Australia. Guidelines are used to assess risk of adverse effects on water quality. Available from: [www.waterquality.gov.au/anz-guidelines/resources/previous-guidelines/anzecc-armcanz-2000](http://www.waterquality.gov.au/anz-guidelines/resources/previous-guidelines/anzecc-armcanz-2000)