2023 Murrumbidgee River Fisheries Sampling Report

Matt Beitzel, Lisa Evans, Mark Jekabsons

Executive Summary

In 2023 a fisheries survey was undertaken at 10 established sites on the Murrumbidgee River. The aim is to continue to monitor the fish population including pest, native and threatened fish species to aid conservation and recreation fisheries management, monitor impacts from water extraction and assess the impact of urban encroachment.

A total of 304 fish were captured, dominated by pest Carp at all sites. Murray Cod were also captured at all sites and Golden Perch were recorded at a larger number of sites than the previous survey. This is likely due to increase flow over the last 2-3 years providing connectivity from downstream populations. However, it was evident that juvenile Murray Cod were only recorded upstream of Canberra and that there is a large cohort of Murray Cod entering maturity and the legal recreational fishing take. Areas of investigation and management that are recommended include:

- Determining the spawning dynamics, connectivity requirements and natal origins of the native species.
- Supporting the regional recovery of threatened species.
- Determining the functional flow and habitat requirements for key species.
- Understanding, minimising and offsetting the impact of near river urbanisation.
- Maximising the sustainability of recreational fishing by updating and enforcement of the fisheries regulations

Introduction

The Murrumbidgee is the largest river in the ACT region and is home to an important variety of native fish and other aquatic animals. Threats to the river and its ecosystem in our region include, water extraction and flow modification, erosion, sedimentation, degraded riparian vegetation, barriers to fish passage, illegal fishing, urban development, urban and rural pollution, and pest species.

Tantangara Dam in the upper catchment, 130 km upstream of the ACT, diverts 96% of the Murrumbidgee River's flow away to the Snowy Hydro Scheme. Despite this and extraction for irrigation upstream of the ACT, the river in NSW is considered unregulated. Within the ACT, the river has some environmental flow protections and Icon Water can extract water under licence through the Murrumbidgee to Googong pipeline (M2G) at Angle Crossing and the Murrumbidgee Pump Station (MPS) at Casuarina Sands for Canberra and Queanbeyan's water supply. This is managed under Licence with a Streamflow & Water Quality Management Plan and the ACT Environmental Flow Guidelines.

Despite the current and historic impacts, the Murrumbidgee has sections of habitat in good condition and has populations of threatened and recreationally important native fish. Through the ACT it is managed as the Murrumbidgee River Corridor Nature Reserve. The Upper Murrumbidgee Demonstration Reach (UMDR), extending from Tantangara to Burrinjuck was established in 2009 and undertakes river and riparian rehabilitation projects with the community, NGOs and Government.

The Office of Nature Conservation (ONC) of Environment, Planning and Sustainable Development Directorate (EPSDD) undertake monitoring of the fish populations in the Murrumbidgee every two years. The Murrumbidgee Fishery Survey assists in managing the threatened and recreational fish species in the Murrumbidgee in the ACT Region. Icon Water assist by funding the survey of sites upstream of the ACT as part of their monitoring commitment to the M2G and the results are shared with our partners in the Upper Murrumbidgee Demonstration Reach (UMDR).

This study aims to:

- assess the fish community of the Murrumbidgee River including pests, recreational and threatened species;
- inform recreational fishing and conservation management actions;
- provide monitoring for the UMDR and M2G;
- establish baseline data for monitoring the future urban development near the Murrumbidgee River.

Methods

Between February and May 2023, ten sites along the river, from the northern ACT border downstream to Bredbo in NSW upstream, are surveyed using boat electrofishing. In 2023 ONC staff were assisted by staff from Office of Water, ACT Parks and Conservation Service and Ginninderry Conservation Trust and Caring for Country Rangers in the survey.

Seven sites are within the ACT with 6 downstream of the M2G offtake at Angle Crossing. There are three sites upstream in NSW, up to the Bush Heritage property Scottsdale near Bredbo. The sites include popular recreational areas such as Casuarina Sands and Kambah Pool and more isolated location such as Retallacks Hole and Prutties.

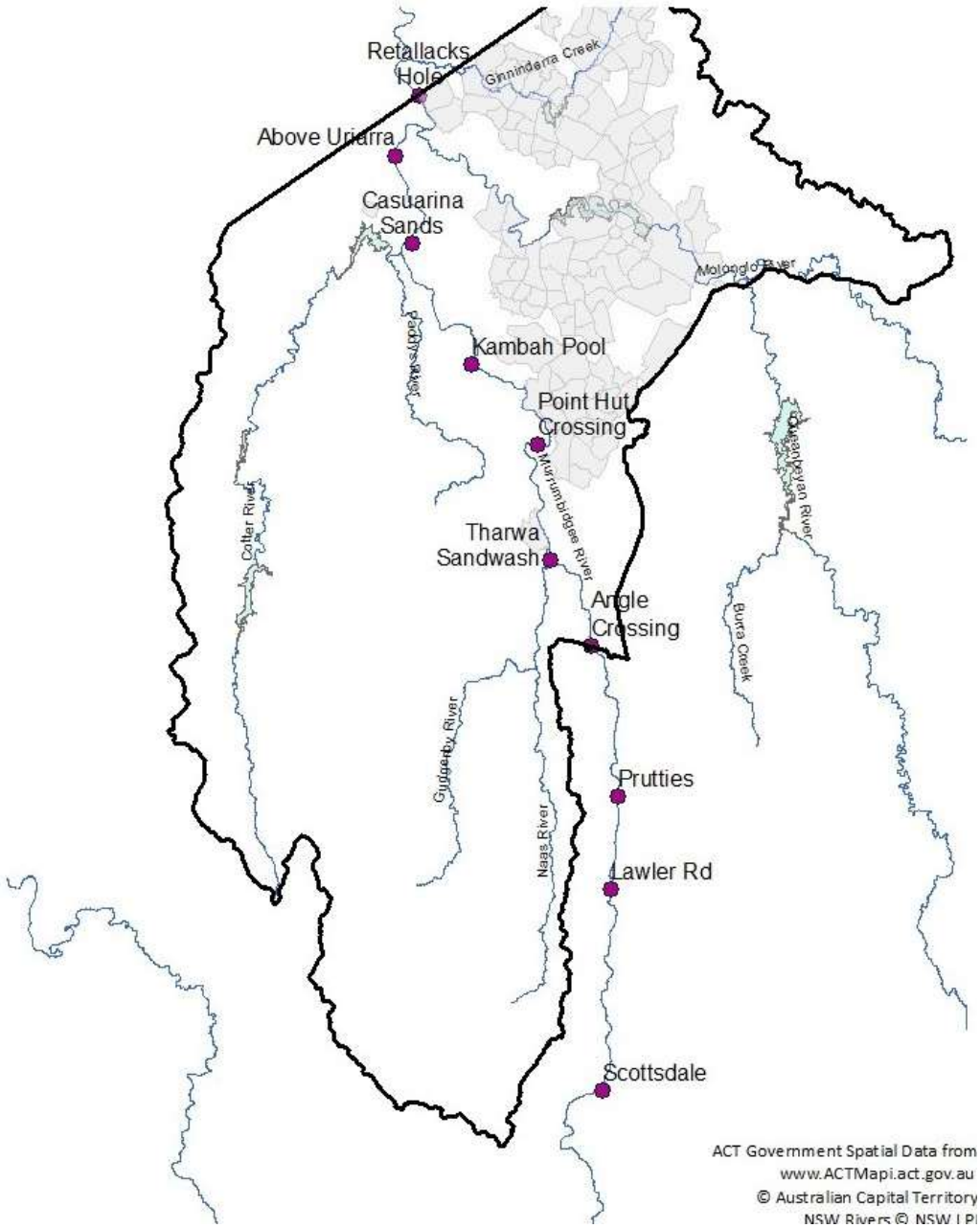

Figure 1. Location of survey sites for the 2023 Murrumbidgee River fishery survey.

Two different smith root electrofishing boats are used depending upon access to the site, a 2.5kw single boom boat and a 5kw twin boomed boat. At each site, 12 transects or shots are performed along the bank, with each shot being two minutes of active electrofishing. A GPS app is used to track and mark the location of each shot.

Fish caught are identified and measured to length and released. Weights are calculated from length using the MDBAs Sustainable River Audit length weight relationships. Internal PIT tags are implanted, and genetic samples are taken from large bodied native fish to gain information on parentage, growth and movement which will assist in managing the fishery.

Results

In the 2023 study, 304 fish from five species were captured (Table 1). Three native species were caught (and one potential Trout Cod-Murray Cod hybrid which has been included as a Murray Cod for the analysis) and two pest species. Carp dominated most sites with 237 captured in total.

	Carp	Golden Perch	Macquarie Perch	Murray Cod	Redfin
Number	237	12	1	53	1
Max Length (mm)	750	503	49	1100	116
Average length (mm)	347.33	420.83	49	331.52	116

Table 1 Fish caught in the 2023 Murrumbidgee Fish survey

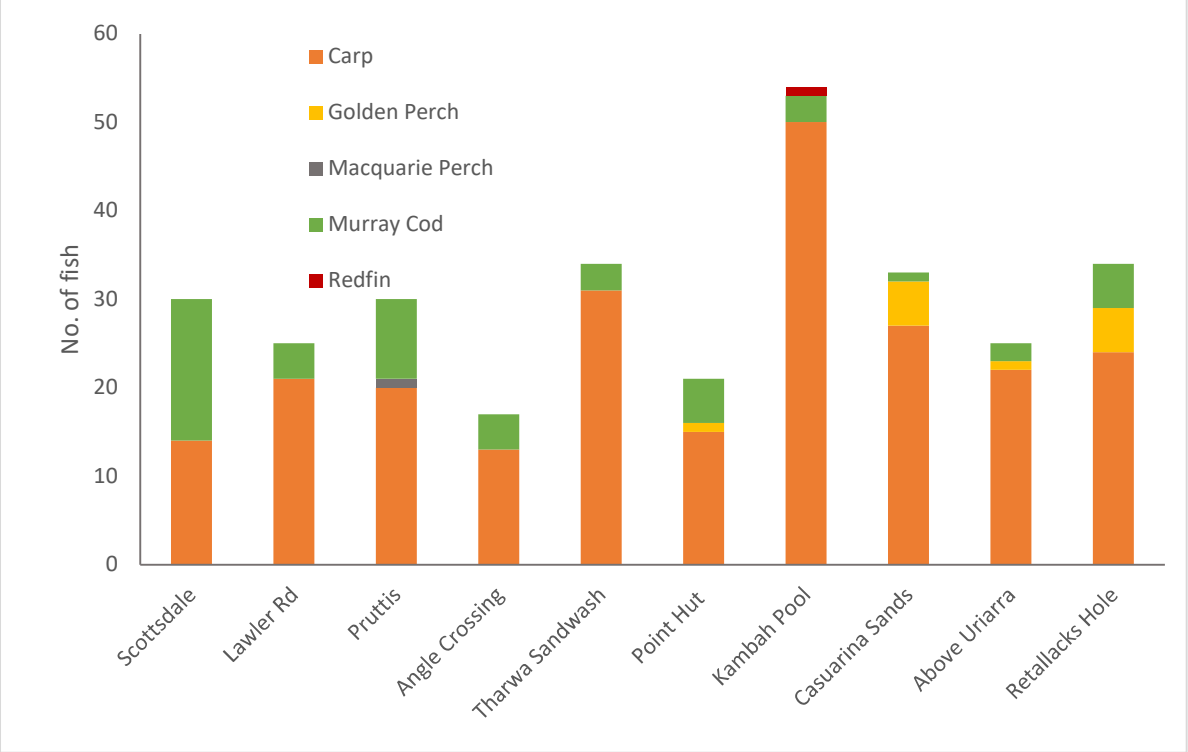

Figure 2. Stacked bar chart of catch per site from the 2023 Murrumbidgee River Survey.

A total of 53 Murray Cod were captured across all sites (Figure 2). One juvenile Macquarie Perch was caught at the Prutties site, upstream of the ACT. Except for Murray Cod, which are listed as threatened nationally, this was the only other threatened species recorded. No Trout Cod were detected in this survey, though as previously mentioned, a potential Trout Cod-Murray Cod hybrid was recorded. Genetic samples taken from most cod and Golden Perch were submitted to the FishGen genetic parentage program to assist with confirming their status, impact of stocking activities in NSW and further understanding the breeding dynamics of these species in the region. It is expected that results from FishGen will be available in Spring 2023.

A strong group or cohort of young of year Murray Cod is evident in the length frequency (Figure 3). Comparable to previous years, this cohort is primarily from the upstream sites and only one being detected in the five sites downstream of Point Hut. Since 2017 the survey has detected 122 Murray Cod YOY, under 150 mm in length and of these 116 have come from Point Hut or above. The cause of such a disparate production of Murray Cod juveniles is unknown however, all the sites

downstream of Point Hut receive urban inflow and receive significant angling pressure during the open and closed season. Additional analysis of the breeding dynamics, habitat and external impacts is required for a better understanding of the cause and effects of the disparate spatial recruitment.

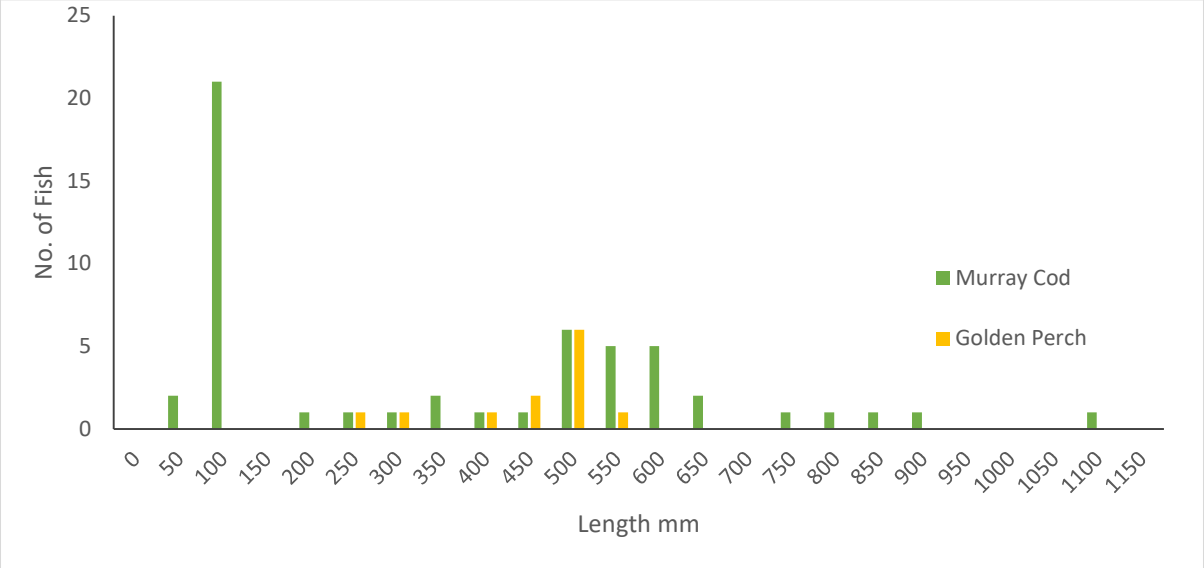

Figure 3. Length frequency of Murray Cod and Golden Perch 2023.

The length graph for Murray Cod shows that there has also been low recruitment in the previous year (Figure 3). However, the strong cohort of fish that was 300 - 550 mm in last survey is now entering maturity at of 500-650 mm. They will take 2- 6 years to grow through the recreational take limits of 550 -750 mm. While legal recreational take is suspected as being relatively low in the ACT (Schirmer and Mylek 2016), illegal take and excessive recreational take are still a risk to the population. It is hoped that these fish grow through the take limit and contribute to the breeding population in coming years. Additional measures have been put in place, with the support of anglers, to prohibit all Murray Cod take in the river downstream of Uriarra Crossing. It will be interesting to see in future years if there is a difference in the population in the no take area.

The length graphs also show the population of Golden Perch. Notably, a cohort of smaller fish 250-300 mm were recorded (Figure 3). Golden Perch in this survey were recorded from Point Hut to Retallacks Hole which is an increase in distribution compared to recent years (Figure 2). Higher flow is likely to have increased connectivity since 2020 allowing smaller Golden Perch to immigrate from downstream (Carpenter-Bundhoo et. al. 2023, Zampatti et. al. 2019). To improve the sustainability for this species, the ACT recreational fisheries limits for Golden Perch have been changed reducing the bag limit from 5 to 2 in the Murrumbidgee. Enforcement and education of the fisheries regulations is important for this change and those for Murray Cod, to have the desired effect of improving the sustainability of native fish populations in the Murrumbidgee. Additional research and improvements to connectivity are needed to manage the Golden Perch population.

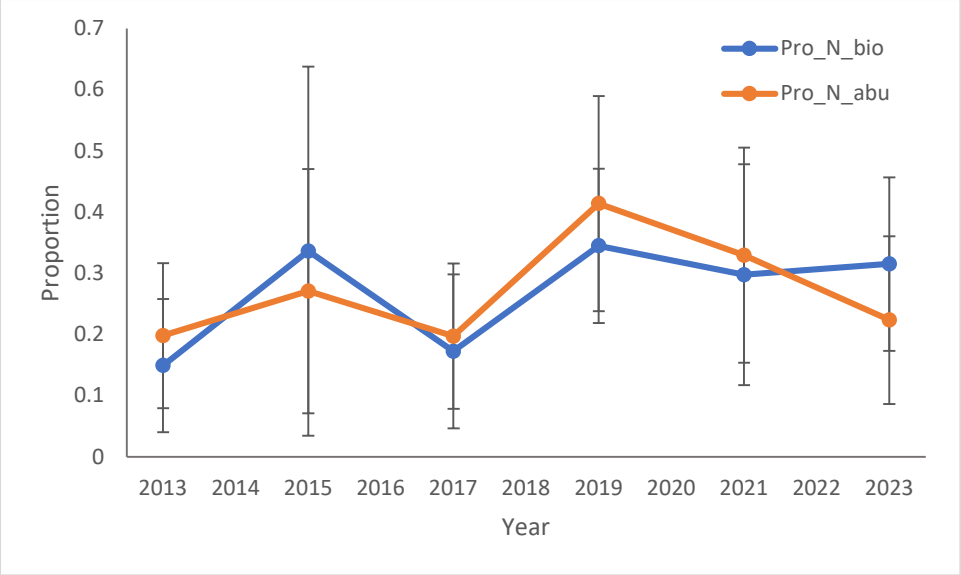

Figure 4. Proportion of native biomass (Pro_N_bio) and native abundance (Pro_N_abu) in the Murrumbidgee Fishery Survey 2013-2023

In comparison to the previous years, the proportion of native biomass has held reasonably steady since 2019. However, the proportion of native abundance has declined over the same period. The biomass has been supported by the large cohort of Murray Cod that has been moving through the size classes. However, as the cohort ages, while individuals gain in mass, it is normal for abundance to decline through migration or mortalities (Kohen and Todd 2009). The abundance of native fish hasn't been supported from subsequent cohort survival or sufficient immigration.

Native fish abundance and biomass tends to be influenced by high flow years (such as recent La Nina years) by washing out of nests, displacement of juveniles and poor water quality particularly following dry periods or bushfires (Bunn and Arthington 2002, Zampatti et. al. 2019,) . However, high flows can support fisheries by providing resources, offering opportunities for connectivity and clearing sediment (Carpenter-Bundhoo et. al. 2023, Humphries et. al. 2009).

Conclusion

This survey has confirmed that two large bodied native fish species, Murray Cod and Golden Perch were reasonably widespread in the surveyed reach. It has also shown that while breeding of Murray Cod was detected, it was restricted to the sites upstream of Canberra. One other threatened species was detected. Generally, native species are outnumbered by pest species, particularly Carp. There is some indication that the populations of Murray Cod may be increasing in the region, however this trend is mainly driven by annual juvenile production and recent range expansions and has not occurred for long enough or of sufficient magnitude to improve the sustainability of the population. Despite this, there are areas of higher quality habitat, enabling fish species to maintain their populations. These key habitats are under threat from urbanisation, water quality and changes in the catchment including climate change and extraction.

Areas of investigation and management that are recommended include:

- Determining the spawning dynamics, connectivity requirements and natal origins of the native species.
- Supporting the regional recovery of threatened species.
- Determining the functional flow and habitat requirements for key species.

- Understanding, minimising and offsetting the impact of near river urbanisation.
- Maximising the sustainability of recreational fishing by updating and enforcement of the fisheries regulations

References

Bunn, S.E. and Arthington, A.H., 2002. Basic principles and ecological consequences of altered flow regimes for aquatic biodiversity. *Environmental management*, *30*, pp.492-507.

Carpenter-Bundhoo, L., Butler, G. L., Bond, N. R., Thiem, J. D., Bunn, S. E., & Kennard, M. J. 2023. Fish movements in response to environmental flow releases in intermittent rivers. *Freshwater Biology*, *68*(2), 260-273.

Humphries, P., Brown, P., Douglas, J., Pickworth, A., Strongman, R., Hall, K. and Serafini, L., 2008. Flow-related patterns in abundance and composition of the fish fauna of a degraded Australian lowland river. *Freshwater Biology*, *53*(4), pp.789-813.

Schirmer, J. and Mylek, M. 2016 Water quality and the community: understanding the views, values and actions of residents of the ACT and surrounding region Institute for Applied Ecology, University of Canberra report to the ACT Government Basin Priority Project.

Todd, C.R. and Koehn, J.D. 2009. Murray cod modelling to address key management actions: final report for project MD745. Arthur Rylah Institute for Environmental Research Report to the Murray Darling Basin Commission. (Department of Sustainability and Environment: Heidelberg).

Zampatti, B.P., Fanson, B.G., Strawbridge, A., Tonkin, Z., Thiem, J., Butler, G.L., Balcombe, S., Koster, W., King, A., Crook, D. and Woods, R., 2019. Basin-scale population dynamics of Golden Perch and Murray Cod: relating flow to provenance, movement and recruitment in the Murray–Darling Basin.