

F4F News

The Flows for the Future Program Update

Our Second Edition

Welcome to the second edition of the Flows for the Future newsletter. You are receiving this newsletter as a valued member of our low flows community and you are important to the success of the program. We hope that you enjoy these updates and find them useful and informative.

Overview

Flows for the Future (F4F), is the first large scale low flow program nationally (and as far as we know, globally), and was established to improve the health and sustainability of catchments across the Eastern Mount Lofty Ranges (EMLR).

There are over 8,000 dams interrupting stream flow in the EMLR and more than 20,000 across the whole Mount Lofty Ranges. F4F aims to re-establish seasonal low flow patterns to restore catchment and ecosystem health.

F4F is a joint Australian and state government funded initiative working in partnership with landholders, stakeholders and communities to improve the health, resilience and sustainability of our natural habitats.

With successful completion of the initial 3 years of the program, F4F moves from strength to strength with over 400 sites now passing low flows.

A great catch!

In our last newsletter we featured an article on the sole population of native River Blackfish remaining in Rodwell Creek (which is a tributary of the Bremer) and the artificial watering that is being done to ensure its survival.

River Blackfish are in dire straits across the board, not just in Rodwell Creek. Only 'six fragmented locations'¹ occur in South Australia, with most populations on the decline due to a combination of factors that include reduction in both water flow and quality.

So it was with great excitement and relief last year that, during the 2020 Annual Autumn Fish Survey, a single River Blackfish was netted in the lowland reach of the Marne River at the Three Sisters Pool downstream of Black Hill. This record is the second for the site (the first being in 2016) and the only recent record from the Marne, with the nearby long-term Black Hill Springs site not yielding any individuals since 2013.

The endangered River Blackfish is a nocturnal predator that consumes large macroinvertebrates like shrimp, caddis fly larvae and sometimes smaller fish. The larvae and first-year juveniles need good cover such as ample leaf litter or vegetation. We hope that the efforts by individual landholders, government and non-government programs to manage the use of water and habitat will result in the return of thriving Blackfish populations to the Eastern Mount Lofty Ranges and Marne Saunders catchments.

¹Action Plan for South Australian Freshwater Fishes (2009), Hammer, M. et al., Native Fish Australia (SA) Inc., Department for Environment and Heritage SA.



River Blackfish



Blackfish caught in the Marne



Ruan Gannon in action surveying Three Sisters Pool in 2016.

River Blackfish *Gadopsis marmoratus* – note the long dorsal fin which is one character that helps distinguish it from other native fish.



Low flow devices can deliver large cumulative benefits to the health of catchments.



A low flow device showing water flowing into the dam during a rainfall event.

Dry Times

The Eastern Mount Lofty Ranges has experienced a run of dry seasons in recent years. During 2019, the total rainfall in many areas was in the lowest 10% on record (including Keyneton, Finniss, Strathalbyn, Harrogate and Palmer).

In 2020, although total rainfall appears to be closer to the long-term average (thanks to late autumn and winter rains), flows in the catchments were still very low because the catchments were so dry and needed to wet up enough to allow surface run-off to occur.

Most dams have been affected by dry times. Between 2018 and 2020, all dams (with or without low flow devices) struggled to fill having received little to no rainfall run-off.

Low flow devices only pass 'low flows', i.e. flows up to a specific 'threshold flow rate'. Monitoring data has verified that during medium and large events the majority of flow goes into the dam while the small proportion below the threshold flow rate is

passed. Lack of medium and/or high flow events during a season has a much greater impact on storages than the presence of a low flow device. Therefore the impact of low flow devices in dry years is negligible.

Ecosystems have also been impacted by dry years. For example important refuge waterholes have not received top-up flows, putting fish and other aquatic fauna that depend on these habitats at risk.

Low flow devices are most important in dry times because that small amount of water makes a big difference to the environment, yet a small difference to available dam storages. This is because timing is the key factor for ecosystems, whereas volume, obtained mostly from medium and high flows is most important for dams.

For more information see the Flows for the Future 'Dry Times' Factsheet.

How Do Gravity Devices Work?

The Flows for the Future Program has a range of different device types it can utilise to pass the first key environmental low flows in a catchment. To date this has included devices that rely on electronics and pumps to monitor and pass flows, dam removals, and adjusting pumping equipment in watercourses – however the most common device implemented so far has been the low flow gravity device.

This device is relatively simple and involves no electronic components. Water flow is directed over a grate and falls into a concrete pit upstream of the dam. The pit is connected to a buried pipe that passes low flows downstream of the



Inlet: A typical low flow device inlet structure

dam, releasing water back into the watercourse where it can continue down its natural path in the catchment.

A few variables are important to ensure the device passes the correct amount of water:

- Firstly, an orifice is installed on the upstream end of the pipe; this orifice restricts the amount of water that can flow through the pipe.
- Secondly, the pipe must be installed at the right depth in the pit.

‘Threshold Flow Rate’ – ... what is it?

Every catchment needs a certain amount of surface flow to pass freely downstream, whenever there is rainfall or other flow, to keep ecosystems alive and functioning.

This is especially important through summer, when dams aren’t spilling and pools can become stagnant.

So how do we ensure the user’s water security while providing the environment with the minimum that it needs? Answer: F4F uses ‘Threshold Flow Rates’ (or ‘TFRs’) in its device designs.

During a flow event, a set amount of water (up to the threshold flow rate in litres per second) is directed through a F4F device and around a dam. In small events, this volume of water may comprise the entire event, but for medium to large flow events it comprises only a small portion of the flow event. Passing flows up to but not over the TFR, when combined with stock and domestic and licensed use limits (governed by the Water Allocation Plan), ensures healthy and productive environments for both users and ecosystems.

Below are some examples of how F4F’s devices use TFRs in their design.

Flow patterns vary between tributaries or sub-catchments (zones) - some zones are naturally drier, with flora and fauna having evolved with fewer events and/or smaller flows in each event. At zone scale the TFR is presented as a unit per km² (and called a ‘UTFR’ - Unit Threshold Flow Rate). UTFRs for zones were determined by measuring real ecosystem and flow data at different sites across the Mount Lofty Ranges and associating those data with particular zone characteristics like rainfall, soil infiltration rate and extent of forestry.

The TFR for an individual dam or extraction point is a proportion of the zone UTFR and is based on catchment size: the catchment area for the individual site is multiplied by the zone UTFR. So while bigger dams are often a more significant barrier to flows, their size doesn’t determine how much flow needs to be passed per se.

The intention of passing low flows is that many flow events pass (or partly pass) at critical times in the season, but larger volumes flow into the dam at wetter times when the flow rate exceeds the TFR.



Gaugeboards with a TFR marker let licence holders know when low flows have been exceeded so they can commence extraction.



End caps have an orifice cut into them that corresponds specifically to the TFR for individual sites.

When these two variables are correct, only the low flows will pass through the pipe, with the remainder of the water flowing over the device and into the dam for storage. This device type is relatively low profile on a property, only the inlet and outlet will be visible, and they are also low maintenance with only the pit and outlet requiring periodic cleaning.

Many of these devices have been installed as part of the Flows for the Future Program with each device undergoing flow rate testing upon completion to ensure that they are operating as intended. Where there have been minor discrepancies, it has simply been a matter of altering the orifice size slightly to ensure the device is accurate.

“The pit is connected to a buried pipe that passes low flows downstream of the dam,”

Outlet: The outlet structure is clearly marked with a post and protected by a small concrete slab





Solar powered pumps are used to release the low flow component that is recorded from the V notch weir.



Release device inlet: A V notch weir is used to monitor inflows upstream of a dam.

Swampy Stuff

Why are low flow devices needed in really wet catchments?

It's a fair question that has been asked several times during F4F's initial visits to the Tookayerta Creek (near Mount Compass).

The 'Tookay' flows almost all year round due to generous baseflow contributions from the Permian Sands aquifer. Because of this, the catchment abounds in lush swamp vegetation and a diverse aquatic fauna, and there are fewer large capacity dams as water users can extract directly from the watercourse all year round rather than relying on water storage.

However... even when there appears to be decent flow, dams and direct extraction from watercourses still create barriers, as these ecosystems have evolved during times of substantially more flow than other catchments. In Tookay, nature's intention is for the peaty substrate to remain soaked and for waterholes to stay connected. In addition, land development, vegetation clearance and drainage have impacted negatively on the swamps such that they are now considered a Nationally Critically Endangered community. So it is important that our team, landholders and the broader community work together to ensure adequate low flows regularly pass through the Tookayerta.

The way in which F4F ensures low flows are passed at licensed watercourse extraction points is by installing gauge boards marked with the height at which the flow rate through the pool exceeds the definition of 'low' (and thereafter

becomes 'medium'). As long as water users don't start pumping until this calculated 'Threshold Flow Rate' is reached, they are considered to be passing low flows at their site and these low flows will go on to support this important catchment area.

It is possible that some Tookay landholders are already passing low flows, due to their current infrastructure configuration, method of extraction or through discontinued use of their water allocation. If this is the case then the purpose of the gauge boards will be more about future-proofing the catchment for drier times that may be ahead. If larger dams in highland areas are also needed to contribute low flows, the owners of those dams will be offered one of our standard low flow dam device options, tailored to their individual site conditions and requirements.

All works will be undertaken with the utmost care considering the importance of the Fleurieu Peninsula Swamps. Alternative designs that minimise impact include Release Low Flow Devices (with no trench), non-trenched pipe placement, porous materials to allow flow-through of underground water, erosion control measures and revegetation. In addition, F4F has enlisted a dedicated panel of experts and a Wetlands





Tim and Lee: Tim Vale and Lee McKenzie discussing site specifics in Tookayerta



Fern: Ruddy Ground-fern (*Hypolepis rugosula*), often hard to distinguish from Bracken Fern, but needs its feet wet!



Project Officer Tanya Milne, on the Mount Compass boardwalk with Rob Morrison and Co.

Project Officer to oversee site assessment and management, including:

- obtaining the correct approvals;
- ensuring both direct and indirect impacts are minimised (for example, addressing the impact that diverting even a small amount of water might have on a swamp);
- avoiding works in high quality swamps or in and around threatened plants;
- only proceeding if any impacts are offset by a clear overall benefit; and
- clear direction of contractors.

Back in the Swamps...

Some of F4F's staff and current landholder participants remember being involved with early surveys and assessments of swamps along the Tookayerta back in the 1990s and

2000s. Tanya Milne remembers finding 'extinct' beetles, banding elusive Southern Emu-wrens and posing for a news crew on the Mount Compass Boardwalk. Tim Vale commented that "Landholders are the key to protecting and managing biodiversity in swamps", after reflecting on his memories of working with landholders in Tookayerta who actively worked to protect their swamps from grazing that resulted in rapid recovery of swamp vegetation.

The Fleurieu Peninsula Swamps were soon recognised as unique areas in need of preservation and sensitive management. Iconic species of the FP Swamps include the Mount Lofty Ranges subspecies of the Southern Emu-wren, Yellow-bellied Water Skink, Native Broom (*Viminaria juncea*), Swamp Honey-myrtle (*Melaleuca squamea*) and the sometimes problematic Coral Fern (*Gleichenia microphylla*).

All works will be undertaken with the utmost care considering the importance of the Fleurieu Peninsula Swamps.

Citizen science volunteers

F4F joins forces with citizen science volunteers, Landscape Board staff, community groups and aquatic ecologists to run regular WATERBUG BIOBLITZ days in the Angas, Finnis, Marne and Saunders catchments.

If you'd like to join us in catching and identifying macroinvertebrates (waterbugs), contact:

Tanya Milne: 0448356273
Dana Miles: 0427600722.

Tony Lynch – Landholder Tungkillo

Tony and Catherine Lynch own and run a 300 hectare farm near Tungkillo that has been in Tony's family since the early 1970s. Initially a horse stud, the property until recently ran around 600 sheep but the last few years has seen a transition to a beef cattle herd of around 150 head with 100 of them being breeders. Tony works in Adelaide during the week but spends as much time as possible on the farm where he has fenced most of the watercourses from stock and revegetated the fenced off areas with local native species.

The Flows for the Future Program contacted Tony as one of the dams on his property fell within the scope of the program. Project Officers discussed with Tony how a device would work on his property and how to minimise any impact a device would have on running the property while it was installed.

"At first I was sceptical of the cost versus the benefits" says Tony "But being at the top of the catchment I could see that it was important to have flows from the top of catchment to the bottom"

The property is gently undulating and luckily the paddock where the dam and its inlet are found has a moderate slope that allowed for a relatively simple construction job. The construction crew were onsite for around 5 days during early December 2020 and luckily only small amounts of rock were encountered during the trenching part of the construction process. "The device looks great and blends in with the surrounds, you can't even see where the trench was dug" adds Tony.

Tony's property is found in the upper reaches of the Reedy Creek Surface Water Catchment that eventually flows into the River Murray just south of Mannum. By passing low flows near the top



Field Officer Bronwyn Rennie discussing site specifics with landholder Tony Lynch.

The gravity device inlet built on the Lynch property.



of the catchment small volumes of water are delivered to the watercourse below his dam, usually in the driest part of the year. This flow does not significantly contribute to dam volume but is critical to maintain ecosystem health.

Tony was impressed with the professional conduct of the contractors who installed the device and was pleased with the low profile of the device that helps it blend in with the surrounding environment. He sums up the experience by saying "From the first contact with the program through to the installation of the device, I was updated at every step. These were the best contractors I have ever dealt with in over 30 years on the farm".

Winner of National Award for Program Innovation



the program continues to move from strength to strength

Flows for the Future (F4F) is proud to have been recognised at the Australian Water Association Awards (AWA), winning the National Award for Program Innovation in June 2020.

The prestigious award recognises innovative environmental or sustainability programs in the water industry and included finalists from each state and territory. Although Covid-19 meant it was a virtual event; that didn't dampen the excitement of the team for successfully winning such a distinguished award.

AWA congratulated F4F on work that is invaluable to river catchment health and goes a long way to maintaining stream connectivity in the Eastern Mount Lofty Ranges.

F4F Program Leader, Renata Rix, said that the team is really proud of the impact it's been able to have in the community throughout this important project. She noted that the program continues to move from strength to strength with over 400 sites returning low flows and she is confident of further improvements in the future.