

# ARI Aquatic Quarterly Update

SPRING 2023



Grey Teal

## About us

The Applied Aquatic Ecology section aims to generate and share knowledge, through world-class, applied, ecological research. This supports and guides sustainable ecosystem policy and management to ensure healthy, resilient ecosystems. We work collaboratively with national, state and local agencies, research institutes, universities, interest groups and the community.

## Breeding threatened Glenelg Freshwater Mussels

ARI has started a captive breeding trial of the nationally threatened Glenelg Freshwater Mussel. If offspring can be produced, these could bolster existing wild populations and establish new ones. Ultimately, this work aims to help to recover the mussels and prevent their extinction.

Mussels have an interesting lifecycle. Their larvae (glochidia) attach to fins or gills of fish, providing a surface to grow on and allowing them to move elsewhere. They eventually detach from the fish and the juvenile mussels burrow into the streambed. Results are promising so far, with some glochidia attaching to fish (Common Galaxiids and Variegated Pygmy Perch)! The next step is seeing if glochidia thrive and grow into juveniles. It's hoped the juvenile mussels will form the founding population at the [conservation hatchery](#) currently being built at the Victorian Fisheries Authority's Snob Creek Hatchery.

DEECA is funding this work. It's a strong collaboration between ARI, the VFA, the Glenelg Hopkins Catchment Management Authority and Australian mussel experts. An [Action Statement](#) has been prepared.

ARI's long-term work with these mussels includes: surveys and habitat assessments; identification of risks and priority management actions; emergency extractions and temporarily housing of mussels in our aquarium during the 2019-20 fires; and trialling of an eDNA survey method.



A mussel with a glochidia strand poking out



Tim Fernando collecting a mussel in the field



### Understanding waterbird seasonality in Victoria

Waterbirds are often a key focus for environmental watering actions in Victorian wetlands. However, many Australian waterbirds are highly mobile, travelling long distances in search of suitable habitat. Predicting waterbird occurrence and abundance in Victoria would improve our ability to deliver water and monitor waterbirds effectively.

We described seasonality in the breeding activity, occurrence and/or abundance of all Victorian waterbird species that occur regularly in freshwater wetlands. This work collated and analysed existing data: reporting rates from BirdLife Australia's Birddata repository, and abundances from three monitoring programs (Eastern and Western Treatment Plants, and WetMAP Stage 3).

This work found:

- Waterbird seasonality is consistent across Victoria.
- Almost all breeding Victorian waterbird species peak in their breeding activity between September and January.
- Most species showed seasonal peaks in abundance, which were mostly in summer or autumn, and seasonal peaks in reporting rate which were between spring and autumn with exact timing dependent on the species.

Most Victorian waterbirds appear migratory with some or all of the population making predictable movements into Victoria for summer, and out of Victoria in winter. However, there are exceptions to this general trend.

Our results show that a wide range of waterbirds are likely to benefit from management of water for the environment that targets wetland inundation through spring, summer and autumn. Inundating wetlands by September and ensuring water remains until March incorporates the timing of likely breeding and peak occurrence for most waterbirds. Response monitoring can also be planned around these peaks.

This work will help planning water for the environment deliveries in wetlands to benefit waterbirds. It's part of [WetMAP](#) (Wetland Monitoring and Assessment Program for environmental water).



Caspian Terns



### Assessment and recovery of fish after blackwater events in 2022

The 2022 floods across eastern Australia resulted in multiple blackwater events. Blackwater occurs when dissolved oxygen levels drop due to the breaks down of organic matter (e.g. leaf litter, bark, grass and fertilisers from farms) swept into rivers during flooding. The lack of oxygen in the water can cause the death of aquatic animals including fish and crayfish.

During the floods, ARI worked with a range of partners to help rescue native fish from important populations in northern Victorian waterways and translocate them to secure areas. This included Murray Cod, Golden Perch, Silver Perch and Trout Cod. Some of these fish were also taken to fish hatcheries either temporarily or to act as broodstock, to support the breeding and conservation of threatened native fish species and help aid future recovery efforts.

ARI also used pre and post flood data to assess the short-term impact of the floods and blackwater fish kills on fish communities and seek insights into the potential recovery pathway for native fish populations. Large-bodied natives (e.g. Murray Cod, Golden Perch, Trout Cod) declined significantly in high hypoxia impacted areas. There was a widespread decline of small-bodied natives, likely because of the extreme flow conditions affecting the key habitat features they need to spawn and grow. Carp benefited from flooding, regardless of hypoxic events, with dramatic increases in numbers mainly driven by recruits. To read more, check out our recent [Aquatic Quarterly Update Influence](#).

This work was funded by DEECA Water and Catchments.



Murray Crays climbing out of the water



Jason Lieschke, ARI, helping to transport Murray Cod



Dead fish during the blackwater conditions



## Influencing Change

### A gathering of Platypus experts

The [Future of the Platypus Conference](#) was recently held at the Healesville Sanctuary, hosted by the Australian Platypus Conservation Centre. Researchers, zoo and wildlife managers and health carers came together to talk and share ideas to ensure the species' future (see the Conference program [here](#)).

ARI's Di Crowther and Sally Hladyz presented two talks:

- Managing the impacts of large weirs as barriers to Platypus dispersal.
- Mapping threats to Platypus to inform management decisions and support population recovery.

Platypus were listed as vulnerable in Victoria under the Flora and Fauna Guarantee Act 1988 in 2021 and an [Action Statement](#) has been prepared. Many research, habitat restoration and community engagement efforts are underway to [support the species' recovery](#). DEECA works with the Australian Platypus Conservancy, catchment management authorities (CMAs) and local communities to increase our understanding of threats and improve Platypus habitat.



Sally Hladyz and Di Crowther at the Platypus conference

### A Fish Monitoring Plan for the Budj Bim Cultural Landscape (BBCL)

ARI is preparing a long-term monitoring plan for Kooyang (Short-finned Eel) and other fish species for waterways across the BBCL, in partnership with the Gunditj Mirring Traditional Owners Corporation (GMTOAC). ARI will then assist with fish surveys to identify key species, tag eels and set benchmarks, and train Budj Bim rangers in survey methods. This work continues a long term collaboration with the GMTOAC.



GMTOAC and Winda-Mara Aboriginal Corporation members set a fyke net with Wayne Koster ARI

Large irrigation pumps



### Investigating fish losses during water diversions

Large amounts of water are diverted from Victorian rivers each year, including through irrigation channel and pumps. This process can lead to fish being extracted and diverted from rivers. ARI is investigating fish losses through this process, including which species and life stages are impacted. This work will help inform potential management interventions. It's funded by DEECA Water and Catchments.



## Outputs

- [Hale et al. \(2023\)](#) Is my model fit for purpose? Validating a population model for predicting freshwater fish responses to flow management. *Ecosphere*.
- [Koehn et al. \(2023\)](#) Cold-water pollution impacts on two 'warm-water' riverine fish: interactions of dam size and life-history requirements. *Marine and Freshwater Research*.
- [Raymond et al. \(2023\)](#) Using density estimates, sex ratios and size structure to assess the status of a threatened Australian freshwater crayfish (*Euastacus armatus*) population. *Hydrobiologia*.
- [Kitanovic et al. \(2023\)](#). Grasses in riparian zones display unexpected tolerance to cool-season inundation. *Wetlands Ecology and Management*.
- [Khwaja et al. \(2023\)](#) Repeated monitoring suggests shorebirds are disturbed consistently during winter at a globally important roost in tropical Australia. *International Wader Study Group*.
- [Adams et al. \(2023\)](#) Multi-gene insights into the taxonomy and conservation of Tasmania's galaxiid fishes. *Marine and Freshwater Research*.



## Knowledge transfer

Presentations: [Ecological Society of Australia conference](#): Using fish earbones to determine birth origin, and guide management decisions related to both stocking programs and other restoration actions (Harris – [abstract in this session](#)); Flood impacts on Victorian native fish populations (Stoios – [abstract in this session](#)). [Freshwater Sciences conference](#): Drivers of occurrence, richness and extent of aquatic plants in flow-regulated rivers ([Vivian](#)); Evaluating the effects of environmental water on fish populations in the MDB ([Hladysz](#)); Providing soil moisture to riverbanks through environmental flows to benefit vegetation – [VEFMAP](#) talk ([Jones](#)); Guiding the strategic management of aquatic fauna ([Hale](#)); MDBA-CEWO - Fish-MER: Using our outputs to inform basin-scale management and guide future research (Tonkin); GHCMA - Wetland Intervention Monitoring Program (Morris); Nillumbik Shire - Burrowing Crayfish (identification, survey methods and threats) (Crowther)

Videos: The Flow MER - Fish Theme ([Tonkin](#)); Monitoring fish and environmental flows in the lower Goulburn River ([Koster](#)); Monitoring vegetation and environmental flows in the lower Goulburn River ([Morris](#)).

Work that ARI has been involved in has also been shared by our collaborators and via news channels: [King River fishway underway at Docker](#) (NECMA media release); [Monitoring our floodplain ecosystem health \(fish\)](#) (MCMA media release); [Waterbirds flock to mallee floodplains](#) (MCMA media release); [Fish monitoring shows flooding had little impact on native fish](#) (ABC Mildura-Swan Hill radio interview with Jarod Lyon); [Monitoring and managing fishways – what happens after construction](#) (Finterest); World Bird Migration Day and WetMAP ([GBCMA Facebook](#); [WCMA Facebook](#); [NCCMA Facebook](#)); [Dowd and Heart Morass before and after](#) (WetMAP vegetation surveys) (WGCMA Facebook)

We acknowledge Victorian Traditional Owners and their Elders past and present as the original custodians of Victoria's land and waters and commit to genuinely partnering with them and Victoria's Aboriginal community to progress their aspirations.



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