Fact Sheet

Response of the Coorong- Sediment

The following technical report associated with the Murray-Darling Basin 2022-23 flood environmental response in the Coorong research program is available at Reports – Goyder Institute.

The 2022-2023 flood in the River Murray was the second largest on record, only surpassed by the 1956 flood. The floodwater and high flows into the Coorong from the end of 2022 and throughout 2023 reduced the salinity of the water within the soil (porewater) and oxygenated the sediments in both the North and South Lagoon. This prevented sulfide and ammonia build up in the porewaters.

PROJECT AIM:

To assess the impact of the 2022-2023 flood in the River Murray on the sediments in the Coorong.

HIGHLIGHTS

- To assess the impact of the flood and high flows on sediments and the water within the sediment (porewater) in the Coorong, cores were retrieved from 10 sites along the North and South Lagoon. Cores were retrieved 3 times; during the high flow period in August 2023, as the high flow period was receding in November 2023, and when the water level had returned to baseline flow in March 2024. Porewaters in the surface sediments were analysed every 2.5 cm to a depth of 15 cm.
- The flood and subsequent high flow period, oxygenated sediments and decreased salinity. This was due to low salinity in the surface water, which was lowest salinity since 1998 in the North Lagoon and lowest salinity in the South Lagoon since 2011-12. The decrease in salinity and increase in oxygen in the sediments allowed for conditions favourable for aquatic plants, macroinvertebrates and fish. Nutrients in the sediment did not change significantly between the three sampling periods.
- As the high flows from the River Murray begin to recede from the beginning of 2024, surface sediments have less oxygen and higher salinity, particularly in the South Lagoon. When sediments were lower in oxygen, porewater concentrations of sulfide and ammonia accumulated. While sulfide concentrations measured in porewaters remained below levels that would affect aquatic vegetation, ammonia concentrations, in combination with higher salinity, were high enough to potentially inhibit burrowing macroinvertebrates and cause the loss of aquatic plants.

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First Nations Acknowledgement

KEY FINDINGS

In August 2023, porewater (the water within the sediment) salinity was low (2-4 g/L) due to the low surface water salinity. Salinity remained low in the North Lagoon in March 2024 (2-4 g/L),but had increased in the South Lagoon sediments by March 2024 (from 5 g/L to 8 g/L).

The high flow event also oxygenated the sediments. As the flows receded, low oxygen conditions in the porewater began to dominate at several sites, particularly in the middle of the Coorong and in the South Lagoon. The low oxygen conditions allowed the accumulation of sulfide and ammonia in sediment porewaters (Figure 2). Sites further away from the Murray Mouth (i.e. sites in the south lagoon) accumulated higher concentrations of ammonia and sulfide in the porewaters.

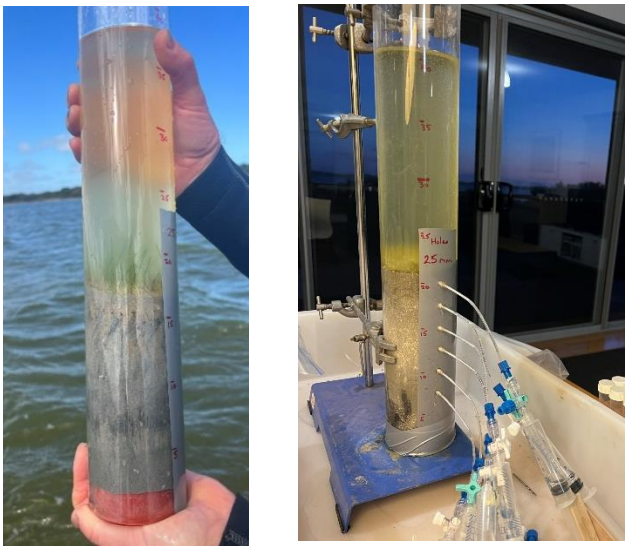

Figure 1: Cores were retrieved from the sediment. Samples were then collected from every 2.5 cm depth to 15 cm.

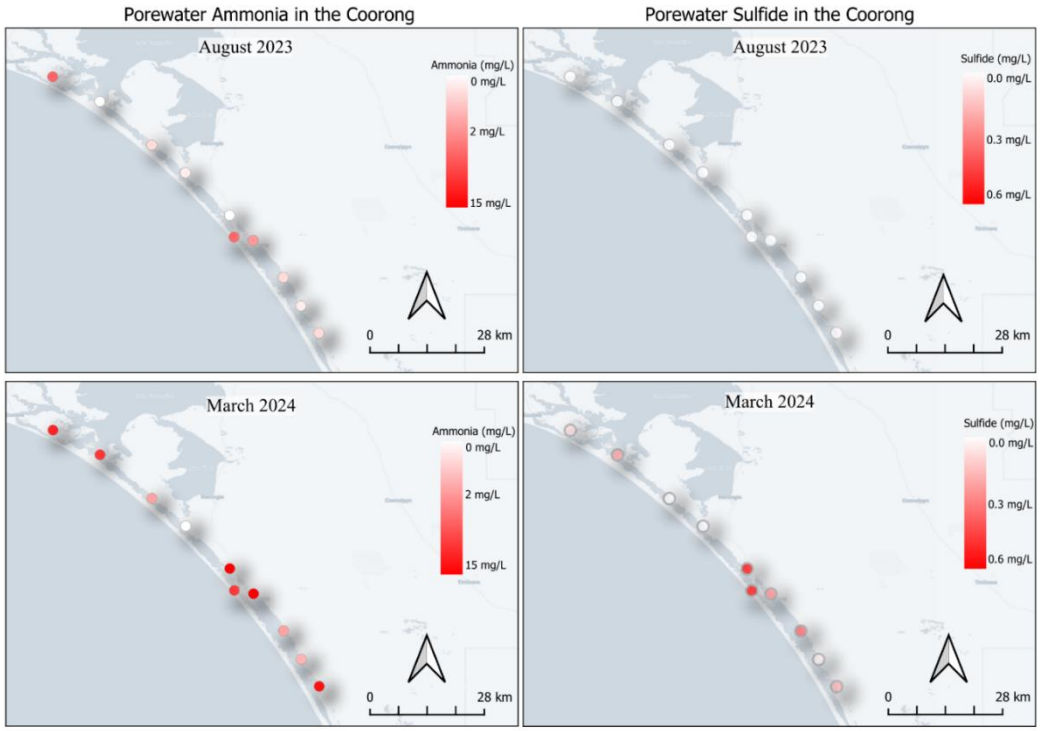

Figure 2: Map of the Coorong sampling sites with ammonia (left) and sulfide (right) accumulated between sampling in August 2023 (top) and March 2024 (bottom).

Sulfide concentrations increased in the porewaters but remained below levels that would affect aquatic vegetation. Ammonium values, however, increased in March 2024 and exceeded values which may cause harm to burrowing macroinvertebrates and aquatic plants, particularly at some sites in the South Lagoon.

This suggests a possibility of free ammonia toxicity to aquatic organisms and limited burrowing invertebrates in the South lagoon as salinity exceeds 60 g/L. Results from this study highlight that high flow events positively impact the Coorong sediments by decreasing salinity and increasing oxygenation of sediments, allowing conditions suitable for macroinvertebrates and aquatic plants.

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This project was completed from August 2023 - March 2024.