

# Response of the Coorong to the 2022–2023 River Murray flooding

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](#).

Summary of the environmental and ecological observations influencing ecological condition and key components of the Coorong food web

The River Murray flood of 2022-3 led to major short-term changes in the Coorong ecosystem. The large volume of fresh water increased water levels and lagoon connectivity, and reduced salinity.

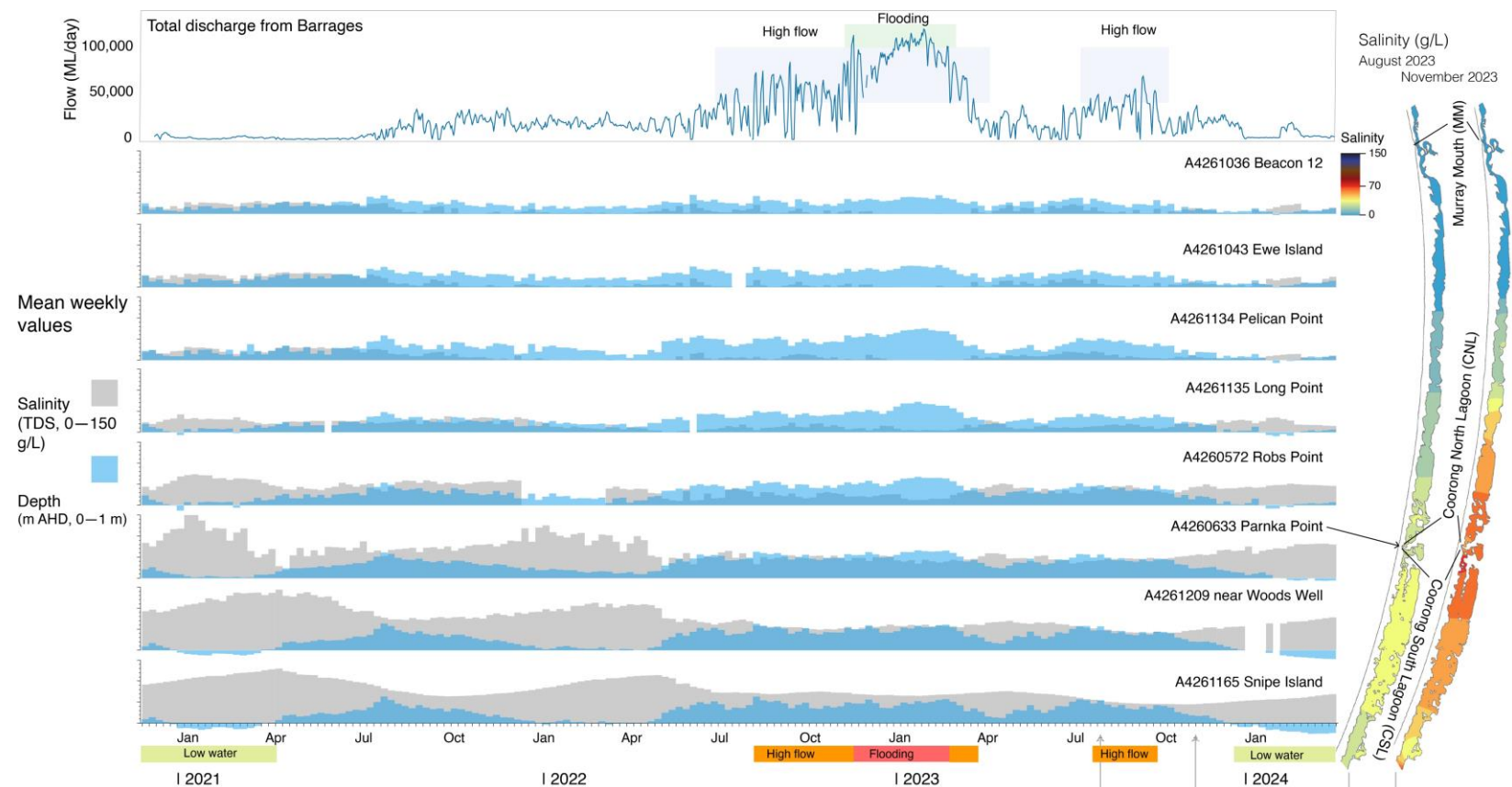
Away from the immediate flow over the barrages, nutrients reduced and sediment quality improved. The reduced salinity enabled increased productivity of fish and invertebrates, as well as greater biodiversity throughout the system. Large numbers of formerly widespread species also returned to the Coorong South Lagoon.

The aquatic plant community, highly adapted to the extreme salinities that occur in summer, thrived initially but died off once the salinity reduced to less than that found in the ocean (~35 g/L). Other lower salinity tolerant aquatic plant species began to recruit in their place.

Once the flood and high flows ceased, salinity increased again, particularly in the South Lagoon. This research has shown that sustained input of lower salinity water can return positive ecological function to the Coorong.

## KEY FINDINGS:

- The influence of River Murray flooding in South Australia was at its peak from 15 November 2022 – 26 January 2023. Water input from the River Murray has a direct effect on the condition of ecological communities of the Ramsar listed Coorong and Lower Lakes.
- The extended period of high flow and flood waters positively impacted the water and sediments of the entire Coorong. This, in turn allowed plants and animals in the Coorong ecosystem to flourish.
- Typically, over the summer and autumn period in the Coorong, water levels drop, and salinities rise as the weather warms (e.g. Figure 1; 2021-22 ‘Low water’ period). This did not occur during the 2022-23 summer as floodwaters-maintained water levels and reduced salinities at all sites (Figure 1, highlighted as ‘High flow’ and ‘Flooding’).
- The salinity remained relatively low (below 60 g/L in both lagoons) throughout most of 2023. While nutrient concentrations in the flood waters near the Murray Mouth sites were relatively high, the nutrient concentrations in the rest of Coorong waters decreased in response to the high flows and flood waters. The condition of surface sediments also improved, with low salinities and oxygenated sediments.
- The influence of these floodwaters on the sediment and water was observed the length of the Coorong (Figure 1).
- In the 2023-24 spring/early summer period, barrage flows rapidly decreased, water levels fell, and salinity began to increase.
- The plants and animals which flourished in the lower salinity conditions began to die off. Low oxygen conditions rapidly returned to sediments and monosulfidic black ooze were observed to be reforming in early 2024.

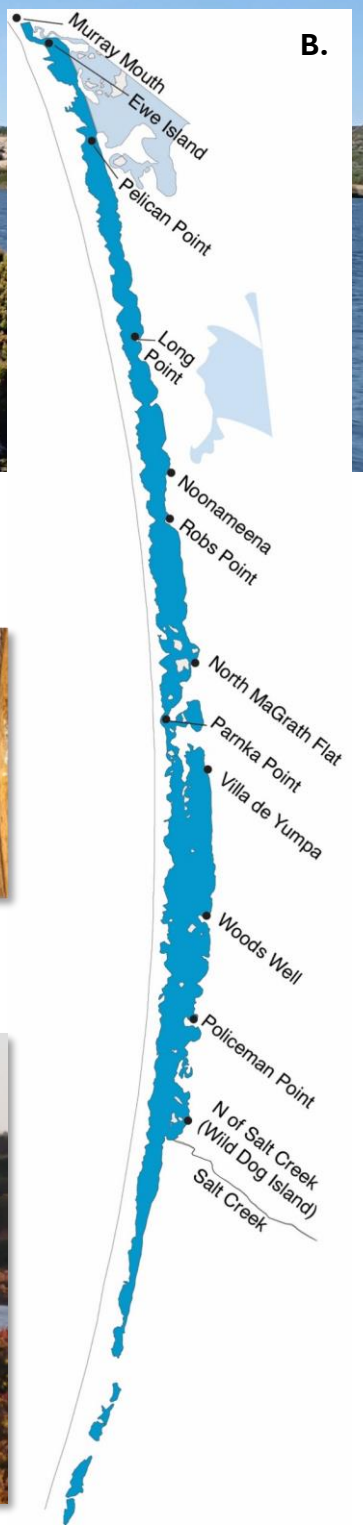


**Figure 1: Environmental conditions in the Coorong from late 2020 until early 2024 including the periods of high flow and flooding of the River Murray. Salinity (total dissolved solids scaled from 0–150 g/L) is plotted in grey, and water depth (tide height m AHD 0–1 m) is plotted in blue (note values below 0 are below mean sea level). Spatial visualization of salinities at two times following the flooding showing the increase in salinity as water levels drop.**

\*\* Each profile provides weekly averages of data from long term monitoring stations (station number and site name listed, see [water.data.sa.gov.au](#) for more details).

November 2021

February 2023



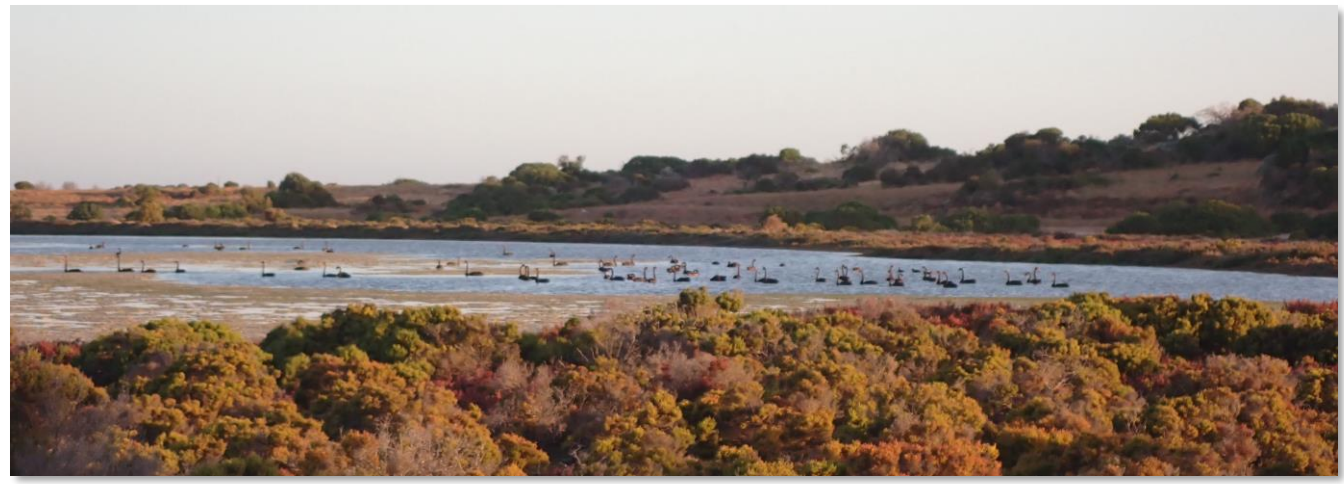
**Figure 2: A. Photographs of the relative water levels at Parnka Point. The left photograph is from November 2021, the right from February 2023 during the peak flows. B. The map illustrates the relative locations of key sampling sites surveyed in this study. C. Below right images of key biota observed during sampling post-flood in the Coorong.**

**PLANTS, INVERTEBRATES, FISH RESPONSE TO HIGH WATER LEVELS**

- Fish and macroinvertebrates increased in distribution, abundance and biodiversity in response high water levels.
- The additional volume of freshwater allowed better connectivity between lagoons, lowered salinity, provided larger areas of shallow water habitat and improved water and sediment conditions. These positive ecosystem changes were observed from the end of 2022 and throughout most of 2023.
- At first, the aquatic plant community, dominated by the extreme hypersalinity tolerant *Ruppia tuberosa*, increased in biomass and survived over a wider depth range. However, these aquatic plants declined once salinity levels decreased to less than marine (~35 g/L salt). Diverse species recruited in their place, including *Ruppia megacarpa* and the stonewort *Lamprothamnium* sp. High algal loads occurred but filamentous algal mats formed only in a few areas where water movement was low.
- When water levels dropped in late 2023, due to reduced flood water inputs and typical summer conditions returned to the Coorong, salinity increased again reducing the viable habitat for invertebrates and aquatic plants causing an overall reduction in numbers.
- The post-flood recruitment of macro-invertebrate species, fish and additional aquatic plants seen in many southern Coorong sites, many of which had not been seen since before the Millennium Drought, shows that positive ecological function can be restored to the Coorong if inputs of additional water can be sustained leading to reductions in high nutrient and high saline conditions.



High biomass *Ruppia* Community      Worm burrows, bio-irrigating      Increased abundance of mussels      Yelloweye mullet



Black swans foraging in *Ruppia* Community January 2023 near Parnka Point

**FOR MORE INFORMATION**

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