

AFSS member update from South Australia November 2023

Compiled by SA Rep, Jason Nicol

It has been an interesting 12 months in South Australia with the strong La Nina and above average rainfall throughout the state and south-eastern Australia, including the upstream catchments of the Murray-Darling Basin, culminating in the second largest flood on record in the Lower River Murray. Understandably much of the recent research and monitoring activity has focused on the impacts of the flood.



Clockwise from left, the Lock 1 gauge board showing the maximum river levels for the three largest floods in recorded history; 1956, 2023 and 1931, the picnic area at Lock 1 and riverfront shacks at Blanchetown on the River Murray January 22nd 2023 (Photos: Jason Nicol).

River Murray Vegetation Monitoring and Research

Jason Nicol (South Australian Research and Development Institute (SARDI), Aquatic and Livestock Sciences)

The Living Murray (TLM) has icon sites at both ends of the SA River Murray (Chowilla Floodplain and Lakes Alexandrina and Albert) with vegetation condition monitoring stretching as far back as 2006. It was the first time in 17 years of TLM monitoring at Chowilla that all of the 130 sites were inundated and the vegetation response was impressive. In contrast, the vegetation in Lower Lakes was similar to previous years despite the highest water levels (up to 50 cm higher than normal lake levels) occurring in December 2022.



Clockwise from left, close up of understorey vegetation on the Chowilla floodplain, Lake Littra, a temporary lake on the Chowilla Floodplain and a ring tree near Lake Littra (Photos: Jason Nicol).

The vegetation components of the Healthy Coorong, Healthy Basin and Coorong Flood Response projects (Goyder Institute for Water Research) have been investigating submergent vegetation (*Ruppia* spp. and *Althenia cylindrocarpa*) dynamics in the Coorong since 2020. In the Coorong the decrease in salinity and increased water levels brought about by the flood resulted in high biomass of submergent species in comparison to recent years. In addition to the increase in abundance of flowering plants the charophyte *Lamprothamnium* has made a return to the Coorong (see below). Reports for these projects are either in progress or in review.



Ruppia spp. in the South Lagoon of the Coorong (Photos: Cassandra Urgl).

River Murray flood effects on Fox-tailed Stonewort in the Coorong

Faith Coleman (Federation University Australia)

The Charophyte genus *Lamprothamnium* or Foxtailed Stonewort was historically one of the dominant macrophyte types in the South Lagoon, but has not been present in large stands within the Coorong since 1990 or prior. The last significant records of Floxtailed stonewort in the Coorong proper were found in 1983, with accounts of some in the ephemeral sections in 1990 and more recently the SA Herbarium/University of Adelaide found occasional strands in rafts of filamentous green algae.

The species has continued to form meadows in Morella Basin, Salt Creek, surrounding saline lakes (>3 g/L) including Lake Indawarra and Lake Ellen, along with several farm wedgeholes between the Dukes and Princes's Highways.

With the lowering of salinities in the South Lagoon (<70 g/L), the Coorong fishermen, the University of Adelaide's Associate Professor Luke Mosley and Federation University Australia's Faith Coleman had identifying the location of Stonewort meadows down to a fine art by the end of March, simply by looking for a combination of groundwater seeps and 'drunken Swans'.

Vouchers were submitted to the South Australian Herbarium and monitoring of the sites continues as low salinities persist and the warmer months arrive.



The charophyte, *Lamprothamnium* from the Coorong (Photo: Faith Coleman).

Freshwater Macroinvertebrates

Chris Madden and Paul McEvoy (Freshwater Macroinvertebrates)

- Assessment of diet and availability of invertebrates underpinning feasibility of platypus rewilding with Green Adelaide Landscape Board and Flinders and Adelaide Universities
- Support of Citizen Science aquatic Bioblitzes in several regional catchments. Working with Department for Environment and Water (DEW) and Landscape Boards.
- Sampling and identification of macroinvertebrates for Flows for the Future (Eastern Mount Lofty Ranges Streams) and Sustainable Low Flows (Western Mount Lofty Ranges streams) projects for DEW.

- Sampling for Aquatic Ecosystem Condition Reporting for the Environment Protection Agency as well as collection of specimens for experiments to advance state water quality guidelines.
- A partnership with Lateral Environmental of WA to provide identification services for samples collected in SA and WA for mining exploration and monitoring.
- Analysis of macroinvertebrates in native fish gut samples for SARDI.



Sites in the Flinders Ranges (Puttapa Spring on Puttapa Ck (L) and Mudlapena Spring on Frome Creek (R)) sampled for macroinvertebrates for the South Australian Environment Protection Authority by Chris Madden and Paul McEvoy. I am reliably informed there is a yellow footed rock wallaby in the photo of Mudlapena Spring (Photos: Chris Madden).

Ngarrindjeri Thukabi Monitoring

Scotte Wedderburn (The University of Adelaide)

The first ever monitoring for Thukabi (turtles) in the Lower Lakes of the River Murray was undertaken in February 2023 by the Ngarrindjeri Aboriginal Corporation (NAC) and the University of Adelaide. Funding was through the Murray–Darling Basin Authority’s The Living Murray Indigenous Partnership Program and managed by South Australia’s Department for Environment and Water. The project is a result of consultation with members of the Ngarrindjeri community through a series of yarning circles that identified the declining health of Thukabi populations as a cultural concern. Only 10 sites were sampled, as a start, but this will double in February 2024. In February 2023, 35 eastern long-necked turtle (*Chelodina longicollis*) and four Murray short-necked turtle (*Emydura macquarii*) were captured, measured, weighed, and marked before release. The objective of the project is to enhance cultural well-being by getting community members out working on Country, and to gather data that can contribute to management of the system to enhance Thukabi populations.



Murray short-necked turtle captured on the Finniss River during Ngarrindjeri Thukabi monitoring in February 2023 (Photo: Scotte Wedderburn).



Kezrah and Shanesia Varcoe retrieving a fyke net during Ngarrindjeri Thukabi monitoring in February 2023 (Photo: Scotte Wedderburn).



Some of the Ngarrindjeri Thukabi monitoring team in February 2023: Scotte Wedderburn, Whitney Rickett, Gerald Rigney and Tyreen Gollan (Photo: Scotte Wedderburn).

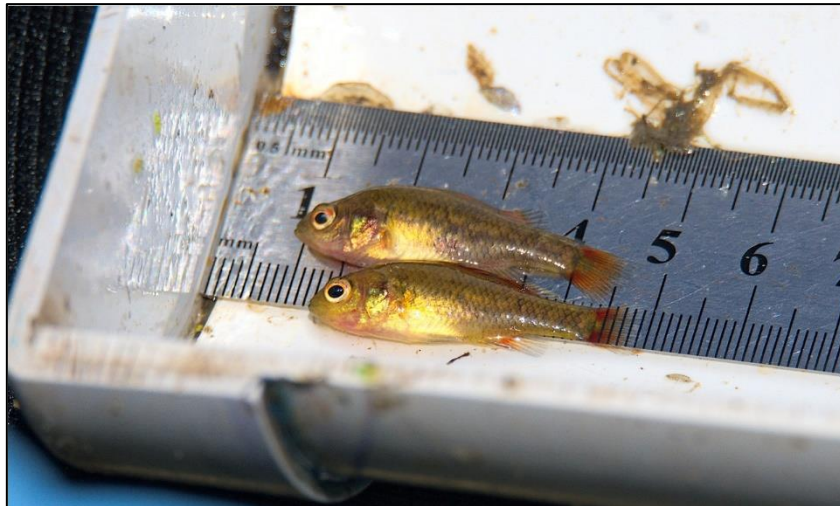
Threatened fish populations in the Lower Lakes of the River Murray

Scotte Wedderburn (The University of Adelaide)

The condition of the Murray Hardyhead (*Craterocephalus fluviatilis*), Southern Pygmy Perch (*Nannoperca australis*) and Yarra Pygmy Perch (*N. obscura*) populations in the Lower Lakes have been monitored since 2007 under the Murray-Darling Basin Authority's The Living Murray program, which is managed in South Australia by the Department for Environment and Water. Following population collapse during the Millennium Drought, Southern Pygmy Perch has re-established due to reintroductions and recovery of aquatic habitats. Murray Hardyhead has returned to Lake Alexandrina but is yet to re-colonise in Lake Albert. In 2022–23 condition monitoring, however, Murray Hardyhead was rarely detected, which was expected given the high river flows. In November 2022 monitoring, there was the highest abundance of young-of-the-year (YOY) Southern Pygmy Perch recorded since the drought. Most of this potential was lost, however, as shown by only a moderate level of recruitment recorded in March 2023. The reasons for such high YOY mortality are unknown, but the massive number of YOY Common Carp (*Cyprinus carpio*) that made it to the Lower Lakes over summer is likely implicated. Several reintroductions of Yarra Pygmy Perch between 2011 and 2014 have been unsuccessful. The species has not been detected in condition monitoring or during a targeted survey in 2018. Yarra Pygmy Perch, therefore, is regarded as the first freshwater fish to be extirpated from the Murray–Darling Basin.



Sally's Lagoon on Mundoo Island in March 2023 when Common Carp dominated the fish catch (Photo: Todd Bamford).



Southern Pygmy Perch captured on Mundoo Island in March 2023 (Photo: Todd Bamford).



Common Carp dominated the catches in March 2023 (Photo: Scotte Wedderburn).

DEW Pike and Katarapko floodplains team

Michelle Denny, Richard Walsh and Samantha Walters (Department for Environment and Water)

The Riverland floodplains are looking amazing following the major flood of 2022/2023, the largest flood for the SA River Murray since 1956.

We continue to analyse and report on our post-flood monitoring results. We have substantial ecological monitoring assistance delivered by SARDI, SA universities and other scientists and monitoring providers, many of whom are represented in this newsletter. That monitoring covers trees, fish, waterbirds and bush-birds, groundwater and soils. Within our Pike and Katarapko team we have recently completed data analysis for our annual understorey vegetation condition monitoring, showing the best outcomes we've seen since the surveys were established. The shedding floodplain has been completely transformed with widespread regeneration of flood-responding grasses, herbs and shrubs replacing the more salt and drought-tolerant saltbushes and copperburrs. Our post-flood lignum surveys revealed some mixed results with localised patches of lower-lying lignum (that was deeply inundated for an extended period) declining in condition, while higher elevation lignum received the first drink it has seen in many years and in general the response was positive across extensive areas. Our team has just started spring frog and tadpole monitoring, which has been fairly quiet start given we currently have receding flow in the SA Murray.



Field of *Calotis scapigera*, Katarapko floodplain (Photo: Richard Walsh).

In collaboration with the University of New England, we established a project to track the movement of turtles in 2022. The University of New England provided the survey design and visited Pike and Katarapko floodplains to trap and attach transmitters to turtles of all of the three species that occur in the SA River Murray. The project is utilising both GPS and acoustic transmitters. DEW staff have undertaken monthly tracking campaigns to locate and download data from the turtles carrying GPS transmitters, and data is being periodically downloaded and collated from the acoustic receiver array deployed throughout the lower Murray. A big thanks to SARDI and our upstream agency colleagues who have supported the project by sending through data from acoustic receivers they are managing.

The project was designed to assess how the turtles navigate infrastructure such as the floodplain blocking bank and regulators, and to determine whether they use particular travel routes to enter the floodplain from the river and to access known nesting hotspots. At the commencement of the project we did not know that we were about to receive the highest flow that the SA River Murray has seen since 1956, and we now expect the data to provide an interesting story on turtle movement under flood conditions.



Turtle monitoring (Photo: Michelle Denny).

Murray Crayfish Reintroduction into the SA River Murray

Sylvia Zukowski (Nature Glenelg Trust)

Around 200 Murray crayfish have been released into the river as part of a landmark trial to reintroduce the iconic Australian species back into the South Australian River Murray. Once common in the waters of the South Australia River Murray, the number of Murray crayfish declined to a point of virtual extinction as a result of overfishing, the effects of river regulation and declines in water quality. Improved understanding and recent improvements to these conditions mean it's now time to attempt to bring the species back to South Australia.

Murray Crayfish were rescued by OzFish volunteers during the upstream black-water event, and North-West Aquaculture and Nature Glenelg Trust maintained the crayfish in captivity until they were released. Many of the rescued crayfish have been returned to the locations they were rescued from but with the support of NSW DPI Fisheries and other state agencies, we were able to secure some of these crayfish for release in South Australia..

The releases represent an important first step to re-establishing a self-sustaining population of this iconic species in South Australia. While Murray crayfish are still found in river locations in Victoria and New South Wales, human intervention is required to successfully re-establish a population in South Australia. Aided by recent research, the team involved is feeling confident that the trial will help to understand the conditions required for Murray crayfish to flourish.

The reintroduction initiative has been guided by almost a decade of research and planning and builds on a similar project interstate, so that we are in the best possible position for it to be successful.

- 29 released crayfish have been fitted with tracking devices to help the team to monitor their movement within the river.
- Nature Glenelg Trust staff recently downloaded the crayfish transmitter information from receiver's that are managed by CSIRO and SARDI. In great news, movement was detected in all tracked crayfish.
- First such study for freshwater crayfish in Australia
- 29 tagged crayfish with accelerometers (i.e., activity)
- Receiver array (thanks SARDI/CSIRO)
- So far (July to Oct) almost 500,000 detections
- All crays detected
- >80% crays detected in the last two weeks
- Will get ~10 months data to examine activity in more detail e.g. diurnal, seasonal, flow related patterns

Ongoing monitoring of the trial by NGT will also be supported by the River Murray and Mallee Aboriginal Corporations (RMMAC) River Ranger team.

This initiative to reintroduce Murray crayfish into South Australian waters is a fantastic example of cross-border collaboration by State, regional, non-government and community organisations, all of which have played an important part in launching a reintroduction of such significance.

This initiative is a partnership between Nature Glenelg Trust, and the Murraylands and Riverland Landscape Board through funding from the landscape levies, with support from New South Wales DPI, Victoria Fisheries Authority, OzFish Unlimited, North West Aquaculture, River Murray & Mallee Aboriginal Corporation (RMMAC), CSIRO, SARDI and PIRSA.



Murray crayfish with acoustic transmitters (Photos: Sylvia Zukowski).

Wetland Restoration Activities

Ben Taylor (Nature Glenelg Trust)

- Fish monitoring has been undertaken at two NGT reserves, Hutt Bay and Mount Burr Swamp.
- Nature Glenelg Trust has hosted Nature Festival events, a 6-day, 8-location Grand Tour from Adelaide to Walker Swamp (southern Grampians) to showcase their restoration activities.
- Investigations into hydrological restoration options for the Aldinga Washpool (southern Adelaide) have commenced.
- Implementation of hydrological restoration of Fleurieu Peninsula Swamps at Hesperilla CP, Stipiturus CP and Yundi Nature Conservancy have commenced.
- Investigating hydrological restoration options for Minyumai Indigenous Protected Area in northern NSW.
- Mapping drains with a view to the hydrological restoration of Burdens Marsh on the Tasman Peninsula (with Tasmanian Land Conservancy).



Recently (April 2023) hydrologically restored wetland habitat at Mount Burr Swamp taken early October 2023 (Photo: Ben Taylor).

The Goyder Institute for Water Research CLMM Research Centre

Nick Whiterod (Goyder Institute for Water Research)

The Goyder Institute for Water Research CLMM Research Centre, based in Goolwa, South Australia, has officially commenced operation. Funded by the Australian Government, the Research Centre will work with communities to investigate the impacts of climate change on the Coorong, Lower Lakes and

Murray Mouth (CLLMM) region. The Research Centre is staffed by Jane French (Centre Manager), Nathan Hartman (First Nations Engagement Officer), Nick Whiterod (Science Program Manager) and Tiffany Nay (Communications and Engagement Officer) under the guidance of Goyder Institute for Water Research Director Alec Rolston.

The Research Centre is currently establishing a research portfolio that reflects community and First Nations priorities as well as addressing critical research needs to effectively manage the region. The CLLMM Research Centre will draw on the passion and knowledge of the community and First Nations along with scientists, including those from Goyder Institute partners, the South Australian Department of Environment and Water, SARDI, CSIRO, Flinders University, the University of Adelaide and the University of South Australia.



CLLMM Research Centre staff (left to right), Alec Rolsten, Tiffany Nay, Nathan Hartman, Jane French and Nick Whiterod.

Anne Jensen – Freelance Environmental Consultant

Anne undertook annual monitoring of the health of river red gums across four catchments in the Mid-North of South Australia for the Northern & Yorke Natural Resources Management Board 2008-2016. In 2021 she returned to extend monitoring in the Crystal Brook Creek catchment during an environmental watering trial.



Left to right: Environmental flows in Crystal Brook Creek through the Beetaloo Valley in October 2021. Environmental flows did not reach this old mature red gum in the lower reaches of Crystal Brook Creek in 2021 (Photos: Anne Jensen).

Anne was also engaged by the Myanmar Institute for Integrated Development as an international wetland repair specialist on project teams working on sustainable management for Inlay Lake, a shallow lake in the mountainous region north of Yangon in Myanmar, which includes a Ramsar-listed site. This project included five site visits to identify key issues and present proposals for practical management actions by lake communities and management agencies to sustain lake ecosystems and its catchment.



Photos from Anne's trips to Myanmar (Photos: Anne Jensen).

In addition to her work in Myanmar and assessing environmental flows in the mid north of South Australia, Anne is involved with the Nature Foundation's *Water for Nature* program which delivers environmental water to wetland sites in the South Australian Murray Valley and provided coordination and support for the development and publication of the evidence-based Great Artesian Basin Springs Adaptive Management Plan.