

Department of Planning and Environment

# Reconnecting River Country Program

## Environmental benefit and risk analysis: Yarrowonga to Wakool Junction (Murray River)



Niemur River at Moulamein Road Bridge. Photo by Vince Bucello.

### About the Reconnecting River Country Program

The Reconnecting River Country Program is about improving flow connectivity to wetlands, riparian and floodplain vegetation communities through relaxing flow constraints in the southern-connected Murray-Darling Basin including:

- Hume to Yarrowonga (Murray River)
- Yarrowonga to Wakool (Murray River).

A constraint is any physical, policy or operational barrier limiting the flow of water in river systems. There are a range of flow constraints in the basin, meaning rivers connect to their floodplains less often than needed to maintain healthy river, wetland and floodplain ecosystems. The program aims to remove or relax these constraints.

Removing or 'relaxing' constraints allows water for the environment to be delivered at higher levels and at more appropriate times.

### Program benefits

Improving environmental flow delivery will support the recovery of native plants and animals in our rivers, wetlands and billabongs. Importantly, the program will provide long-term generational physical, emotional, economic and wellbeing benefits associated with positive ecological outcomes. It also has the potential to provide important economic benefit to local communities in southern NSW.

The NSW Government will collaborate with stakeholders to ensure issues are identified and a range of tools developed to mitigate potential effects before making changes to existing rules, policies or infrastructure.

# About the Environmental Benefit and Risk Analysis

## What we assessed

The Environmental Benefit and Risk Analysis is a major component of the options analysis and evaluation process being undertaken by the program. It assesses the potential environmental outcomes of the flow options being explored within the following themes:

### Benefits



### Potential risks



For each theme, potential environmental outcomes were measured using the best-available science, scientific models and expert knowledge including:

- the best available scientific information on the types of flows native fish, waterbirds and vegetation require to complete their life cycles and be in healthy condition
- hydrological modelling representing the potential system-wide flow patterns possible using currently available volumes of water and the different flow options being investigated
- inundation mapping providing an understanding of the potential areas to be inundated under the flow options being considered.

## Flow limit options being assessed<sup>1</sup>

	Murray at Doctors Point (ML/d <sup>2</sup> )	Murray downstream Yarrowonga Weir (ML/d)
Base case	25,000 <sup>3</sup>	15,000
Option 1	25,000	25,000
Option 2	30,000	30,000
Option 3	40,000	40,000
Option 4	40,000	45,000

<sup>1</sup> Options assessed to date. A range of other flow options could be explored between the base case and Option 4

<sup>2</sup> Megalitres per day

<sup>3</sup> It is difficult to deliver environmental flows up to 25,000 ML/d at Doctors Point due to the current constraint downstream of Yarrowonga Weir of 15,000 ML/d.

Note: 35,000 ML/d flow options were added for both Doctors Point and Yarrowonga in early 2023, to enable a more robust assessment of the change in impacts and benefits across the range of flows being investigated. Environmental benefit and risk assessments for these options will be undertaken during 2023.

## About the Yarrowonga to Wakool Junction project area

The project area consists of the Murray River, its broad floodplain and network of rivers, anabranches and creeks (including the Edward-Wakool system).

Important wetland systems in the area include the:

- Millewa, Werai and Koondrook-Perricoota Forests, which form part of the internationally important NSW Central Murray Forests Ramsar site
- Barmah and Gunbower Forests – Ramsar-listed sites located in Victoria
- Living Murray icon sites, which are recognised for their environmental, cultural and international significance
- river-connected wetlands along the entire length of the Murray, Edward, Wakool and Niemur Rivers and smaller creeks and anabranches.

**Currently, less than 9 per cent of wetlands in the project area can be reached with water for the environment.**

Wetlands and waterways in the project area support a diverse range of native plants and animals, some of which are threatened and in decline. This includes:

- 18 species of native fish
- 100 water-dependant bird species
- 10 frog species, platypus and at least three turtle species.



# What we learned – Yarrowonga to Wakool Junction program benefits

## Native fish



The study shows an up to 34 per cent increase in golden perch numbers in the Yarrowonga to Wakool Junction reach.

Relaxing flow constraints can potentially buffer natural population declines during drier periods and boost population increases during average and wetter climate conditions to build greater resilience. In addition, this increase in abundance of native golden perch could provide opportunities for increased recreational fishing and associated tourism for the local region.

### Estimated increase in golden perch (yellow belly) numbers with higher environmental flows



## Ecosystem production



Ecosystem 'production' describes the growth and transfer of energy from plants and algae into the body mass of animals in the aquatic food web.

The study finds the expected production benefit in the Yarrowonga to Wakool Junction reach is up to 15 per cent higher than the base case.

## Lateral connectivity (wetland inundation)

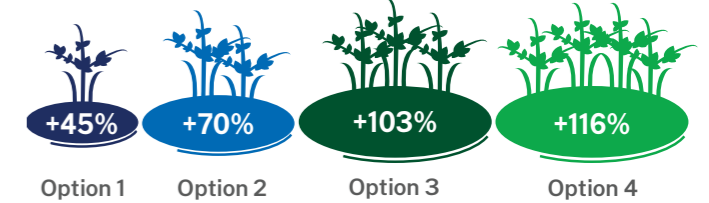


Up to double the area of wetlands (116 per cent increase) could be reached by environmental flows under relaxed flow limit options compared to what is currently possible.

The benefits increase with increasing flow limit options.

This substantial increase in wetland inundation area significantly increases the potential for water for the environment to sustain healthy wetland ecosystems, particularly during periods of drier climate.

### Estimated increase in wetlands potentially reached by higher environmental flows



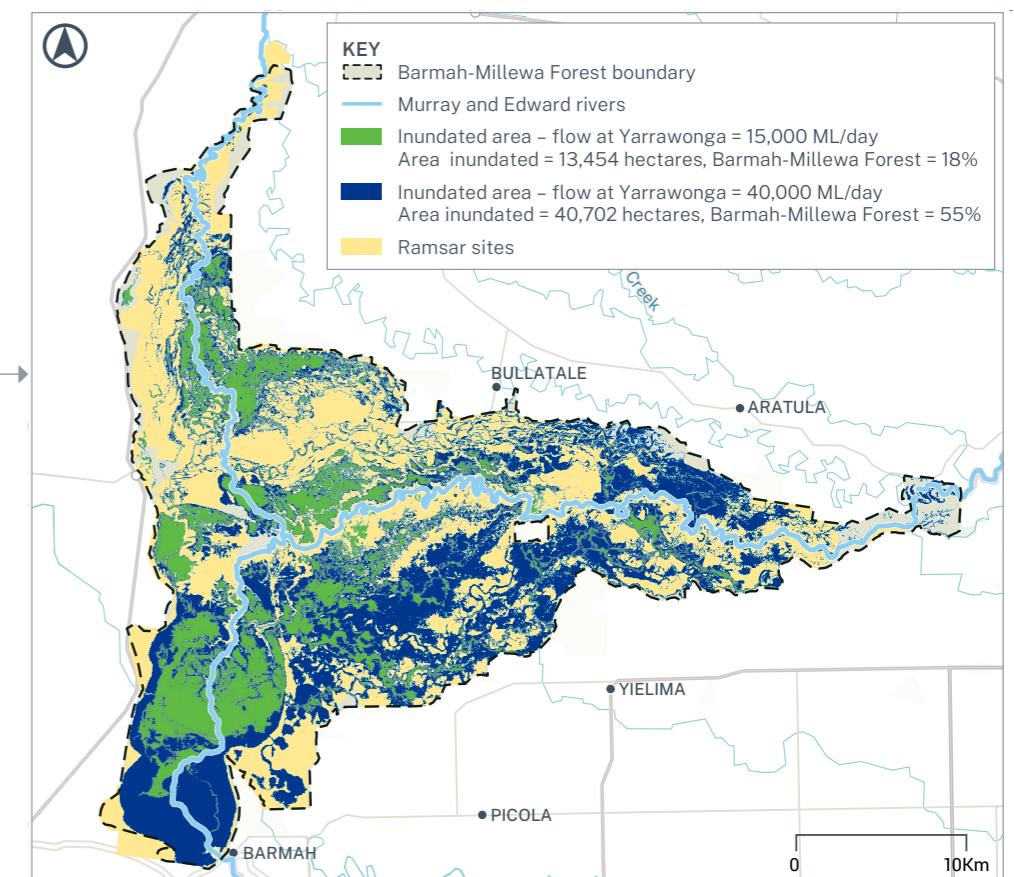
## Waterbirds



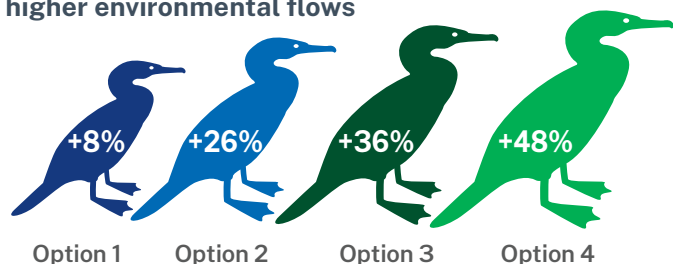
The waterbird study focused on the Barmah-Millewa and Koondrook-Perricoota-Gunbower Forests. More frequent watering of these wetlands at appropriate times is

expected to increase the number of waterbirds, including in drier years when waterbird breeding and foraging habitat is limited:

- Barmah-Millewa Forest (up to +13 per cent in average years and +80 per cent in drier years)
- Koondrook-Perricoota-Gunbower forests (up to +48 per cent in average years and +34 per cent in drier years).



## Estimated increase in waterbird numbers in Koondrook-Perricoota-Gunbower with higher environmental flows



## Wetland and floodplain vegetation

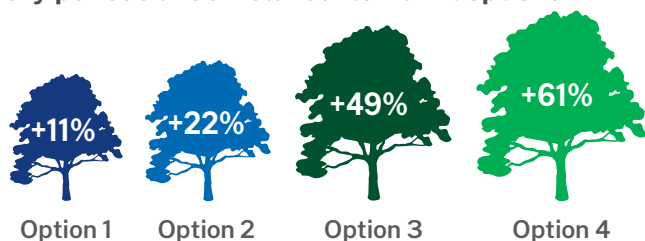


The study shows relaxed flow limits would **support two to five times more area of native vegetation** in wetlands and low-lying floodplains in the Yarrowonga to Wakool Junction reach than is currently possible.

### What does this mean for native vegetation health?

With more frequent watering at appropriate times, the study shows up to a **16 per cent increase in healthy river red gum forest and woodlands** over the long-term compared to the base case; and an up to **61 per cent increase during dry periods**. This means local habitat is protected during these dry spells.

## Estimated increase in river red gum forests and woodlands maintained in healthy condition during dry periods under relaxed flow limit options



## More information

The program is being led by the Department of Planning and Environment's Water Infrastructure NSW in partnership with the department's Environment and Heritage Group, the Department of Regional NSW's Local Land Services and the Department of Primary Industries, Fisheries.

The program is currently identifying and evaluating flow and impact mitigation options for further investigation in the next stage of the program. Options analysis is part of the requirements under the **NSW Government Business Case Guidelines**, as well as under the **Infrastructure NSW Infrastructure Investor Assurance Framework**.

Scientific, technical and operational analysis is being undertaken to support options evaluation. Options

## Water quality



The study finds no increased risk of adverse water quality events such as hypoxic blackwater events (low levels of dissolved oxygen) and blue-green algal blooms due to relaxed flow limit options. In fact, benefits to water quality are likely, due to the potential to bring forward the timing of some high flow events from the warmer months (late spring/summer) to cooler months earlier in the season (winter/early spring).

## River form



The study finds a low to medium risk higher flows may influence the rate of river bank erosion and other geomorphic processes that influence river form. There are a range of water management techniques and actions as part of river works programs to reduce this risk from medium to low in most river reaches. For example, we can manage environmental flows to slow the rate of fall in river levels following a high flow event.

A key benefit of higher flows includes the maintenance of river features providing diverse habitats for our native plants and animals, and improved nutrient and carbon transfer to the floodplain.

## Invasive weeds



The weed risk assessment found a small overall decrease in weed impact under the relaxed flow options compared to the base case.

The study predicts a reduction in suitable habitat for some water-based weeds and increase in habitat for some land-based weeds. These increases and decreases for different species balance out, with a slight net benefit (reduced weed impact) overall. The study also finds an overall small decrease in weed hot spots.

Weed management plans may be required addressing potential increases in weed distribution and impact for certain species in some locations.

evaluation will also incorporate local knowledge and expertise through collaboration with landholders and other stakeholders.

To find out more about upcoming consultation opportunities please contact us or get in touch with your local engagement officer.

## Acknowledgement

The Department of Planning and Environment and the Department of Regional NSW's Local Land Services acknowledge we stand on Aboriginal land. We acknowledge the Traditional Custodians of the land and we show our respect for Elders past, present and emerging.

## Contact us

Phone: 1300 081 047

Email: [admin.rtcp@dpie.nsw.gov.au](mailto:admin.rtcp@dpie.nsw.gov.au)

Website: [dpie.nsw.gov.au/reconnecting-river-country-program](http://dpie.nsw.gov.au/reconnecting-river-country-program)

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