The Lakes Hub is an initiative of the Milang and District Community Association Inc. funded by the Australian Government and the South Australian Government's *Murray Futures* program.

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Environmental flows, wetlands and Peregrine falcons

Hello!

It has been six months since the last Lakes Hub Bulletin. This is not because of a lack of things happening— quite the opposite. Our little team of volunteers has been flat-out. For more frequent (if less in depth) updates, please remember to follow our Facebook page.

Since the last bulletin we have had a state election, which has resulted in SA having a Liberal Party government for the first time in sixteen years. The River Murray Lakes and Coorong Action Group had their AGM, with the new Environment Minister in attendance. Various Lakes and Coorong folk have been talking to media and politicians about potential secondary impacts of Carp control, the importance of flows, red tides, sediment health, Murray-Darling Basin Plan implementation and Long-nosed Fur Seals.

This edition of the Bulletin covers some of the news around Black Bream, information on the Peregrine Falcon, some of the latest research on restoring habitat for native fish, invitations to various events and some of the discussions happening around Carp control.

There is also news of the Lakes and Coorong community, with the sad passing of C.A.P. member Jock Robertson. We would like to offer our condolences to his family.

Until next time, remember to get out and enjoy our beautiful estuary in the spring.

Faith Coleman

South Aussie with Cosi visits the Coorong

Click here for video

Black bream fish returns to Coorong and Lower Lakes after drought

(Source: DEW media release)

The number of baby black bream in the Coorong estuary has recently increased thanks to environmental water delivery to the Lower Lakes and Coorong.

The population in the Coorong has been in severe decline since the late 1980s, with little very few black bream recorded in recent years.

According to DEW spokesperson Adrianne Rumbelow "The ecosystem of the Coorong is still recovering post-drought, and this includes populations of long-lived fish like black bream. "The commercial fishery catch of black bream in the Coorong over the last nine years has been only five per cent of what it was in the mid-1980s."

Garry Hera-Singh flagged with DEW in October 2017 that he had seen a number of adult female black bream below the barrages, in good condition and ready to spawn.

Department staff worked with local scientists and commercial fisher-folk to manage environmental water to create a salt-wedge within the estuary, during spring and summer. A salt wedge is an area where freshwater sits above salt water. Salt wedges are needed to keep black bream eggs and larvae buoyant and they also provide food for larval fish to develop and grow.

During March and April 2018 the SARDI Aquatic Sciences carried out fish monitoring in the Coorong and recorded more than 100 black bream fingerlings. SARDI spokesperson Associate Professor Qifeng Ye said that the fingerlings were recorded at many sites throughout the northern part of the Coorong.

"These fish were most likely spawned during late spring and summer, and the environmental water released through the barrages helped create suitable nursery conditions for this species," Associate Professor Ye said.

"This is a good sign towards recovery of this iconic fish species […]We still have a long way to go before these baby black bream are mature and can help rebuild the population in the Coorong, but, this finding demonstrates the importance of environmental water delivery to the Lower Lakes and Coorong."

Commonwealth Environmental Water Holder Jody Swirepik said this was a great example of the benefits of cooperation between community, scientists and governments.

The monitoring results of this great outcome will help inform future decisions on how to make best use of water for the environment," Ms Swirepik said.

MDBA Executive Director Carl Binning said this event highlights the importance of using water for the environment in smarter ways and at specific times.

What are Black Bream?

Black Bream (*Acanthopagrus butcheri)* are known by a number of names including Southern Black Bream and Blue nosed Bream.

Black Bream are found only in Australia and only between Shark Bay in Western Australia to Mallacoota, Victoria and can also be found along the southern coast of Tasmania.

A. butcheri can be found in both marine and freshwater environments but they principally an estuarine species; they cannot complete their lifecycle in a marine environment, requiring a salt-wedge estuary to breed.

This species is very loyal to the estuary of their birth, with many living out their entire life within that estuary.

The populations of large estuaries (such as the Coorong) are often distinguishable from Black Bream caught in other estuaries, due to distinct genetic differences.

Peregrine Falcon—Part One

Sources :- Photo: Danny McCredie (Mating pair at Morialta CP). Text: Wikipedia

The **peregrine falcon** (*Falco peregrinus*), is a widespread bird of prey in the family *Falconidae*. A crow-sized falcon, it has a blue-grey back, barred white under-body and a black head. As is typical of bird-eating raptors, peregrine falcons are sexually dimorphic, females being considerably larger than males. [3][4]

The peregrine is renowned for its speed, reaching over 320 km/h (200 mph) during its characteristic hunting stoop (high speed dive), [5] making it the fastest member of the animal kingdom.[6][7] According to a National Geographic TV programme, the highest measured speed of a peregrine falcon is 389 km/h (242 mph).[8][9]

The peregrine's breeding range includes land regions from the Arctic tundra to the tropics. It can be found nearly everywhere on Earth, except extreme polar regions, very high mountains, and most tropical rainforests; the only major ice-free landmass from which it is entirely absent is New Zealand. This makes it the world's most widespread raptor[10] and one of the most widely found bird species. In fact, the only land-based bird species found over a larger geographic area is not always naturally occurring but one widely introduced by humans, the rock pigeon, which in turn now supports many peregrine populations as a prey species.

Both the English and scientific names of this species mean "wandering falcon", referring to the migratory habits of many northern populations. Experts recognize 17 to 19 subspecies which vary in appearance and range.

While its diet consists almost exclusively of medium-sized birds, the peregrine will occasionally hunt small mammals, small reptiles, or even insects. Reaching sexual maturity at one year, it mates for life and nests in a scrape, normally on cliff edges or, in recent times, on tall human-made structures.[12] The peregrine falcon became an endangered species in many areas because of the widespread use of certain pesticides, especially DDT. Since the ban on DDT from the early 1970s, populations have recovered, supported by large-scale protection of nesting places and releases to the wild.[13]

The peregrine falcon is a well respected falconry bird due to its strong hunting ability, high trainability, versatility, and in recent years availability via captive breeding. It is effective on most game bird species from small to large.

Detailed description

Headshot of Peregrine Falcon

The peregrine falcon has a body length of 34 to 58 cm and a wingspan from 74 to 120 cm.[3][14] The male and female have similar markings and plumage, but as in many birds of prey the peregrine falcon displays marked sexual dimorphism in size, with the female measuring up to 30% larger than the male.[15] Males weigh 330 to 1,000 g and the noticeably larger females weigh 700 to 1,500 g.

In most subspecies, males weigh less than 700 g and females weigh more than 800 g, with cases of females weighing about 50% more than their male breeding mates not uncommon.[4][16][17] The standard linear measurements of peregrines are: the wing chord measures 26.5 to 39 cm, the tail measures 13 to 19 cm and the tarsus measures 4.5 to 5.6 cm ([10]

The back and the long pointed wings of the adult are usually bluish black to slate grey with indistinct darker barring, the wingtips are black.[14] The white to rusty underparts are barred with thin clean bands of dark brown or black.[10] The tail, coloured like the back but with thin clean bars, is long, narrow, and rounded at the end with a black tip and a white band at the very end. The top of the head and a "moustache" along the cheeks are black, contrasting sharply with the pale sides of the neck and white throat.[18] The cere is yellow, as are the feet, and the beak and claws are black.[19]

The upper beak is notched near the tip, an adaptation which enables falcons to kill prey by severing the spinal column at the neck.[3][4][5] The immature bird is much browner with streaked, rather than barred, underparts, and has a pale bluish cere and orbital ring.[3]

The need for a broad perspective of habitat restoration for rehabilitation of native fish populations.

(Source: Extracted from article by Brenton Zampatti and Martin Mallen-Cooper).

In terrestrial and aquatic ecosystems, habitat complexity and connectivity promote biodiversity and population resilience. In regulated rivers, however, dams, weirs and water extraction simplify habitats and flow regimes, and disrupt connectivity. This has major impacts on the health of aquatic ecosystems, including fish. Rehabilitation of fish populations in these rivers is dependent on three key elements: habitat, flow and connectivity. Considerable effort is devoted to habitat restoration, particularly re-snagging and riparian rehabilitation, with the premise that 'habitat makes fish happen', but restoring physical habitat alone is insufficient to support diverse and healthy fish populations.

Rehabilitating fish populations in the highly regulated rivers of the Murray-Darling Basin (MDB) requires habitat restoration to be considered in the context of flow and connectivity. A strategic and realistic goal is to promote mosaics of connected habitats that incorporate the complex flow characteristics of natural rivers, at a range of spatial and temporal scales. To do this we need to look in more detail at what constitutes flow, habitat and connectivity, and how these factors interact to support ecosystem function.

Restoring ecologically relevant aspects of a river's natural flow regime is fundamental to restoring the ecological health of regulated rivers. In this context, the term 'flow' is generally used to describe a river's discharge, that is, the volume of water passing a specific point over a unit of time (for example, megalitres/ day). Nevertheless, water volume and discharge are not factors to which aquatic biota, including fish, respond. Instead, they are influenced by the hydraulic elements that constitute flow, such as water velocity, depth and turbulence, and how they differ in space and time. These factors combined are called hydrodynamics, and the hydrodynamics of a river form an essential component of fish habitat.

A river's hydrodynamic characteristics are determined by the interaction of hydrology (discharge) with the geomorphology of the river channel, including channel shape and substrate, and habitat features such as large wood and bankside vegetation. In aquatic ecology there is a fundamental distinction between flowing water (river) and still-water (lake), with each supporting distinct ecological processes and patterns. River regulation, in particular dams and weirs, fragments and simplifies riverine habitats, in some cases rendering flowing water habitats more like lakes.

"It is not only what we can do, but also what we do not do, for which we are accountable."

Moliere

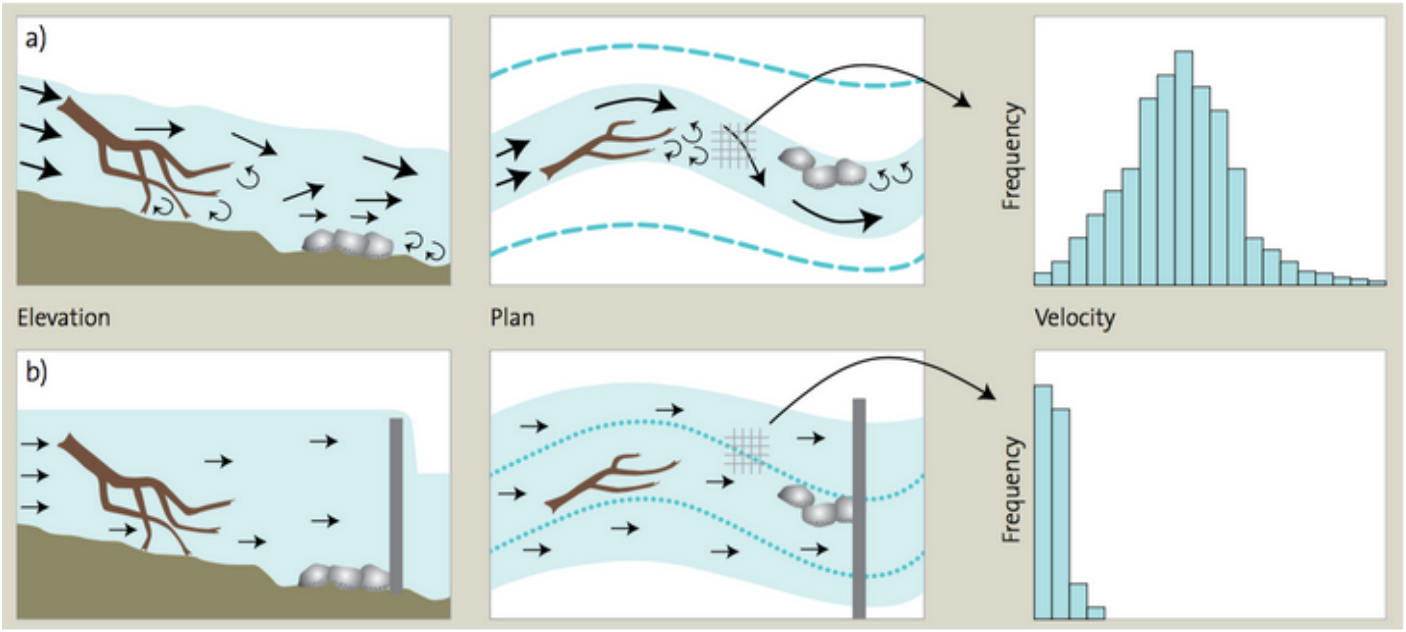

Figure 1: An illustration of hydrodynamic diversity and the impact of a weir pool in a river

In Figure 1, a natural stream a) has higher mean water velocities and a greater diversity of velocities, with roughness such as snags and rocks creating eddies and complex changes in flow direction. In contrast, a river regulated by a weir b) has comparatively low mean velocities and a narrow range of velocities, with any snags and rocks promoting little hydrodynamic complexity.

Both rivers can have essentially the same structural habitat and discharge, but the regulated river has simplified hydrodynamics that favour generalist native species (often those adapted to wetlands) and invasive species such as carp. Lost from these habitats, or present in low abundances, are riverine species that rely on the complex hydraulic habitats created by flowing water.

In the MDB, one of the most striking examples of altered hydrodynamics occurs in the lower River Murray, where the construction of barrages and weirs has transformed more than 800 km of riverine habitat into a series of cascading lake-type habitats. This simplification of riverine hydrodynamics, and disruption of connectivity, has altered ecological function and biodiversity in the lower Murray, resulting in the loss of many biota, including at least three species of riverine fish (Trout cod, Macquarie perch and River blackfish), Murray crayfish and other invertebrates (e.g. aquatic snails).

Restoring fish populations also requires an understanding of fish life histories and the spatial and temporal scales they operate over. This involves progressing beyond understanding the habitat requirements of individual fish to that of populations. In the MDB, we know that Murray cod love snags, but fundamental questions remain regarding the scales at which populations operate, and the diversity of habitats that influence population dynamics, including spawning, recruitment and migration.

Hydrodynamics influence the ecology of fishes at micro (cm to 10s m), meso (100s of m to 10s of km), and macro-scales (100s of km). At each scale, complexity and connectivity are essential. Micro-scale hydrodynamics, which can be considered from the perspective of a fish larvae, juvenile or adult, may include variation in water velocities, created by the interaction of flowing water and in-stream objects (for example, substrate and snags), providing hydraulic complexity that redistributes drifting larvae, minimising intra- and interspecific competition. This diversity also promotes slow-flowing edges and slack waters that concentrate zooplankton and fish larvae, providing refuge, and a feeding and nursery area. In weir pools, this hydraulic complexity is often absent.

Meso-scale hydrodynamics reflect the diversity of habitats at the river reach-scale including pools, runs, riffles and associated off-channel habitats. Fish may move between these habitats to feed or complete key life history processes. For example, Murray cod in the lower River Murray make seasonal meso-scale

spawning movements from main-channel weir pool habitats to flowing anabranch systems such as Chowilla and Lindsay-Mullaroo, or in the mid Murray, between Lake Mulwala and the Ovens River. Maintenance of these habitats and connectivity between them is essential to the health of Murray cod populations in these regions.

Macro-scale hydrodynamics, which occur over hundreds of kilometres, may influence many aspects of fish ecology including spawning, dispersal (migration and larval drift) and meta-population dynamics. In the MDB, two notable species, Golden perch and Silver perch spawn in spring-summer, likely responding to water temperature and hydraulic conditions (potentially increasing velocity), eggs and larvae drift for many days over many kilometres, and juvenile and adult fish move upstream and downstream over hundreds of kilometres. Continuity of flowing water habitats over a macro-scale is essential for the completion of essential life history processes of these species. Altered hydrodynamics and disruption of connectivity, either through direct obstruction of movement by a weir, or drifting eggs and larvae settling out in weir pools, compromises the resilience of populations.

Restoration of ecosystem health in the MDB requires more than the restoration of volumes of water or physical habitats; it requires an understanding of the hydrodynamics of riverine/floodplain ecosystems and the integrated re-establishment of habitat diversity, flow and connectivity at relevant scales.

This story was written by Brenton Zampatti and Martin Mallen-Cooper and their article is featured in RipRap 39, which presents a range of articles concerning the rehabilitation of native fish populations in the MDB by thinking about structural habitat, connectivity, flow and hydrodynamics. Importantly, it covers an array of species and case studies that demonstrate the variability in life histories of fishes. The stories show the many different factors that need to be considered to ensure 'habitat restoration makes fish happen' to ultimately improve native fish populations.

From Sea To River

(The Lakelander- Thursday, 12 April 2018)

Hundred of thousands of fish are anticipated to move through a new passage - known as a fish ladder or fishway - opened recently at the Tauwitchere Barrage near Goolwa, designed to improve migration between the Coorong and Lower Lakes.

Fishways provide a way for native fish to move freely through structures such as weirs, locks and barrages along the River Murray and its tributaries, which would otherwise block their travel for activities like breeding and accessing new habitat.

The $250,000 project undertaken by SA Water

Stretch of river with snags creating habitat and flow variability

on behalf of the Murray - Darling Basin Authority, is part of an on-going program of works to construct fishways and allow free immigration from the Southern Ocean in South Australia, upstream to the Hume Dam near Albury- Wodonga.

At Tauwitchere, a trapezoidal fishway that can operate over a wide range of water levels to target the movement of both small and large fish has been installed.

The trapezoidal fishway is comprised of a straight channel divided into a series of interconnected pools, which slows down the flow of water, making it easier for fish to travel through. The pools include areas of high and low velocity water, which suits the movement of fish of different sizes.

This is the forth fishway to be constructed at Tauwitchere Barrage and at only four metres wide and fifteen metres lone is relatively small in comparison to the 3.6 kilometre long barrage.

The new Tauwitchere fishway is the last of six to be constructed as part of the Commonwealth - funded Construction of fishways Management Action under the Coorong Lower Lakes and Murray Mouth (CLIMM) recovery project.

Fish found to be using the fishways on the Murray Barrages include species like Australian Smelt; Bony Herring and Golden Perch, as well as Diadromous species like Congoli, which need to move between the ocean and river to complete their lifecycle.

In Memorioum

John W. "Jock" Y. Robertson

It is with sadness that we announce the passing of "Jock" Robertson who departed this life on the 28 August 2018.

But we remember him as a valued member of our community and the valuable contributions he made to the health of the Coorong and Lakes region. Also as a member of the DEW CLLIM Community Consultative Panel. We will miss his long memory and wit at future events.

Complementary measures: is carp herpes really a substitute for water in the Murray-Darling?

Reproduction of article by EDO NSW Policy and Law Reform Solicitor Dr Emma Carmody, 2 February 2017

A short history of Murray-Darling water management

In our previous post on the Murray-Darling, we outlined how the focus of Murray-Darling Basin laws and policies have shifted over the last ten years or so.

When the *Water Act* was introduced by the Howard Government in 2007, there was a clear recognition that we had to reduce the amount of water we were consuming in order to conserve the Murray-Darling for future generations.

The goal back then was to restore the health of Australia's largest river system – a system that is home to 16 internationally recognised (or 'Ramsar') wetlands, and which supplies most of our country's irrigated agriculture.

Since 2007, the focus has shifted toward minimising the 'socio-economic impacts' associated with sustainable water use.

In practical terms, this means the Australian Government – contrary to the weight of scientific evidence – is returning far less water than is needed to restore the Murray-Darling and some of those internationally renowned Ramsar wetlands.

Complementary measures – not a substitute for water

The latest threat to sustainable water use in the Basin is so-called 'complementary measures'. Proponents of these measures argue that certain natural resource management (NRM) actions can act as a substitute for water.

For example, it has been argued that killing European carp in the Murray-Darling system (with a herpes virus) means that the environment will need less water. The idea is that the water 'offset' by killing carp can be used for irrigation, mining or other consumptive uses rather than left in the river.

While there is no doubt that carp have a devastating effect on ecosystems across the Basin, there is no science to support the idea that pest eradication can act as a *substitute* for water. Furthermore, the CSIRO is still in the process of determining whether the carp herpes virus will have any unintended impacts on the environment or human health . In other words, it is not yet clear that the virus is safe, let alone capable of being used to offset water for the environment.

Even if the carp herpes virus is found to be safe, pest eradication should not be seen as a substitute for the water that is needed to sustain our rivers, aquifers and native species.

Up until now, pest control and other NRM actions have been used to enhance, not replace, water for the environment. For example, the Plan of Management for Narran Lakes – a Ramsar wetland in Northern NSW of particular significance to the Dharriwaa Aboriginal people – includes actions to control foxes and feral pigs. Controlling these pests is certainly necessary to protect the native birds, reptiles and animals that spend all or part of their lifecycle in the Lakes. But the Narran Lakes management plan recognises that no amount of pest control will ever change the fact that these wetlands and their dependent ecosystems need water – at the right times and in the right doses – to survive. Without this water, birds and fish cannot breed, native trees on the outer floodplain eventually die and Aboriginal customary use is disturbed.

As with the Narran Lakes, all NRM actions such as carp control should be used *in addition to* – not *as a substitute for* – the water that is needed to sustain the Murray-Darling.

Putting the science aside, the Basin Plan does not allow water to be 'offset' for complementary measures such as the carp herpes virus.

Other pressures on wetlands: Northern Basin Review

So-called complementary measures are just one of many proposals to reduce the amount of water being returned to the environment under the Murray-Darling Basin Plan.

For example, the Government is also seeking to reduce the volume of environmental water available in the Gwydir and Macquarie catchments under the 'Northern Basin review'. These catchments are home to two Ramsar wetlands, one of which (the Macquarie Marshes) was declared by the Australian Government in 2009 to be at risk of experiencing a 'change in ecological character'. It doesn't really make sense to acknowledge that a wetland is under significant stress on the one hand, but to take away even more water on the other.

Complementary measures and the proposal to reduce environmental water in the Northern Basin are particularly concerning as the extraction limits permitted under the Basin Plan are not - based on the Australian Government's own science - environmentally sustainable.

It is clear that any proposal to further compromise the Plan must be rejected by the Australian Government and the Basin State Governments (Queensland, NSW, Victoria and South Australia).

Failure to do so would undermine, yet again, the Water Act's vision for a healthy, sustainable river system.

Experience the wonderful world of wetlands with the whole family.

Enjoy geocaching, live fish demonstrations, water critter discoveries, make your own DIY herbarium, bush tucker workshops, nature crafts and more.

Other things to do include:

* Decorate and pot up your own native plant
* Sensory tub - use just your sense of touch to guess what natural materials are inside
* Natural treasures hunt
* Become an Animal Detective

Activities are designed for kids of all ages.

Early birds can enjoy a cup of tea or coffee on us.

To enjoy the day out bring picnic supplies, water bottles, sun safe gear and enclosed shoes.

All children must be accompanied by an adult.

This event is a partnership between NRM Education from Natural Resources in the SA Murray-Darling Basin and the Eastern Hills and Murray Plains Catchment Group.

Cost

Free. This program is funded by the SA Murray-Darling Basin NRM Board and the NRM levies, enabling landholders and community to play an active role in our region's future.

Children's Uni Event

Natural Resources SA Murray-Darling Basin is an approved Children's University Adelaide Learning Destination.

Amenities

There are two toilets located in the wetlands. We will provide a wash up tub. There is limited shelter so we recommend bringing your own hat and sunscreen.

Safety

Even though the water is quite shallow we recommend being mindful around the wetland and keeping an eye on your children. Try to keep on the cleared paths as much as possible and look where you are walking to avoid any surprise reptiles.

Registrations

Click the image in the header, to go through to the registration page. Please register ALL attendees including children and adults. All attendees to register for the General Admission and any extra workshops you will attend.

For more information

Contact Danielle at danielle.dutschke@sa.gov.au or 8532 9103.

MURRAY VALLEY FrogWatch SA COMPETITION

Use your smart phone to win prize packs and help us track frog communities in the Murray Valley region.

FIVE prize packs to be won

Three prize categories:

- Most frog surveys submitted
- Most sites surveyed
- First three members to become identifiers

6 JULY to 20 DECEMBER 2018

All you need is your smart phone and the FrogSpotter app is FREE!
Not yet a FrogSpotter? To register and to get the app jump onto www.frogwatchsa.com.au
See overleaf for competition rules
For more information email kate.mason@sa.gov.au

This project is supported by the South Australian Murray-Darling Basin Natural Resources Management Board, through funding from the Australian Government's National Landcare Program and NRM levies.

FrogWatch SA COMPETITION MURRAY VALLEY

Competition Rules

- Starts 9.00am 6 July 2018
- Ends 5.00pm 20 December 2018
- Competition applies to surveys and survey analysis in the Murray Valley FrogWatchSA region. Member registration can be from any region
- Entry is automatic for FrogWatchSA members, no additional entry is required.
- Registration as a FrogWatchSA member can be completed at www.frogwatchsa.com.au
- Members will be notified by email of competition updates and winners
- Winners names will only be published with consent from the winning member
- Winners for prize category 1 and 2 will be notified on 20 December 2018
- Winners for prize category 3 will be notified as each of the first three members to complete their identifier testing and analysis is complete
- The total value of the prize pool is $817
- Prizes are not transferable or exchangeable and cannot be taken as cash
- Whilst best efforts will be made to contact the winners, in the event that for any reason the winners cannot be notified after reasonable attempts, then the prize will be forfeited by the winner and redrawn to the next winner.

Prize category 1: **Most number of surveys submitted**
- Minimum of 5 different survey sites
- Surveys undertaken at night

Prize category 2: **Most number of sites surveyed**
- Surveys undertaken at night

Prize category 3: **First three members to become identifiers**
- Applicable only to the successful completion of the identifier testing for the Murray Valley Region
- Analysis of one survey required to be eligible

PSST! Want the best chance of finding the Nationally threatened Southern bell frog (*Litoria raniformis*)?
Best times for surveys are October-December

For more information email kate.mason@sa.gov.au

This project is supported by the South Australian Murray-Darling Basin Natural Resources Management Board, through funding from the Australian Government's National Landcare Program and NRM levies.

National Carp Control Plan is granted extension… but no extra funding

("Source: Article by Natalie Kotsios, The Weekly Times, 11th of September, 2018)

The National Carp Control Plan has been granted more time to complete their work.

Federal Agriculture Minister David Littleproud confirmed the Fisheries Research and Development Corporation — which is in charge of the NCCP — will get an extension to deliver the proposal, which was originally expected in December this year.

"The FRDC will be given extra time … because it is important we get the science right," Mr Littleproud told The Weekly Times.

"Once the science has been done and there is agreement from all Australian governments that it is safe to do so, releasing the carp virus would be great for the Murray Darling Basin and for farmers."

The FRDC sought a 12-month extension, to December 2019, which appears to have been granted.

The Weekly Times first reported in May fears the carp virus plan could falter because researchers did not have enough time or money to complete their work to a high enough standard. Other posts online and in other papers have since discussed some of the many concerns with the current scoping of the plan, the risks presented by the prospect of large fish kills and a lack of consideration of alternative control measures.

Although this extension is a relief to researchers, funding continues to be a challenge. The Government provided $15 million for the NCCP, but almost $4 million was put aside toward delivering the plan and further portions were put aside for legisative approvals and community consultation. The research portion appearsto be just over a third of the budget. While arguments have been put forward that some of the funds put aside for implementation in 2019 be spent on additional research, this does not appear to be the case, at this time.

A Department spokesman said the NCCP would include options for releasing the virus, an operational strategy, and analysis of the costs, benefits and risks.

It comes as the former Commonwealth Environmental Water Holder David Papps took aim at another non-native fish, suggesting trout should be destocked to improve the Murray Darling Basin for native species.

"They're aggressive competitors with certain species of native fish, occasionally referred to by some fish biologists as the rabbits of the river," Mr Papps, who also supports use of the carp virus, told South Australia's Murray Darling Basin royal commission.

LINCOLNSHIRE FISH HEALTH
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Dear Senator,

I am writing to you to express my concern at the proposed release of the Carp Herpes Virus, CyHV-3 otherwise known as KHV into the Australian Environment.

I do so as a concerned scientist and medical professional, but more importantly as a scientist with significant field experience with this particular virus in the wild environment. Unfortunately, we in the UK have lived experience not available to Australian scientists, having lived with the effects of this virus for some time. It is my hope that some good can come from this in that our experience can give you further insight into the global scientific perspective on your current proposal. It is concerning that the specific warnings and feedback provided by myself and others in the international scientific community to the National Carp Control Plan seem to be missing from your national debate.

To give you some background, my laboratory has been involved with CyHV-3, since the earliest cases in the UK. Samples taken from mortalities in imported Koi in 1989 were later confirmed when testing became possible. This made us aware of the origins of the virus and our investigations into the disease have continued ever since.

My facilities house a large volume of Carp that have survived KHV and these fish continue to provide us with insight into the disease. In addition, we have studied these and other fish species acting as carriers of the virus and their integration with wild fish, naïve to the disease. Unfortunately, such interactions are now inevitable for us as all attempts to control the virus have proven futile with many new strains emerging over time. Our work has provided a comprehensive understanding of the biology of CyHV-3 and critically, its effects on aquatic ecosystems both for carp and the organisms and water sharing their environment. Based on our long experience we advise against the plan to release this virus into the rivers and waterways of Australia.

It is concerning that the NCCP have not discussed the feedback they have received from international experts in this virus, or the methods employed when interacting with us. Matt Barwick contacted me by telephone having been told my company was heavily involved with KHV research. I asked if he wanted information to ensure that the disease never got into Australian waters and he replied that he wanted to know what he might have to deal with if it ever did. At no point did he indicate his intention to promote the deliberate release of CyHV-3 into the Australian environment.

He stated that he was seeking information to boost biosecurity and we exchanged emails. I sent him my organisations biosecurity protocols aimed at ensuring imported ornamental fish including Carp and Koi are quarantined to the highest standard so as to ensure the spread of any serious disease such as KHV is prevented. Mr Barwick replied that he would find it useful.

In later conversations with others including UK regulatory authorities, I discovered that my conversations and emails with Mr Barwick had been at cross-purposes. His intention was not to prevent the introduction of CyHV-3 to Australian waters but to use the virus as a crude form of euthanasia for unwanted Carp. Had Mr Barwick stated his true objective I would have made clear that I do not consider it safe or indeed ethical, to use this disease as a measure of controlling Australia's wild carp population.

I now make that position clear to the Australian Senate and encourage them to press for detailed transcripts of the viewpoints expressed to them by the international scientific community, it is my belief based on discussion with my peers and colleagues including those contacted by Mr Barwick that the vast

majority will not support this plan.

I am aware that Mr Barwick visited Cefas, a UK government agency whose role under legislation is to keep serious disease out of UK waterways. CyHV-3 is a notifiable disease in the UK and the decision to give it this status was based on a consensus of scientific opinion. This is supported by many countries and it is impossible to understand why a country free of the disease is even considering introducing it when there are safer alternatives without the ongoing and permanent risks associated with CyHV-3.

CyHV-3 is not the solution to over-populated rivers and has the potential to indefinitely create serious issues, not just for the rivers and waterways, but for the ecosystems and industries that depend upon them. Mr Barwick and the NCCP may be expecting a simple mass carp mortality when in reality, there will be many surviving carriers, able to repopulate rapidly with resistant offspring, perpetuating the disease and the carp population into the foreseeable future.

There are too many issues to cover in a short letter, but I will try to cover a few critical points.

The NCCP's assertions that CyHV-3 is definitively species specific does not stand up to scrutiny, Grimmett SG, Warg JV, Gethchell RG, Johnson DJ, Bowser PR (2006) found that CyHV-3 replicated in fat head minnow cells. While the NCCP have tested a small number of Australian species for replication, negative results in these tests do not prove a lack of ability for the virus to switch hosts, especially in the face of international studies that demonstrate that it can and has.

It has also been thoroughly documented that the virus can be carried and spread by all fish species tested. This is relevant as it relates to the ease of spreading and perpetuating the virus, which is exceedingly difficult to control in a wild environment, in reality it may be impossible due to the ability of the virus to be spread by water, by mucous, by other species and even fishing equipment.

The greatest risks however, lie in the impact of up to 2,000,000 tonnes of dead carp all being released in a very short period of time across Australia's waterways. Carp afflicted by CyHV-3 do not die cleanly, they sink to the bottom bleeding from necrotic lesions in the gills while open sores erupt over their bodies. The fish bleed and rot as they die with their bodies rapidly being overtaken by colonies of secondary infections including Aeromonas, Clostridium botulinum (responsible for fatal botulism) and E.coli to name a few. The degraded bodies often start to float after a few days, spreading the impacts further downstream and exposing the dead bodies to consumption by wildlife which are in turn impacted by these secondary infections.

While the public debate in Australia has correctly identified the risks to native fish species and aquatic organisms created by the anaerobic conditions and nutrient loads that follow mass fish kills, it must be noted that secondary infections present an equally serious challenge. These secondary diseases are disfiguring and left untreated, can be fatal. These diseases present a very real threat to agricultural livestock, clean-up crews and native animals, both aquatic and those depending on the waterways as a water source.

These are but a few of the considerations that appear to have been lost in discussions focused purely on black water events and the mutation capability of the virus. To ensure Australia's unique biodiversity and security, I hope that the scientific debate gives consideration to those with experience of KHV as there will be participants in the dialogue who are not in a position to understand the potential risks. KHV has had a serious impact on industry, Koi keeping and the natural environment in many countries and this is now a risk for Australia. The full ecological implications are not possible to envisage for the obvious reason that a virus is unpredictable.

Yours Sincerely,

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Contributions to the Bulletin

The Bulletin is currently issued whenever we have enough contributions. We are always looking for Coorong and Lower Lakes events and articles of interest. Contributions must reach the Lakes Hub Coordinator (info@lakeshub.com) by the start of business, the Tuesday prior to release.