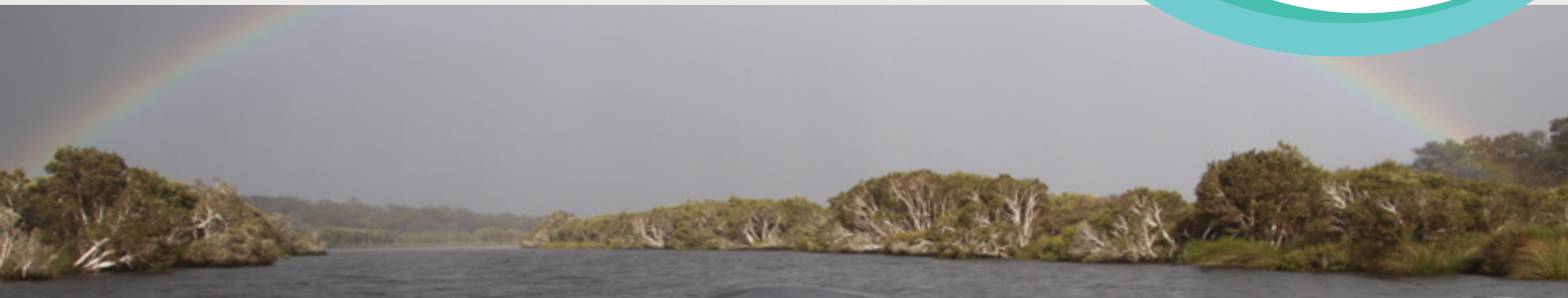


Water quality snapshot: Hardy Inlet 2023

Through Healthy Estuaries WA, the Department of Water and Environmental Regulation (the department) monitors water quality fortnightly in the Hardy Inlet and its catchment.

This snapshot presents some insights from our water quality monitoring from June 2022 to May 2023.

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



Overall, the water quality in Hardy Inlet (the estuary) was good throughout 2022–23. However, there were high phosphorus concentrations during the wetter months in the Scott River and around Molloy Island. There was one algal bloom and no fish kill events during this period.

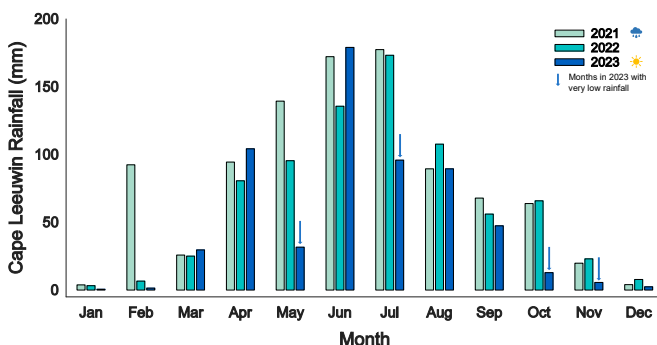
Excessive concentrations of nutrients like phosphorus

can fuel potentially harmful algal growth in waterways. Rainfall washes nutrients (nitrogen and phosphorus), and organic matter from the surrounding area (catchment) into the rivers and drains, and then to the estuary. Nutrients applied in the catchment, for example as fertiliser or livestock waste, wash into the waterways when it rains.

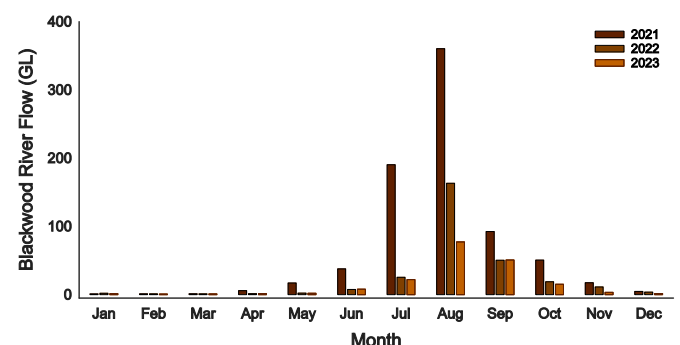
Rainfall and flow

Rainfall in 2023 in the Blackwood catchment was very low (e.g. 600 mm at Cape Leeuwin compared with the average annual rainfall of 790 mm for the previous 30 years). It was significantly lower than 2021 (950 mm at Cape Leeuwin) which was the wettest year in the past 10 years. Monthly rainfall was very low across the year in 2023, except for the months of April and June. Rainfall in 2022 (780 mm) was between that of 2021 and 2023.

River flow and rainfall generally follow a similar pattern, but flow is also influenced by factors such as groundwater, soil moisture, evaporation and extraction. Two consecutive years of relatively low rainfall in 2022 and 2023 meant that flows in the Scott and Blackwood were low in these years, particularly in 2023 (288 GL compared with an average of 444 GL for the previous 30 years). The recent low flow years are in line with longer term trends of declining flows and rainfall because of climate change.



Cape Leeuwin monthly rainfall in 2021 (a wetter than average year), 2022 and 2023 (a drier than average year). Data from the Bureau of Meteorology



Blackwood River monthly flow in 2021–23. Data from Department of Water and Environmental Regulation station 609019

Nutrients

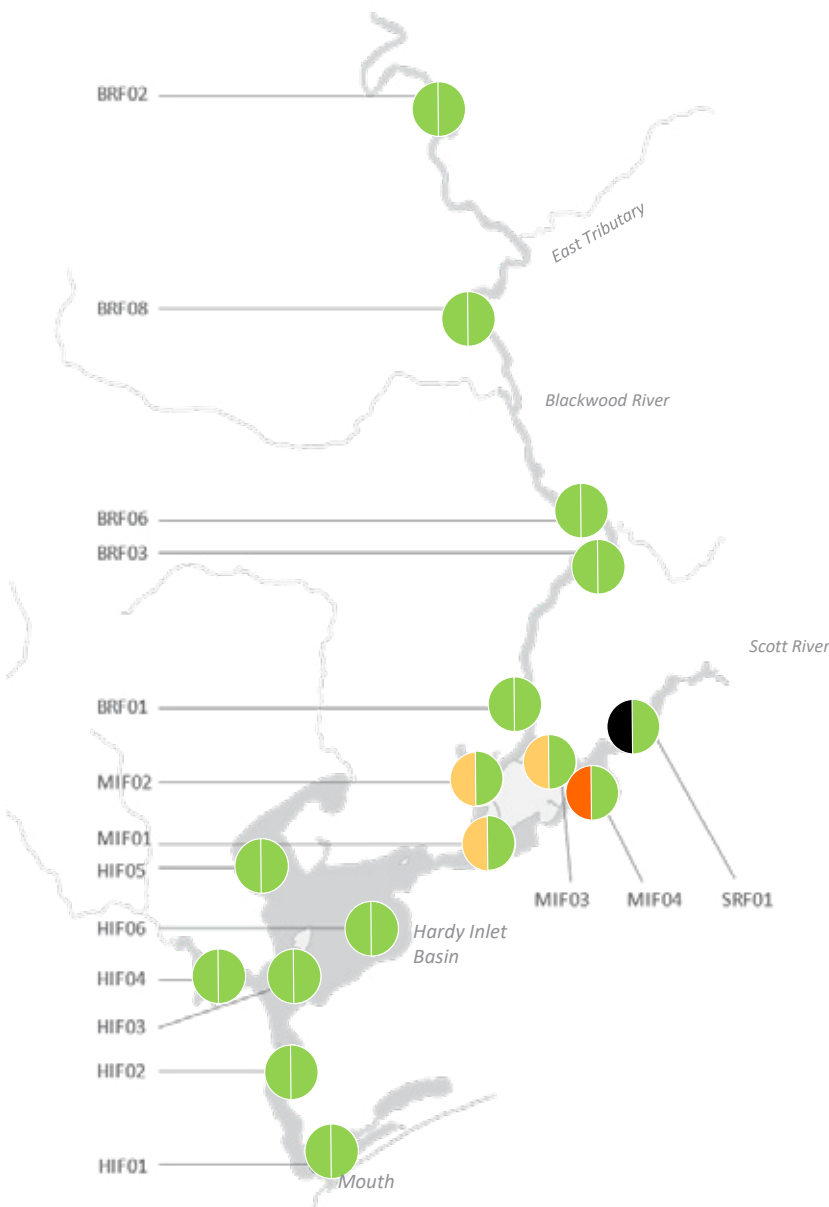
We regularly monitor nutrient concentrations because excess phosphorus and nitrogen can promote algal growth. While algae are a natural part of aquatic ecosystems, excessive algal growth can harm or kill fish and pose risks to human health, and can make waterways unsightly and smelly.

Nitrogen enters the Hardy Inlet (the estuary) from both the Blackwood and Scott catchments, especially during the wetter months of the year.

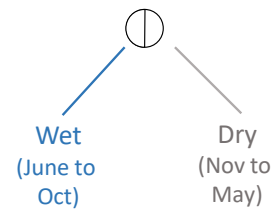
The average nitrogen concentrations in the parts of the estuary closest to the ocean were healthy (below guideline values) throughout 2022–23. Further upstream, in the estuarine sections of the Scott and Blackwood rivers, nitrogen concentrations were moderate (0.75 – 1.5 mg/L) in the wet months and low in the dry months (November to May).

Phosphorus enters the estuary from both catchments, but especially from the Scott catchment. This is partly because the soils in the Scott catchment tend to have a lower phosphorus retention capacity than soils in the Blackwood catchment, leading to more leaching and run-off of phosphorus into the waterways. Intensive agriculture (beef and dairy grazing) and the extensive network of drains in the Scott catchment also contribute to the high phosphorus load from the Scott.

Average phosphorus concentrations in the estuary were high during the wetter months around Molloy Island where the Scott River flows into the estuary. In the dry months, average phosphorus concentrations were at healthy levels across all monitoring sites.



Category	Guideline	Total Phosphorus
Low	< guideline	< 0.03 mg/L
Moderate	Guideline to 2x guideline	0.03 to 0.06 mg/L
High	>2x to 3x guideline	0.06 to 0.09 mg/L
Very high	> 3x to 4x guideline	0.09 to 0.12 mg/L
Extreme	> 4x guideline	> 0.12 mg/L



Average surface phosphorus concentrations in the wet months (June to October 2022) and dry months (November 2022 to May 2023)

Algal productivity

Chlorophyll levels, an indicator of algal productivity, were generally moderate (3–6 µg/L), which is typical for the Hardy Inlet. One microalgal bloom occurred in July 2022.¹ The bloom spread from Alexandra Bridge down to Molloy Island, and was most concentrated where the East Tributary enters the Blackwood River. The bloom consisted of a phytoplankton known as a haptophyte, which has the potential to cause fish mortality through toxin production. Haptophyte densities observed during this bloom were the highest historically recorded in the area and may have resulted in visible discolouration of the water. Fortunately, there were no reports or observations of affected fish from this short-lived bloom, which lasted less than a fortnight.

Phosphorus levels measured upstream in the East Tributary had been very high in the weeks before the bloom and may have contributed to its development. Blooms can occur at this time of the year when rains wash nutrients into the estuary, but the river is not flowing strongly enough to wash them out to sea.

Importantly, there were no blooms of *Lyngbya*-like species, a potentially harmful group of microalgae of which there have previously been blooms in the estuary.² There were also no excessive macroalgal blooms, which have occurred in the past, possibly thanks to cooler spring temperatures.

In late summer to early autumn 2023, there was occasional algal scum washed ashore between the estuary mouth and the Ellis Street boat ramp. This was caused by *Trichodesmium*, a marine species of algae that washed into the estuary from the ocean. This species of algae is potentially harmful to humans but is highly visible so easy to avoid. It resembles pink sawdust on the surface, and when it decomposes, the colour can change to purple, green and white. *Trichodesmium* regularly aggregates on the ocean surface on warm, still days, and then can enter the estuary with the incoming tide.

¹ The department has defined Phytoplankton Environmental Guideline values for each microalgal species. When densities of the algal species exceed guideline values, they may be harmful to ecological and human health, and/or cause visible water discolouration.

² For more information, see [Condition of the Estuary: Hardy Inlet 2016-19 report](#).



Microalgae *Trichodesmium* on the surface of the estuary



Microalgae *Trichodesmium* washed ashore and decomposing on the estuary foreshore

Summary

Low rainfall in 2022 and 2023 meant that nutrient inputs to the Hardy Inlet were lower compared with wet years such as 2021. During the wet months, the Scott River and the area around Molloy Island had higher phosphorus concentrations compared with other areas.

An algal bloom occurred in July 2022 between Alexandra Bridge and Molloy Island. Risks of algal blooms will continue in some areas of the estuary, especially where the Scott River flows into the estuary.

Continuing efforts to reduce nutrient inputs from the catchment remain critical to improve the health of the Hardy Inlet. The State Government's Healthy Estuaries WA program is supporting work in the catchment to reduce nutrient inputs to the Hardy Inlet. For example, the program works with farmers on best practice fertiliser management and keeping livestock out of waterways.

Report an algal bloom via Algal Watch:

Tel: 08 6250 8064

(Monday to Friday 9:30am – 4:30pm)

Email: peu@dwer.wa.gov.au



More information

estuaries.dwer.wa.gov.au/estuary/hardy-inlet

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