Fact Sheet

Response of the Coorong Food Web- Aquatic plants and algae

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 community of submerged aquatic plants in the Coorong changed dramatically during the 2022-23 River Murray flood. Initially there was a boost to the biomass of the extreme hypersalinity tolerant Ruppia Community, dominated by Ruppia tuberosa, as plants grew larger and in deeper water. As water became fresher with the high volume of the flooding, species of submerged aquatic macrophytes with lower salinity tolerances grew more widely including the stonewort, Lamprothamnium papulosum, and a different species of Ruppia, R. megacarpa. As freshwater conditions were reversed once the flood waters receded many populations of the aquatic plants that had grown were left high and dry, but the Ruppia Community was observed beginning to recover with water returning to the system after a dry summer and autumn in winter 2024.

PROJECT AIM:

To assess the impact of the 2022-2023 flood in the River Murray on the aquatic plants and algae in the Coorong.

HIGHLIGHTS

- The flood and subsequent high flow period initially created conditions favourable for aquatic plants already growing in the southern Coorong which grew larger and had a higher biomass. When water became quite fresh (~10 g/L) the species typically found in the system that are tolerant of extreme hypersalinity, were replaced in some areas by those that thrive in different conditions, particularly in the areas monitored in the Coorong North Lagoon.
- The Charophyte *Lamprothamnium papulosum* was detected and found to occur in several different zones of the southern Coorong corresponding to this change in water quality. Other aquatic plants were observed demonstrating a level of resilience where environmental conditions allow.
- Filamentous algae were present, associated with the high nutrient loads of the southern Coorong, however massive surface algal mats did not form, but large drift banks were seen during summer with the very high flow.

This project is part of the South Australian Government's *Healthy Coorong, Healthy Basin* Program, which is jointly funded by the Australian and South Australian Governments. The Goyder Institute for Water Research is a collaborative partnership of the South Australian Government through the Department for Environment and Water, CSIRO, Flinders University, the University of Adelaide and the University of South Australia. Published November 2024.

First Nations Acknowledgement

KEY FINDINGS

The Ruppia Community is recovering after a period of very low salinity due to the flood conditions.

The aquatic plants that grow in the Coorong are adapted to an annual cycle of extreme hypersalinity in the summer months (salinity > 60 ppt, typically > 100 ppt in mid-summer) and falling water levels (to below -0.4 m AHD in mid-summer). The Ruppia Community, including these extreme hypersalinity adapted species, responded positively to the drop in salinity and higher water levels and plants formed banks of high biomass in deeper water.

Figure 1: Ruppia tuberosa caught in anchor in the deeper water of the Coorong South Lagoon July 2023 (left), high biomass Ruppia megacarpa finishing its growing season in the North Lagoon January 2024 (right).

During the high flow period, surface sediment quality improved, however once the water level returned to baseline flow the sediments rapidly accumulated organic matter, resulting in dark oozy sediments (e.g. sediment core in photo below right). Water levels dropped rapidly in October 2023, leading to the die-off of plants as they were exposed, which typically occurs in the Coorong, but had not for the past two summers due to the higher water levels that persisted for more than 18 months. New seedlings have been observed in the most recent surveys (photo below left) along with plants surviving from the previous growing period season demonstrating a perennial population still occurs in the southern Coorong.

Figure 2: Ruppia seedling emerging from a sediment core from the southern Coorong in June 2024 (left), Southern Coorong sediment core with dark, sulfidic sediments from the surface to bottom of core in November 2023 (right).

The trend in growth of the aquatic plant community being monitored is summarised on Figure 3. The flows from the Barrages are plotted to the left side of the graph, as an indicator of water availability in the system and scaled to the different relative flow periods. The lines on the graph are the relative performance of plants in each time period across all sites (some periods include more than 100 sites). The results are also shown relative to the distance from the Murray Mouth, which indicates location along the length of the Coorong. The data shown begin at Noonameena in the North Lagoon (~43 km from the Murray Mouth), and end near Salt Creek in the South Lagoon (~92 km from the Murray Mouth). Note the initial improved growth following the flood extreme, then a decline as the system freshened.

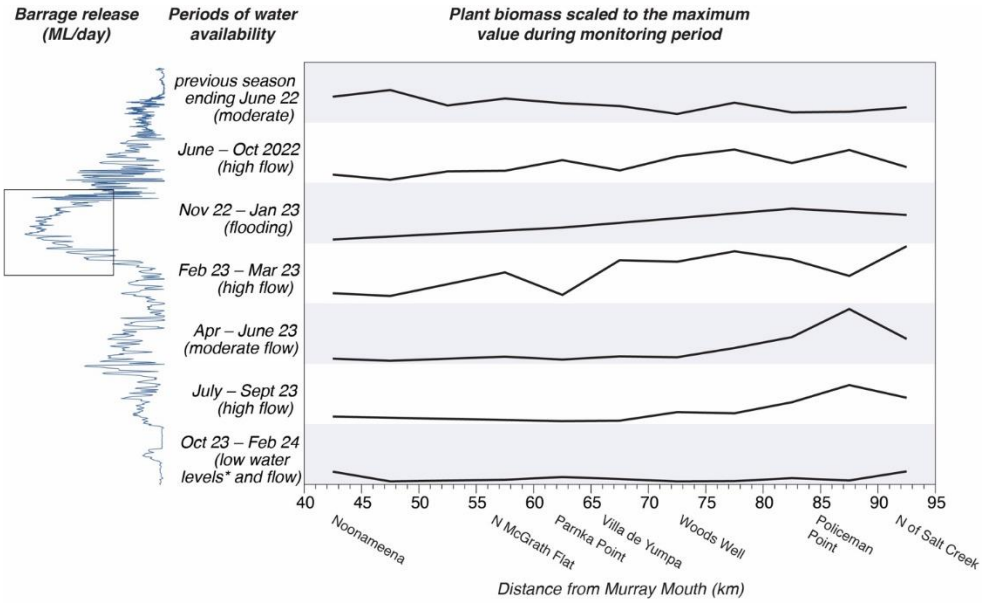

Figure 3: The trend in growth of the aquatic plant community. Flows are on the left side of the graph and plant biomass levels at sites along the South Lagoon are in the right.

Figure 4: North Magrath Flats site near Rabbit Island in the central section of the Coorong, was taken in December 2022 when water levels were very high due to the flooding. A mat of dying filamentous algae has accumulated as drift that strong winds caused the mats to become stranded on the shoreline. At this time of year, the Ruppia Community is flowering, and the formation of these mats disrupts their ability to set seeds.

PROJECT TEAM: **University of Adelaide:** Luke Mosley, Michelle Waycott, Emily Leyden, Brett Thomas; **Flinders University:** Sabine Dittmann; **PIRSA-SARDI:** Qifeng Ye, Jason Nicol; **Goyder Institute:** Bryony Cotterell, Alec Rolston.

REFERENCE: Michelle Waycott

CONTACT: **E** enquiries@goyderinstitute.org

This project was completed from August 2023- March 2024.