

Water for the River Murray Channel: 2021-22 ecological responses

Flow is important for the ecology and health of rivers. Restoring the different aspects of natural flows is key to rehabilitating the health of regulated rivers. In the River Murray, environmental water holders are managing flows for improved outcomes for the animal and plant populations that live in the rivers and wetlands. A five-year monitoring plan is now in place for the River Murray, measuring how the water quality, food webs and fish populations respond to flow. This information helps agencies work together to manage the river for the best environmental outcomes.

Scaling up collaborative research to get the best ecological outcomes

Previous monitoring of the River Murray Channel has often occurred at specific sites and small sections of the river. Agencies are now working together to look at how the ecology of the river responds to flow at a whole of River Murray scale. We are doing this by piecing together the different monitoring programs along the river and also filling gaps. This will allow us to assess the whole of the River Murray's response to flow, irrespective of state boundaries. The aim is to better understand how aquatic animals and the system they depend on respond to flow, so that we can make better decisions and improve how we manage environmental water in the River Murray.

Algae and dissolved organic carbon (DOC), (which is consumed by microbes), are the base of the food chain in rivers. They are fuel for small animals and plants, which in turn become food for larger things, including fish. Flows that inundate floodplains not only improve the health of the floodplains, but also generate new DOC. This happens when leaves that are sitting on the floodplain are soaked in the water, releasing the brown-coloured DOC – much in the same way as tea bags being soaked in water. This DOC is transported back into the river with the flood waters. Monitoring in 2021-22 concentrated on measuring these basic food resources in rivers and how the fish responded to the flows.

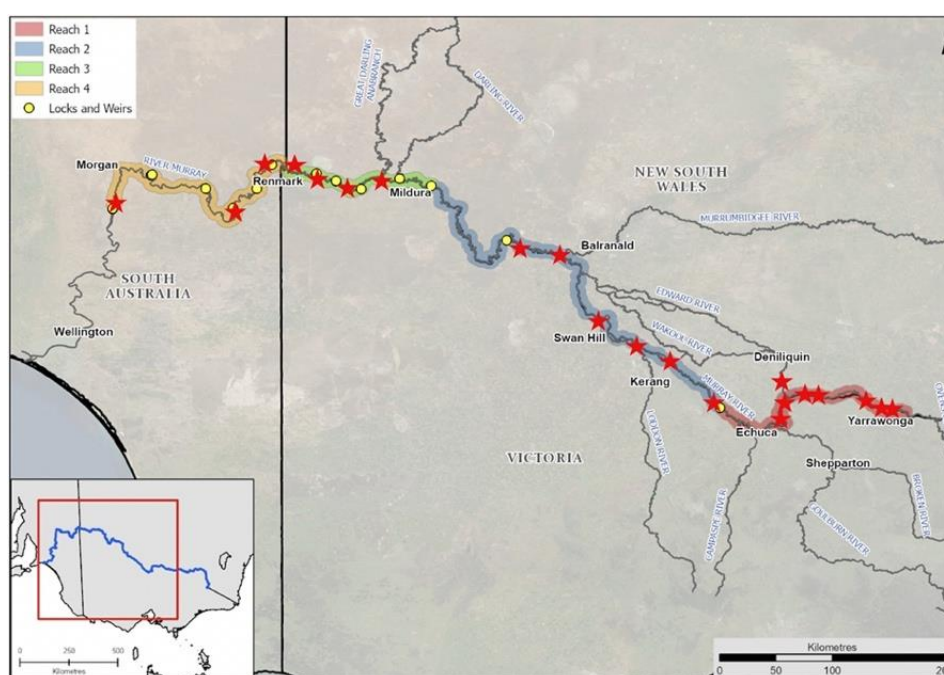


Figure 1. Map showing four river reaches (coloured lines) monitored as part of the overall River Murray Monitoring Plan. Stars show the sample sites.

What did we find?

The flows and riverine food production in 2021-22

- Elevated flows were recorded in the River Murray during 2021 (Figure 2). The peak flow at Tocumwal was 40,000 megalitres per day (ML/d) in late September, with peaks above 20,000 ML/d persisting into early 2022. Flows this size led to water making it onto the floodplain at the Barmah-Millewa forest. This water refreshed wetlands and gave the forest an important 'drink'.
- Flows at other sites rose and fell more gradually, increasing slowly over the monitoring period, generally peaking late spring (reaches 2 and 3) and summer (reach 4) (Figure 2). Flows did not lead to extensive floodplain wetting in reaches 2 and 3, although they were high enough to make their way down some creeks, back waters and low-lying areas, or wet new areas of bank. Flows remained in the channel in South Australia (reach 4) though would have wet new areas of bank.

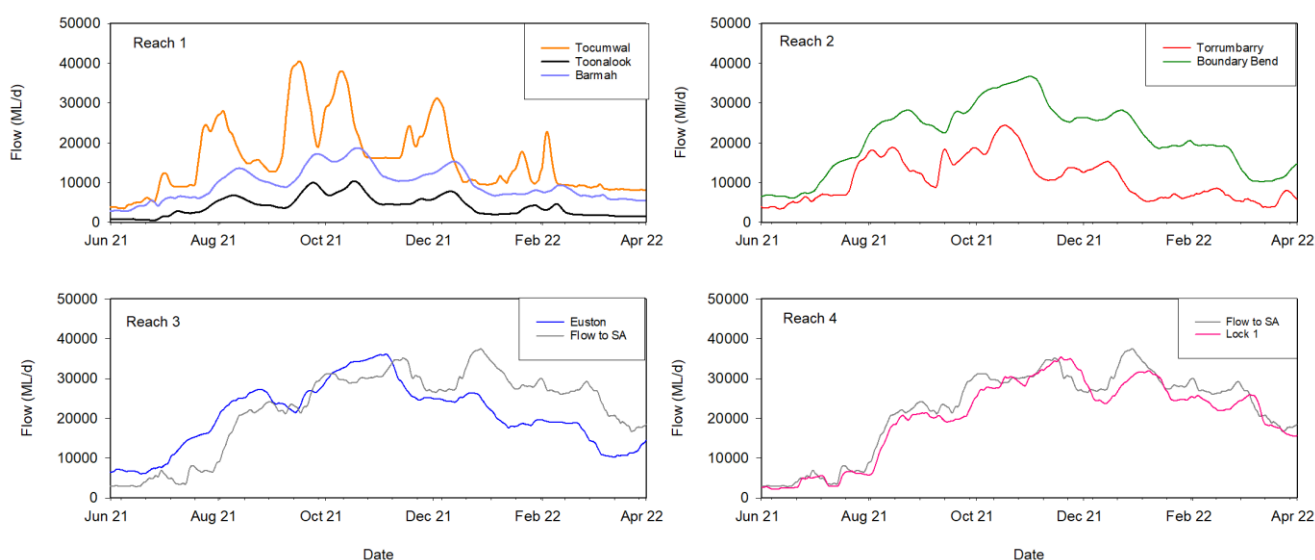


Figure 2 River Murray flow at different sites along the River Murray and Edward/Kooye River.

- DOC and nutrients on floodplains were mobilised following 2021-22 flow pulses, thereby increasing the amount of food delivered to the river channel (Figure 3). Even though water remained within channel in South Australia, increases in DOC occurred (Figure 3). DOC concentration continued to increase at the South Australian sites, when lower flows returned, suggesting water rich in DOC was making its way out of any low-lying areas. This observation requires further study to confirm the reason.
- This refresh of organic carbon and nutrients would have provided food at the base of the riverine food webs.

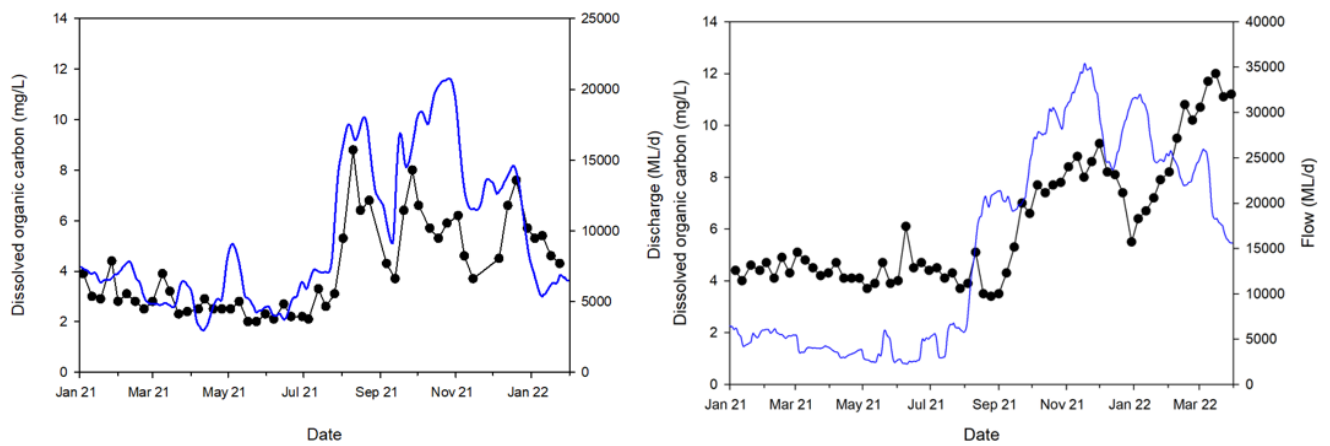


Figure 3. Graphs showing dissolved organic carbon concentration (Black line) increasing at Swan Hill (left side) and at Lock 1 (right). The blue line shows the flows over time

Fish monitoring in 2021-2022

In the spring breeding season, drift nets and net tows were used to look at fish spawning. Then in autumn a fish population 'census' was done, which involved surveying fish populations to look at the numbers of golden perch, silver perch and Murray cod, their lengths and ages, (including whether the young from spring survived to autumn) and the condition of the fish. The monitoring found:

- Golden perch and silver perch spawned along the River Murray at the same time as elevated flow during late spring–summer. Silver perch spawning was, however, much lower than that recorded in the Murray channel during previous years.
- Despite spawning being detected along the entire Murray Channel, juveniles of both golden perch and silver perch were detected only in reaches 3 and 4. However, these were in very low abundance compared to previous years.
- Juvenile Murray cod were present across all four reaches, however their breeding success varied across the reaches. This data provides further evidence of consistent breeding and survival of young occurs across the River Murray channel in most years.



Figure 4. A young-of-year Murray cod collected in the River Murray. This fish would have been born in spring 2021.

What did we learn about fish populations and river flow?

- Our findings from the first year of monitoring in the five-year plan support previous studies that demonstrate golden perch and silver perch spawning, and survival are associated with

distinct spring–summer flow pulses, either in-channel or overbank. This response, however, may not be uniform across the River Murray.



Images (left) showing plenty of water at Barmah in the Murray and (right) transparent Golden Perch eggs.

- Analysis of juvenile golden perch (~6-18 months old) showed that they were derived from spawning in both the lower Murray and Darling rivers, but not from spawning in the River Murray upstream of the Darling River junction. This highlights the importance of multiple breeding locations for this species and the need for connectivity among these locations so that fish can move between regions. More spawning locations and greater connectivity will promote populations that are more resilient.
- Murray cod survival from larvae to ‘young of year’ occurred across the four reaches, although the size of the spring 2021 cohort (relative to fish born in the previous year) varied among reaches.
- Repeating monitoring over multiple years means that assessment of productivity and fish responses can be examined under a variety of flow conditions. This supports better management decisions, which will lead to better outcomes for the Murray River.

The 2021-22 Environmental Flow event was a joint coordinated watering action by the Commonwealth Environmental Water Holder, Victorian Environmental Water Holder, NSW Department of Planning, Industry and Environment, SA Department for Environment and Water, Murray-Darling Basin Authority as manager of The Living Murray, Goulburn-Broken CMA, North Central CMA, WaterNSW and Goulburn Murray Water.

For more information: The full technical report can be obtained by emailing the CEWOMonitoring@dceew.gov.au

The River Murray Channel Monitoring Plan is available at: [River Murray Channel Monitoring Plan 2021-22 to 2025-26 - DCCEEW](#)

Collaborators



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