Native Fish Report Card Lindsay River/Mullaroo Creek 2023 Mallee Region



Fish found in the Lindsay River System in our 2023 surveys



Golden Perch
Macquaria ambigua



Silver Perch Bidyanus bidyanus



Murray Cod
Maccullochella peelii

Non-target species

recorded since 2017*

Large-bodied native species

- ✓ Bony Bream
- Freshwater Catfish

Small-bodied native species

- Australian Smelt
- Flatheaded Gudgeon
- Carp Gudgeon sp.
- ✓ Murray-Darling Rainbowfish
- Unspecked Hardyhead

Exotic species

- Common Carp
- Eastern Gambusia
- ✓ Goldfish
- ✓ Redfin

* These non-target species were incidentally captured during NFRC surveys since 2017 but not measured as for target species.











Fish community

The NFRC Program began in 2017 with a focus on targeting the monitoring of population dynamics of key iconic fish species that have high recreational and/ or conservation values, in large rivers across Victoria. In the Lindsay River system, the target species are Golden Perch, Murray Cod and Silver Perch. Surveys occur in March each year, at 10-13 sites from both the Mullaroo (6-8 sites) and Lindsay (4-5 sites) offtakes with the Murray River upstream of weir seven to the junction of the Lindsay and Murray rivers. The number of sites differs due to the level of collaboration with the Living Murray Project. The equipment and habitats surveyed are focused on these species, which are measured to determine population structures. Other fish species that are incidentally captured are recorded, but not measured to determine their population structures, except Freshwater Catfish which are also captured, measured and weighed.

Summary of key health indicators for target species in 2023

Species	Key Health Indicators			
	Recent recruitment	Multiple size classes	Mature fish present	
Golden Perch	No	Yes	Yes	
Murray Cod	Yes	Yes	Yes	
Silver Perch*	-	-	-	

Recent recruitment means young -of-year fish.

* - cannot be determined due to low abundances

Silver Perch were historically abundant throughout the Lindsay River system but have experienced dramatic declines across their range. Silver Perch are present in low densities. Overall, the Lindsay River system appears to be maintaining healthy populations of Golden Perch with the Murray Cod population recovering following the 2016 blackwater event.

Non-target species

The non-target fish species that have been incidentally recorded in the Lindsay River system during NFRC surveys since 2017 are:

Large-bodied native species

Other large-bodied species recorded in surveys are Bony Bream and Freshwater Catfish. Bony Bream, which are cold water intolerant, are common in the lower Murray-Darling Basin, including the Lindsay River system. The species is often in higher abundances in slower flowing habitats. Freshwater Catfish are a lowland species, generally found at altitudes below 200 metres. This species has suffered a decline in distribution and abundance across Victoria. Low abundances of Freshwater Catfish have been recorded from 2018 onwards. In 2021, young-of-year were collected for the first time during NFRC surveys.

Small-bodied native species

The small-bodied species Australian Smelt, Carp Gudgeon, Flatheaded Gudgeon and Unspecked Hardyhead are common and are expected to be widespread throughout the Lindsay River system and more broadly within the Murray-Darling Basin. Murray-Darling Rainbowfish are common throughout the Lindsay River system. This species was once widespread in the Murray-Darling Basin, and now has a patchy distribution and a restricted range and is considered threatened in Victoria.

Exotic fish species

Common Carp and Goldfish are widely distributed across sampling sites. Eastern Gambusia are not as widely distributed and are more likely to be collected in the slower flowing waters. Redfin are also distributed throughout, but in low abundances.

Other native fish species known from the Lindsay River System

There is a range of other species historically known from this system, although they have not been detected for many decades.

Other notable species

Surveys have also recorded Yabbies and turtle species.











Lindsay River System 2023

Environmental and Management Context

Environment

A blackwater event impacted the fish population in late 2016. Generally, stream flows were similar during the autumn sampling periods in 2017 to 2022 but were higher in 2023. Prior to 2022 surveys, the Murray River has had varying levels of connectivity with the upper Lindsay River since the 2016 flood. As such, the upstream reaches of the Lindsay River (above the Mullaroo Creek junction) have generally experienced lower flows and water levels since 2017. Working collaboratively with The Living Murray (TLM) Project, the number of sites fished and used in the analysis has varied with 12 sites fished in 2017, 13 in 2018-2020, ten sites in 2021-22 and 11 sites in 2023. Sites were surveyed by an electrofishing boat in March 2017-22 but were delayed until April 2023 due to flooding. The water turbidity levels were much higher in 2022 and 2023, which likely reduced the efficiency of the electrofishing surveys.

River rehabilitation efforts in the Lindsay River System

A range of rehabilitation actions to improve the health of the Lindsay River system and its fish community, have been identified within the Mallee Waterway Strategy 2014-2022. The core current focus involves allocation of water for the environment and improving fish passage. Since 2006, fish monitoring has occurred for the Lindsay, Mulcra, Wallpolla Islands, as part of The Living Murray Program. The <u>Mallee Catchment Management Authority</u>, DEECA and the <u>Victorian Fisheries Authority</u> support rehabilitation and management of the Lindsay River and its fish community.

See the ARI website for more information about the <u>Native Fish Report Card program</u>

The NFRC program, and related monitoring initiatives, provide improved understanding of the structure of fish communities and how rivers can be best managed.



Figure 1. Map showing the section of Lindsay River system where NFRC sampling occurs.



Figure 2. A Murray Cod



Figure 3. A juvenile Silver Perch











Golden Perch Macquaria ambigua



Key Health Indicators

🗴 Recent recruitment

- 🔮 Multiple size classes
- 🔮 Mature fish present

Monitoring Results				
Total number of fish caught	45			
Fish per 1km of waterway	3.24			
Largest fish by length (cm)	50.8			
Largest fish by weight (kg)	2.74			
% of the catch that is legal size	57.8			

Lindsay River System

RECREATIONAL SPECIES

The abundance of Golden Perch (Macauaria ambigua) appears to have declined after the higher abundances in 2017 and 2018 and were consistent aside from the relatively low catch rates in 2022 (Figure 4). An increase in juvenile abundances in 2023 contributed to the higher catch rates in 2023 compared to 2022. It is likely that the 2016 and 2022 floods attracted juvenile Golden Perch into the system, with abundances of juveniles in the upper Lindsay system (above the Mullaroo Creek junction) being highest in 2017 and 2023 when flows were high. Recruits were detected in 2017 and 2022. In 2022 the small Golden Perch which were present throughout the study areas were spawned in the Darling River (confirmed using otolith chemistry) but had dispersed into and were growing in Victorian Mallee floodplains. The movements of these Golden Perch have also been tracked using acoustic telemetry and the results indicate that while some fish have moved out of the area, most fish have remained within Lindsay Island despite the 2022-23 flooding. A large proportion of Golden Perch collected have been adults, however, a higher proportion of juveniles (42%) was observed in 2023 (Figure 4; Figure 5). The 58% legal (adult) Golden Perch is the lowest percentage across the five northern rivers that monitor them. Other fish surveys in the area, supported by the Mallee CMA found Golden Perch recruits in the Lindsay River and in wetlands in the Lindsay River system in 2022 and 2023 (unpublished data). Golden Perch are consistently captured in the Lindsay-Mullaroo system.

Stocking No stocking has occurred.













Lindsay and Mullaroo densities of Golden Perch size classes from 2017 to 2023

Figure 4. The densities of recruits, juveniles and adult Golden Perch for NFRC surveys in the Lindsay Mullaroo river system from 2017 to 2023





Figure 5. The size range percentage of Golden Perch measured from the Lindsay Mullaroo river system during NFRC surveys in 2023









Murray Cod Maccullochella peelii



Key Health Indicators

- 🧭 Recent recruitment
- 🔮 Multiple size classes
- 🔮 Mature fish present

Monitoring Results				
Total number of fish caught	20			
Fish per 1km of waterway	1.44			
Largest fish by length (cm)	114			
Largest fish by weight (kg)	25.9			
% of the catch that is legal size	35			

Stocking

Twenty-seven thousand Murray Cod were stocked into the Lindsay River in March 2021. Note this stocking occurred after the 2021 surveys.

*Otoliths are fish earbones

Lindsay River System

RECREATIONAL SPECIES

The abundance of Murray Cod (Maccullochella peelii) in the Lindsay River system declined dramatically after the 2016 blackwater event either through emigration or mortality¹. Only one Murray Cod was captured in 2017, with abundances increasing from 2018 to 2020 before declining in 2021, 2022 and 2023 (Figure 6). The decreases in abundances in 2021 and 2022 are largely due to juvenile fish (10-55 cm). In 2020, some fish were aged, and the 2017 spawning made up approximately 50% of Murray Cod in the system³. Murray Cod can reach maturity in 4-5 years. The highest abundances of adults collected were in 2021 and 2022, indicating fish survived and reached maturity after the 2017 spawning event. From 2018-23 multiple size classes including mature and young-of-year fish have been recorded, except for 2022 where no recruits were recorded (Figure 6). The NFRC has set maximum size thresholds for recruits for Murray Cod across all priority rivers as 10 cm (based on previous research). In the Lindsay River system in 2018 approximately 71% of fish captured were 9-15 cm TL, representing youngof-year fish spawned in spring 2017 (a subsample was aged by otoliths*), indicating a faster growth rate after the 2016 blackwater event². As a result, the abundance of recruits is most likely under-represented in Figures 6 and 7 and despite not catching a Murray Cod classified as a recruit in 2022, they were likely present. The 2022 floods caused a minor blackwater event with deaths of Murray Cod and Common Carp in the system (ARI unpubl. data). There is a distinct gap in 20-50 cm fish in 2023, which corresponds with the gap between 15-35 cm detected in 2022. The first Murray Cod detected in NFRC surveys from the Lindsay River was in 2022, with three fish detected in 2023 (a recruit, a juvenile and an adult). This suggests that increased flows in 2021 and 2022 have increased Murray Cod dispersal within the system.













Figure 6. The densities of recruits, juveniles and adult Murray Cod for NFRC surveys in the Lindsay Mullaroo river system from 2017 to 2023

Murray Cod size range percentage for Lindsay and Mullaroo in 2023



Figure 7. The size range percentage of Murray Cod measured from the Lindsav Mullaroo river system during NFRC surveys in 2023

¹ Tonkin et al. (2017) Fish movement in the Lindsay and Mulcra Island anabranch systems: 2017 Progress report. Unpublished Client Report for the Mallee Catchment Management Authority. Arthur Rylah Institute for Environmental Research. DELWP.

² Tonkin et al. (2020). Murray Cod movement and population structure in the Lindsay Island anabranch system: 2020 Report. Unpublished Client Report for the Mallee Catchment Management Authority. Arthur Rylah Institute for Environmental Research. DELWP









ital



Silver Perch Bidyanus bidyanus



Key Health Indicators

- Cannot be determined

- Cannot be determined
- Cannot be determined

Monitoring Results

Total number of fish caught	0
Fish per 1km of waterway	0
Largest fish by length (cm)	NA
Largest fish by weight (kg)	NA
% of the catch that is legal size	NA

Lindsay River System

THREATENED SPECIES

The natural range of Silver Perch (Bidvanus bidyanus) includes most of the Murray-Darling Basin, excluding the cool, higher altitude upper reaches of streams. River regulation and barriers have been listed as factors negatively impacting Silver Perch populations, with these relevant to the Lindsay River system. While the NFRC only expects to capture low numbers of this species, the monitoring can provide a greater understanding of the current status of the populations which is essential to inform management of the species. Due to the low abundances of Silver Perch collected during NFRC the key health indicators cannot be measured. No Silver Perch were detected in 2023. though low abundances have been detected in all six years previous (Figure 8). The Silver Perch detected are a mixture of recruits (2020), juveniles (2017, 2019, 2021 and 2022) and adults (2018-19 and 2021–22 (Figure 8). Recruits of this species are difficult to catch using this sampling methodology. Recruits were only detected in 2020 suggesting spawning success in 2019. As Silver Perch are only detected in low abundances, it cannot be determined whether the 2022 blackwater (hypoxia) event impacted the population. Silver Perch are a highly mobile species with previous studies demonstrating positive impacts of high flows and flooding on their survival, growth and condition^{3,4}. Whilst Silver Perch have been shown to benefit from flow events, even if those flow events are associated with hypoxia, in systems or circumstances where they cannot move, they are susceptible to hypoxia⁵.

Stocking No stocking has occurred.











Lindsay and Mullaroo densities of Silver Perch size classes from 2017 to 2023

Figure 8. The densities of recruits, juveniles and adult Silver Perch for NFRC surveys in the Lindsay Mullaroo river system from 2017 to 2023

³. Tonkin et al. (2017). The effects of flow on Silver Perch population dynamics in the Murray River. Arthur Rylah Institute for Environmental Research. Technical Report Series No. 282. Department of Environment, Land, Water and Planning, Heidelberg, Victoria

^{4.} Tonkin et al. (2019). Hydrology and water temperature influence recruitment dynamics of the threatened Silver Perch Bidyanus bidyanus in a regulated lowland river. Marine and Freshwater Research, 70: 1333-1344.

^{5.} Thiem et al. (2022). Contrasting natal origin and movement history informs recovery pathways for three lowland river species following a mass fish kill. Marine and Freshwater Research, 73: 237-246.













We acknowledge and respect Victorian Traditional Owners as the original custodians of Victoria's land and waters, their unique ability to care for Country and deep spiritual connection to it.

We honour Elders past and present whose knowledge and wisdom has ensured the continuation of culture and traditional practices.

DEECA is committed to genuinely partnering with Victorian Traditional Owners and Victoria's Aboriginal community to progress their aspirations.





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