

No quibbling about carp

CARP CURRENTLY MAKE UP A HUGE PERCENTAGE OF THE FISH BIOMASS THROUGHOUT THE MURRAY-DARLING BASIN. IN THEIR RECENT BUDGET THE FEDERAL GOVERNMENT ANNOUNCED THAT \$15 MILLION WOULD BE ALLOCATED TOWARDS PLANNING TO ENABLE CARP IMPACTS TO BE REDUCED THROUGH BIOLOGICAL CONTROL USING A SPECIES-SPECIFIC VIRUS. **MATT BARWICK** GIVES US AN UPDATE ON THE VIRAL BIOCONTROL AGENT, AND WHAT IT MEANS FOR THE CONTROL OF THIS INCREDIBLE ECOSYSTEM ENGINEER.

Like many Australians, fishing was a big part of my childhood, and I have two vivid memories from my first fishing trip to the Murray River at about five years of age. I remember being so excited at the possibility of catching a Murray cod... I was entranced by the size and power of this giant enigmatic native and wanted in! My first memory from that trip was of sitting on a bank of this wide, lazy river under a big old red gum, and wondering why the water was so muddy... there had been no rain recently. I assumed that maybe our big rivers had always been muddy, for reasons I didn't understand.

My second clear memory from the trip was later that afternoon when after a long wait my rod buckled and I felt the weight and tail beat of a big fish. Excitedly I shouted "It's a cod! I've got a cod!", and my family came down from the campsite to watch the tussle. After some time the big fish came to the surface and rolled in the muddy water, flashing golden in the sunlight. I remember my stomach lurching and a feeling of disgust and embarrassment washing over me. It wasn't a cod at all... It was a stinking carp.

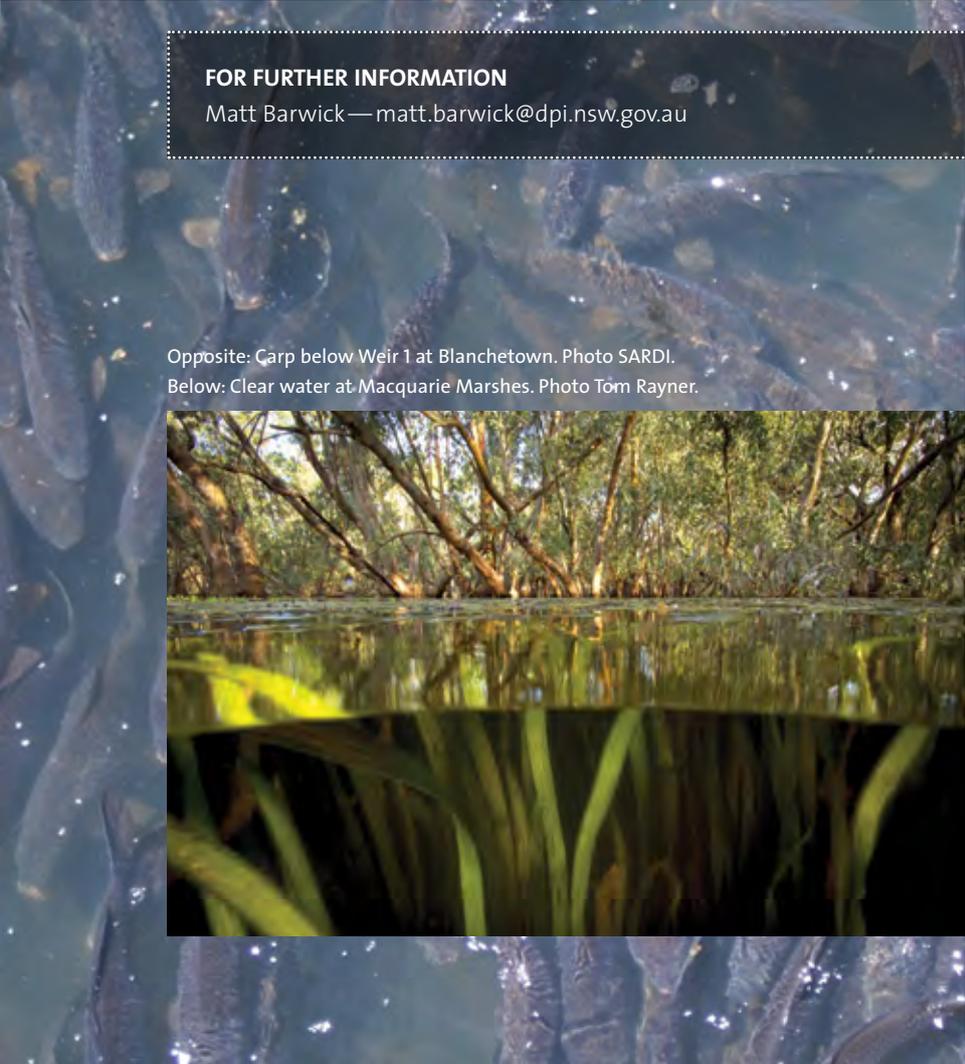
I've reflected back on that day many times since. Mostly because I'm intrigued by my strong response on seeing that fish, before I think I even knew what a carp was. It's like I was hardwired to dislike that whiskered, golden invader. I also reflect on my assumption that our big rivers were always muddy, because I now know that our big rivers aren't naturally highly turbid systems—they used to flow deep and clear. Older farmers have since shared stories with me of being able to walk the river bank and spot cod sitting on snags in 6 feet of water, and being able to spear crayfish, such was the water clarity. I, and those I work with, believe our big rivers can be clear again, but for this to happen, we must take action on carp.



It turns out I'm not alone when it comes to a sense of disdain for this piscatorial pest, in fact, according to a recent survey it's a bit of a national hobby. The Australian community rank carp among the top four most disliked and significant invasive species in Australia, along with cane toads, rabbits and feral pigs. So why the national repulsion?

There are probably a few reasons. Firstly, there are just so many of them! A single female carp can carry over 1 million eggs, and under the right conditions a small number of fish can result in a dense infestation. Unfortunately that's exactly what you can see today throughout much of our largest river system—the Murray–Darling Basin (MDB). Carp currently make up more than 80 per cent of the fish biomass throughout the MDB, and up to 93 per cent in some places. Carp impact on the health of our waterways too; they can shape their surrounding ecosystem, changing it in ways that suit themselves, and disadvantage our native species. They do this primarily through the way they feed: they are largely bottom feeders, and so mooch around taking big mouthfuls of mud, eating the invertebrates hiding in amongst it, and then spit the mud back out. In this way, they contribute to the muddy condition of our rivers which, in turn, degrades the health of aquatic vegetation by reducing the light penetrating down to the riverbed. This then influences the types and abundances of invertebrates that are present.

The ecological impacts of carp translate into social and economic impacts too. One report estimated that the economic cost of having carp in our waterways at around \$500 million per year. Much of this impact was due to the fact that carp reduce the quality of recreational fishing opportunities, which is a huge economic driver for rural and regional communities in the MDB. In fact, there are places where recreational fishes rarely go any more because all they are likely to catch is carp.



FOR FURTHER INFORMATION

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Opposite: Carp below Weir 1 at Blanchetown. Photo SARDI.

Below: Clear water at Macquarie Marshes. Photo Tom Rayner.



Fortunately, the CSIRO have been researching a potential tool for the biological control of carp over the last eight years, with funding through the Invasive Animals Cooperative Research Centre (CRC), and the results are promising. Their research shows that a naturally occurring virus called Cyprinid herpesvirus 3 (more commonly known as the carp herpesvirus) has the key characteristics of a good biological control agent: it is extremely effective in killing the target species (carp), and it doesn't affect other species. Most importantly, international experience has demonstrated that it is safe for humans too.

The level of public interest on this issue became apparent in January 2016, when over 250 media outlets, as far afield as the United States and China ran stories on the potential to control carp in Australia through biocontrol, which resulted in over six million tweets on this topic over a two-week period. It seems the collective imagination of the Australian public has been activated by the potential to address issues caused by the worst freshwater pest species our nation has seen.

Though biocontrol gives new hope to those wishing to see carp disappear from our waterways, and the recent announcement of federal investment will provide significant assistance at the perfect time, it is important to recognise that there is much yet to do.

First, there is a need to complete a detailed legislative approval process, which will take up to two years. There is also a need to complete a thorough risk assessment and undertake public consultation on this issue to ensure the views of the Australian community are well understood. There is a need to undertake monitoring activities before and after release of the virus, so we can document how our aquatic ecosystems and fisheries respond to carp reduction and, of course, there is a need to implement an effective clean-up program to remove dead carp from our waterways and ensure native species and water quality is protected.

If you would also like to keep up to date on progress with this exciting initiative, 'like' the Clearer Waters Facebook page, visit www.agriculture.gov.au/carp-plan, or the Invasive Animals CRC's Pestsmart website at www.pestsmart.org.au/pest-animal-species/european-carp.

...in the national finterest



THE END OF A GOLDEN ERA?

FREQUENTLY ASKED QUESTIONS

How can we be sure that the virus will only affect common carp?

Over the last eight years Dr Ken McColl from CSIRO and his colleagues have been tirelessly testing the carp herpesvirus on a suite of fish species, as well as examples of bird, mammal, reptile, amphibian and crustacea species. This research has demonstrated that the virus only replicates in Common carp. This is perhaps not too surprising, as herpesviruses are generally specific to a single host species, but it is reassuring to see the research confirm this.

Importantly, the work by Ken and his colleagues has also shown that carp present in Australian waterways are extremely susceptible to the virus, and international case studies have demonstrated that under the right conditions, the virus will kill 70–100 per cent of carp in a population that has not been exposed to the virus before.

Will the carp herpesvirus eradicate carp from Australian waters?

It is important to ensure we have a shared idea of what success looks like in terms of carp control in Australia. Total eradication of carp is implausible. Once a pest species is introduced, it is extremely difficult to remove that very last one. It is entirely possible, however, to significantly reduce the impacts of a species by dramatically reducing their numbers—and this has always been the objective of Australia's carp biocontrol program. For this, it will be important to combine implementation of the carp herpesvirus with the strategic application of a range of measures to control carp and promote recovery of native fish communities.

How do we know that carp won't just become immune and repopulate our rivers again?

To overcome the possibility of carp slowly repopulating after the virus is released, it will be important to target the wetlands which contribute the vast majority of juvenile carp to the MDB. Releases of the virus in these areas just after the spawning season will hit them when they are most vulnerable, thereby preventing successful carp recruitment.

Work to investigate a more virulent strain of the virus will help to overcome any future immunity. The release of the carp herpesvirus will also provide an opportunity to simultaneously restore native fish habitats, improve water quality and restore migratory pathways for native fish, to help ensure that carp numbers do not recover.

Can't we just keep using the control methods that we have been using to control carp?

Over the last two decades there has been millions of dollars and many hours invested exploring an exhaustive list of measures to try and control carp in Australia. These include: commercially fishing for carp, installing screens to exclude them from areas containing their preferred types of habitat, trapping them, using sex pheromones to improve the effectiveness of traps, targeting our control efforts on carp 'hotspots' and fitting individual fish with radio transmitters so they can lead us back to their school, enabling us to efficiently target aggregations.

Large accumulations of carp in dense aggregations in deeper holes have been targeted, and technology such as the daughterless carp genetic construct is being trialled which would shift the sex ratio of carp populations by reducing the number of females present in the population.

Despite significant investment in these control measures carp persist as a dominant force in the aquatic landscape. The carp herpesvirus offers the most promising option at this time for the control of carp due to the fact that it is highly effective in killing carp, and is safe for non-target species, including humans.

If the virus is released it will kill a lot of carp. Won't that impact on water quality, and so risk our native fish species?

It is vitally important to ensure that we protect water quality so as to prevent negative impacts on our native species and to ensure ongoing access to clean water for human use. This will be managed by resourcing the job sufficiently and by using appropriate methods to effectively remove dead carp from the waterways.

Detailed research and modelling is currently being undertaken in collaboration with researchers from Water NSW to inform planning for the clean-up strategy. This work will identify carp biomass thresholds that impact on water quality, which can then be used to work out how much carp needs to be removed from the system to prevent negative impacts.

International case studies from places like Japan and North America where large-scale clean-up efforts have been successfully employed have also been investigated to help with formulating our approach.