



NATIONAL CARP CONTROL PLAN  
RESTORING NATIVE BIODIVERSITY

# THE NATIONAL CARP CONTROL PLAN

PROGRESS REPORT - JUNE 2019



In April 2019, the National Carp Control Plan (NCCP) held an event in Canberra to present a summary of the NCCP research program to its advisory groups.

The aim was to discuss the implications of research results on the feasibility of releasing a carp herpes virus as a biocontrol agent to control carp in Australia.

The research overview focused on biophysical projects commissioned as part of the NCCP research program, with updates about the other research to be provided later in 2019.

The broad conclusions for the research program to date include the following:

- The risk to humans from the virus is negligible.
- Current carp biomass is likely to be at the lower end of previous estimates.
- There is potential for positive ecological responses within particular parameters.
- Some concerns remain around water quality, including ammonia, anoxia and cyanobacteria risk. These risks are now being quantified through modelling.

## Risk of human infection

Dr Katrina Roper and Laura Ford worked on a project to investigate the risk of infections in humans from the carp herpes virus. They found no evidence that there is any risk and therefore there is no need for further work into the question of human susceptibility. The virus (CyHV-3) needs temperatures from 18°C to 28°C to grow, so the human body is too hot for it to survive.

The research team also addressed the possible psychological effects that witnessing a mass fish death event could have on humans, particularly children, and made recommendations on how to best mitigate such impacts.

Researchers suggested it would be important to prioritise clean-up of dead fish in areas that are highly visible, such as Lake Burley Griffin in the centre of Canberra. This would help reduce the psychological impact on humans of a mass carp death event. Children witnessing this event were identified as being particularly vulnerable and possibly needing additional information to help process the occurrence.

The recommendation is to develop age-appropriate pamphlets to help parents discuss the issue with their children.

## Why control carp: exploring potential ecosystem responses to carp reduction

This project examined the potential impact of a reduction in carp on a range of species and ecosystems using a process of expert elicitation. Experts considered four different carp reduction scenarios and the implications for seven different groups – fish, macrophytes, macroinvertebrates, waterbirds, amphibians, algae and zooplankton – as well as water quality.

There was broad agreement that all categories except herbivorous birds would be positively affected by a reduction in carp numbers. However, the report cautions that for this to be the case, carp numbers would have to be reduced to 125 kilograms per hectare (or approximately by 70 per cent of existing carp populations).



### Carp biomass study

Understanding carp biomass and distribution is essential to inform planning for carp control. In addition, carp biomass mapping is needed to inform NCCP research projects modelling water quality impacts and epidemiology, and to assess the risks, costs and benefits of carp eradication.

The Arthur Rylah Institute has completed the first continental-scale assessment of carp biomass and distribution.

The biomass estimates represent a single 'point in time' assessment of biomass during a wet year (May 2011) and a dry year (May 2018). The overall biomass estimates will be released shortly. The estimate is lower than was initially predicted.

The project has estimated carp density across a diverse range of aquatic environments, from individual wetlands to large river reaches. Carp are distributed across more than 16,000 square kilometres of Australia including southern Queensland, with lower-density populations in Western Australia. In addition, a national map of aquatic environments was created which will now provide a valuable planning tool for managers of inland water environments.

The project results show carp populations at densities from 200 to 400 kilograms per hectare through much of the middle and lower reaches of Australia's major southern river systems. The highest densities are recorded in lower system wetlands in the Murray, Murrumbidgee and Lachlan catchments.

A major project outcome is that sites where carp density is high enough to cause significant environmental damage can now be identified. Previous research indicates that carp cause environmental impacts at 80 to 100 kilograms per hectare. This project now identifies where carp control efforts should be directed to achieve an environmental outcome.

The researchers caution that the estimates do not include irrigation channels, small farm dams or validation for river systems. For Western Australia, inadequate data was an issue for the project. For Tasmania, only 20 carp are estimated to remain in Lake Sorell after a concerted eradication program.

A follow-up NCCP project has been commissioned to develop a model of carp biomass over time, to help predict carp populations under specific climatic conditions.

### Water quality studies

Understanding water quality impacts of carp mortality is important to assess the risks of virus release and inform clean-up activities. The NCCP has three water quality projects that assess the effects of carp biomass on:

- dissolved oxygen;
- blue-green algae outbreaks; and
- water treatment operations.

### How will carp biomass affect dissolved oxygen and nutrients?

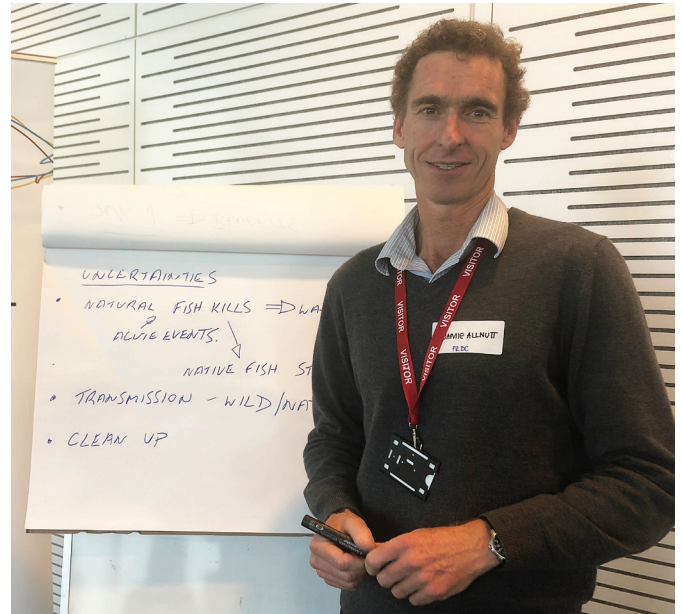
The University of South Australia has modelled the effect of the NCCP-mapped carp biomass on dissolved oxygen and nutrients across eight case study areas factoring in different conditions relating to temperature, flow and habitat. Water quality risks include hypoxia (low oxygen levels) and anoxia (no oxygen).

Early results show that even for the highest-possible densities of decomposing carp, there would not be a significant and sustained drop in dissolved oxygen to a point that would impact on native fish. The work also highlights that reduced levels of dissolved oxygen increase significantly with higher water temperatures and low flow and wind conditions.

Temperature was found to be a significant factor in the rate of hypoxia and anoxia onset. For example, ponds at 18°C became hypoxic 66 per cent faster than ponds at 12°C. In light of this, the project recommends that seasonal conditions be taken into account in relation to virus release.



National Carp Control Plant Coordinator Jamie Allnut at the recent presentation of research findings.



The research on nutrients from carp biomass shows that nutrients will spike in the first few weeks of a carp mortality event. Early results indicate that most nutrients are unlikely to create problems for aquatic environments. Ammonia levels provided the most risk at the highest levels of carp biomass.

**How will carp biomass affect blue-green algae outbreaks?**

The University of Adelaide also developed a similar model to assess whether carp biomass would cause blue-green algae (cyanobacteria) outbreaks. Project results show that temperature stratification in the water column is an important precondition for blue-green algae growth. Temperature stratification is likely during drought. Low water flow and high temperatures increase the risk for blue-green algae growth. Early results show that for five case study areas in high carp biomass areas, there was sufficient flow to prevent stratification. However, blue-green algae outbreaks could occur in localised areas of low river flow and high temperatures.

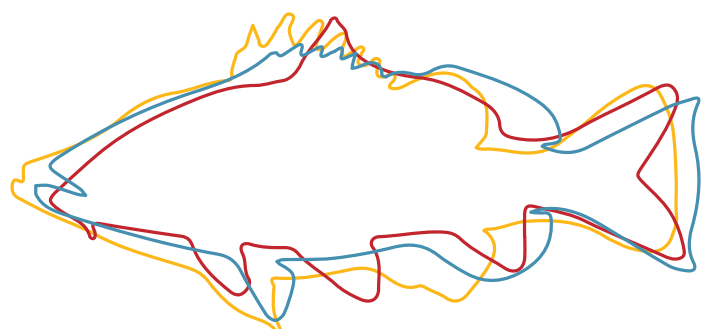
**How will carp biomass affect water treatment?**

This NCCP research project is testing how high densities of carp would break down into nutrients and particles and how this would, in turn, affect standards and treatments for water management for human consumption.

Early results of this research highlight that most elements in decomposing carp can be treated with existing treatment strategies, although high ammonia levels resulting from high densities of decomposing biomass could cause ecological risks and challenges for water treatment. Strategies to manage ammonia risk are being investigated by the NCCP.

The main messages from the water quality studies are:

- Increases in ammonia levels from carp biomass provide some risk to the environment and water treatment in very high biomass locations.
- Based on the assessed levels of carp biomass there are no significant broadscale risks to water quality or of blue-green algae outbreaks, although inland water quality conditions vary considerably.
- Water quality impacts can be managed with effective rapid clean-up at higher-risk locations.
- Biomass impacts can be substantially managed by existing water treatment processes.



### Clean-up project

A desktop study looking into methods for clean-up was completed last year. A number of techniques were identified, but dip nets from small boats was the most common technique used. However, there were few examples of intentional fish kills around the world to draw upon.

### Susceptibility of non-target species

The feasibility of the release of the carp virus depends on demonstrating that it is species-specific and does not affect non-target species.

There is considerable evidence that the carp virus is species-specific. The virus has existed in 33 other countries and since its discovery there has been no evidence of it infecting other non-target species.

Research completed by Ken McKoll and others in 2016 established that the CyHV-3 virus killed carp effectively. He also tested 22 species, including 13 native fish species and Rainbow Trout, and found that none of these species were susceptible to the virus.

However, the NCCP is committed to requiring a high level of evidence to ensure stakeholders and decision-makers can be confident that the virus will not harm other species. Based on questions from previous research, the NCCP identified the need to complete a review of non-target species research with the aim of ensuring that best practice testing was completed for virus susceptibility.

In early 2018 the NCCP commissioned Dr Stephen Pyecroft, a leading animal disease expert, to undertake a comprehensive review of published studies on the topic. When this review is completed it will be assessed by the NCCP's Science Advisory Group as well as independent leading scientists. The review is addressing the following questions:

- What is the most effective diagnostic approach to determine resistance of non-target species to CyHV-3 infection?
- How will unexplained mortalities and false positives be addressed when testing the resistance of non-target species?

- Should stressors be deliberately applied when assessing the resistance of non-target species to CyHV-3 infection?
- Should all life stages of fish be evaluated when assessing the resistance of non-target species to CyHV-3 infection?
- What is the potential for non-target species of fish beyond those previously investigated to become infected by CyHV-3?

The review will recommend next steps to ensure that the highest standards of assessment will be applied to investigating the susceptibility of non-target species to the virus.

The NCCP will publish an issues paper on this topic in the latter part of 2019.

### Delivery to government

For the NCCP team, the task is now to review the knowledge generated from the NCCP research program, community consultation and case studies and to develop a draft plan. Essentially the plan document will provide the Australian Government with the information required to make a decision on whether or not to release the virus.

### Issues papers

Six issues papers will provide a foundation for ongoing discussion and engagement between the NCCP and key stakeholder groups as the NCCP is being drafted. So far, three issues papers have been drafted:

- Issues paper 1 provides background to the NCCP and carp control more broadly.
- Issues paper 2 discusses how the virus is likely to affect Australian carp populations, and how it might best be used to reduce carp populations.
- Issues paper 3 explores viral species-specificity.

The remaining issues papers will be completed in the coming months.

## WANT TO FIND OUT MORE ABOUT THE NCCP?

You can get in touch with the National Carp Control Plan team at:  
[carp@frdc.com.au](mailto:carp@frdc.com.au)

News and information on the individual research projects can be found on the NCCP website:



[www.carp.gov.au](http://www.carp.gov.au)