Department of **Water and Environmental Regulation**
Department of **Primary Industries and Regional Development**
GOVERNMENT OF WESTERN AUSTRALIA

HEALTHY ESTUARIES WA

Water quality snapshot: Miaritch (Oyster Harbour) 2021–22

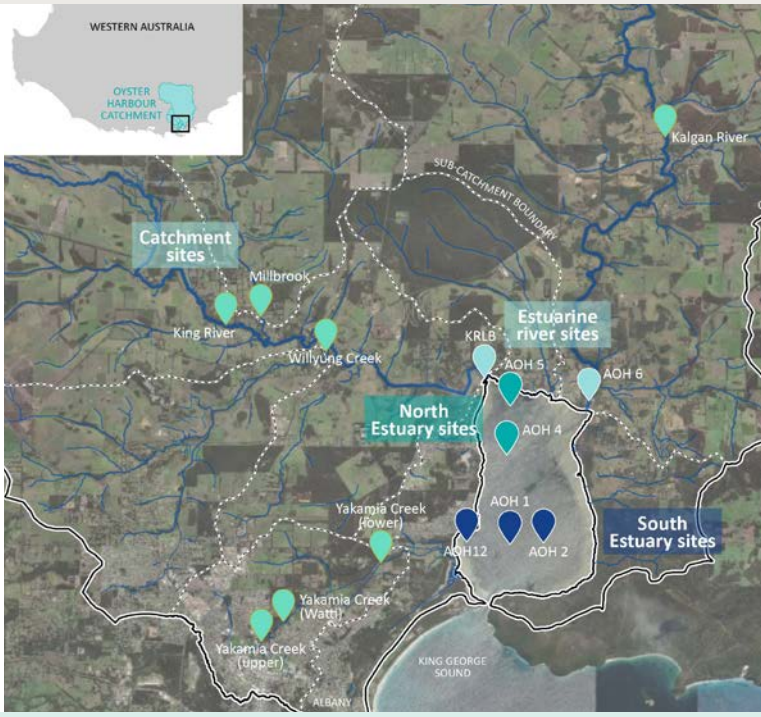
Understanding estuary condition and monitoring for change helps to guide how we manage our estuaries

Through Healthy Estuaries WA, the Department of Water and Environmental Regulation monitors water quality in Oyster Harbour and its catchment. This snapshot provides some insights from our water quality monitoring during 2021 and 2022, comparing the very wet rainfall year in 2021 with the drier year in 2022.

In Oyster Harbour (the estuary) and its catchment, 2021 was the wettest year since 1975 (annual rainfall of 1,125 mm), followed by a slightly below average rainfall year in 2022 (785 mm).

The high rainfall in 2021 flushed nutrients from the catchment into the waterways. We found higher-than-usual nutrient concentrations both in the catchment and estuary throughout winter and spring 2021. Fortunately, the increased nutrients did not result in a problematic increase in algal productivity in the estuary. This was because of low temperatures, high flows and dark, tannin-stained water that reduced light availability.

By 2022, the nutrient concentrations had returned to normal patterns. Overall, water quality in Oyster Harbour is very good, with higher concentrations of nitrogen and phosphorus occurring only in very wet years. At the estuarine river sites, higher concentrations are usually only seen in winter.



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 has the potential to harm fish and pose risks to human health.

In the catchment

Rainfall washes nutrients and organic matter from the soil into the rivers so we normally see higher nutrient concentrations in the rivers in winter.

Nitrogen concentrations tend to be at healthy levels in the Oyster Harbour catchment's three largest rivers for most of the year, with some periods of elevated levels in the winter months.

Phosphorus concentrations in the King River and Mill Brook are also elevated in winter. In the Kalgan River, however, phosphorus concentrations tend to be lower and vary less across the year, only becoming elevated under high-flow conditions, like in the wet year of 2021.

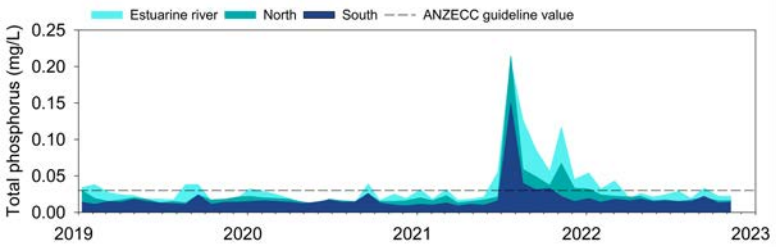
Both phosphorus and nitrogen concentrations across the catchment were higher than usual in winter and spring 2021 because of the higher rainfall and flows, and remained high for a longer period of time than usual. However, by 2022 they returned back to typical levels. This is a positive indication that the higher-flow year has not had an ongoing impact on nutrient concentrations in the rivers.

In the estuary

Like the nutrient concentrations in the catchment, in the estuary we find that nutrient concentrations are higher in winter, especially in wetter years.

Oyster Harbour is permanently open to the ocean with ongoing exchange of water. This means that concentrations of nutrients are lower at our southern estuary monitoring sites near the ocean compared with those in the northern part of the estuary nearer to the rivers.

In 2021, nutrient concentrations were higher than usual throughout the estuary. During 2022, the concentrations returned to typical levels.



Microalgae in the estuary

Microalgae are a naturally occurring and important part of estuary ecosystems. They can sometimes be harmful if present at high densities ('blooms'), or if they are toxic. Microalgae grow rapidly under well-lit, warm, nutrient-rich conditions.

Microalgae density is higher in the north of the estuary compared with the south because of higher nutrient availability. Despite excessive nutrients in the estuary in winter 2021, there were no major algal blooms in winter or spring, and no distinct increase in algal densities. The strong winter and spring flows helped flush nutrients and algae towards the ocean and contributed to cold water temperatures within the estuary, inhibiting microalgal growth. The darker, tannin-stained water during this period also helped limit algal densities as it reduced the light available to support growth.

The water colour in winter 2021 (left) was darker because of the greater amount of organic matter and tannins entering the estuary because of the high rainfall, compared with a typical year (right).

Summary

Following elevated nutrient concentrations in Oyster Harbour and its catchment in the high-flow year of 2021, nutrient concentrations returned to normal in 2022 both in the catchment and the estuary.

The higher nutrient concentrations in winter and spring 2021 did not translate into higher microalgae densities. This was because cooler water temperatures at the northern estuary sites persisted for longer into spring, and there was reduced light availability for microalgae growth because of brown water and high-flow conditions. This shows that the estuary can deal with high nutrient pulses in winter.

Despite this, there is still potential for algal blooms in the future, especially under the warmer and drier climate projections for the region. Compared with the high winter rainfall in 2021, years with short-lived inflows from unseasonal summer storms have greater potential to fuel algal blooms. This is because high loads of nutrients would arrive when flows would not be significant enough to wash them out to the ocean, and because warmer water temperatures and greater light availability would favour rapid algal growth. Continuing efforts to reduce nutrient inputs from the catchment remains important to keep Oyster Harbour healthy and improve its resilience for the future.