Cotter Reservoir EHN Virus Management Plan

Version 1.1, 25 September 2018

Document management

Document summary

Title	Cotter Reservoir EHN Virus Management Plan
Version	1.1
Document status	Draft
Date of issue	25 September 2018

Document development

	Name	Position	Date
Prepared by	Angus Fanning	Environmental Consultant	14/06/2018
Reviewed by	John Hyam	Environmental Monitoring Officer	

Version control

Version	Author	Date	Description	Approval
1.0	Angus Fanning	18/06/2018	First Draft	
1.1	John Hyam	25/09/2018	Correction to references and syntax	

Table of Contents

1. Introduction

1.1. What is the EHN Virus?

Epizootic Haematopoietic Necrosis (EHN) Virus is a ranavirus and is a member of the *Iridoviridae* Family. The virus is unique to Australia and was first detected in Australia in Redfin perch from Lake Nillahcootie, Victoria in 1984 (Langdon et al., 1986) and in New South Wales in 1986 in Redfin perch from Blowering Reservoir and Lake Hume (Reddacliff, 1996).

The EHN Virus is associated with sudden high fatality rates in fish (especially during spring and summer). Fatality typically involves necrosis of the liver, kidney, spleen and pancreas. Clinical signs of disease in an infected fish include a swollen abdomen, darkened skin colour and haemorrhaging at the gills and base of the fins. Death might be preceded by erratic swimming behaviour near the surface of the water (Australian Government, 2016).

The EHN Virus is highly resistant to sunlight, drying and disinfection and can persist for months in infected sites such as water or sediments. It can remain infective for nearly 100 days in water and more than 112 days in dried fish tissues (Whittington et.al, 2007).

1.2. Potential threat posed by the EHN Virus

The EHN Virus, which is closely associated with Redfin perch as its main carrier, can be transferred to new areas by several means including distribution by water, recreational fishing equipment and birds.

Following identification of the EHN Virus in 1986 (in the Broken River in Victoria), it has spread into areas in NSW, Victoria and ACT. Often the spread of the EHN Virus has been closely associated with the widening distribution of Redfin perch, which is an alien fish species and a major vector.

In the ACT, Redfin perch were first recorded in Lake Burley Griffin in the mid-1980s and since then have steadily colonised Canberra's other urban lakes, rivers and the nearby Googong Reservoir in NSW. Given the close association between Redfin perch and the EHN Virus, and that the virus is confirmed in Lake Burley Griffin, Lake Ginninderra and Googong Reservoir, it is considered likely that the virus is or has been present in water bodies where Redfin perch are present, including other urban lakes, Murrumbidgee River and Cotter River below the Cotter Dam. The Cotter Dam has remained a vital barrier to movement of Redfin perch upstream into the Cotter, Bendora and Corin Reservoirs.

Given their favourable reputation among recreational fishermen, Redfin perch are sometimes transferred deliberately to other catchments. Redfin perch have also been stocked into farm dams, from which they sometimes escape to rivers and lakes during storm events. Fishermen might also accidentally transfer the EHN Virus in live bait (e.g. in juvenile Redfin perch) or on their boats, boots or fishing equipment.

It is also suspected predatory birds could carry the EHN Virus on their feathers, feet or bills, or as droppings or regurgitated food.

Given the many potential sources of introduction, the spread of the EHN Virus is largely uncontrollable, however if Redfin perch can be excluded, there is potential that the virus may not persist, due to the absence of a suitable vector.

Native fish species known to be susceptible to EHN Virus include Macquarie perch, Silver perch and Mountain Galaxias. Of the threatened native fish species in the Cotter Reservoir, the Macquarie perch is considered to be most seriously at risk, having recorded very high fatality rates following infection with the EHN Virus under laboratory conditions.

1.3. Means of detecting the presence of EHN Virus

Two general methods can be applied to detect the introduction of the EHN Virus into a water body:

- Monitoring of fish populations for signs of disease (refer to Section 1.1 above for clinical signs of disease) and investigating all disease outbreaks to determine if EHN Virus was the cause;

- Undertake surveillance for the virus based on statistically valid sampling practices and field procedures (including the collection of the correct organs / samples from fish, including liver, kidney

and spleen) and then test in the laboratory for the presence of the EHN Virus in these fish tissue samples.

During the EHN Virus Workshop in October 2009 held in the Bulk Water Alliance (BWA) office in Canberra, Professor Richard Whittington advised that such surveillance would involve very large random samples of each fish population to be tested, as well as any sick or dead fish. It was noted that, assuming 2% of fish in a population are infected, a random sample of 150 fish from a fish species would need to be tested to be 95% certain of detecting at least one infected individual. Surveillance to determine the presence of EHN in the Cotter Reservoir was therefore not considered feasible given the impacts large sample sizes, necessary to provide statistical certainty, would have on the relatively small population of 300 to 600 adult Macquarie perch.

A study undertaken by Sydney University's Faculty of Veterinary Science in 2008, on behalf of Icon Water, aimed to determine whether the EHN Virus was present in several susceptible fish species in the Cotter Reservoir. The testing procedures used the most sensitive and specific methods currently available when analysing a sample of nearly 600 fish obtained from above, below and in the Cotter Reservoir.

Results indicated the fish sampled during the study (alien Eastern gambusia, Redfin perch and Rainbow trout and native Mountain galaxias) were free from the EHN Virus.

No Redfin perch were captured within the Cotter Reservoir during this sampling, or during more recent monitoring and sampling as a component of the *ECR Fish Monitoring Program* (Broadhurst et.al, 2017, Broadhurst et.al, 2018).

Icon Water will note any potential EHN virus signs in fish populations within the reservoir during its ongoing monitoring program in the Enlarged Cotter Reservoir through the *ECR Fish Monitoring Program*.

2. Requirements related to the EHN Virus

2.1. Responsibility for EHN Virus Prevention

Management of the Cotter Reservoir and surrounding land including control of public access and recreational use is the responsibility of the ACT Parks and Conservation Service (PCS). Access to the Cotter Reservoir for water-based recreational activities and fishing is not permitted.

Icon Water is responsible for the operation of the Cotter Dam wall and associated infrastructure. Icon Water therefore needs to ensure that its employees and contractors engaged in the operation and maintenance of the dam infrastructure are informed and are compliant with EHN Virus prevention measures. The scope of this EHN Virus Management Plan only includes the Icon Water responsibilities related to operating the dam infrastructure and not the wider land management which is a PCS responsibility.

2.2. Approval Requirements

The Commonwealth Department of Environment and Energy (DoEE), previously the Commonwealth Department of Environment, Water, Heritage and the Arts (DEWHA), approval conditions (for the construction of the Enlarged Cotter Dam) relating to the EHN Virus require:

- *Identification and implementation of measures to sterilise the area between the existing Cotter Dam wall and the Enlarged Cotter Dam wall from all aquatic fauna or pathogens that would adversely impact the Macquarie Perch.*

- *Monitoring the Cotter river catchment for the presence of EHN virus and the development of a response plan in the event the EHN virus is detected.*

Sterilisation

The "EHN Virus free" status in the Cotter Reservoir (refer to Section 1.4) meant that Icon Water (then, ACTEW) during the construction phase, initiated a number of actions to ensure that EHN Virus was not introduced into the reservoir due to activities associated with the construction of the Enlarged Cotter Dam. These actions included the sterilization of the area between the two dam walls so that any virus

present downstream of the old dam wall is not transferred into the enlarged reservoir when the old dam wall was overtopped. The other main action undertaken by Icon Water involved the disinfection of vehicles and equipment when they were moved from an area which was potentially contaminated with EHN Virus into an EHN Virus free zone. This process continues through Icon Water's operations within the Cotter Reservoir catchment area and is guided by the EHN Virus Work Instruction: *Vehicle wash-down, outboard motor use and EHN virus prevention* (WI03.01.06) as part of the IMS (14001:2004) system.

The potential presence of the EHN Virus will be monitored using the presence (or absence) of Redfin perch (as part of the *ECR Fish Monitoring Program*), as this species is the primary vector in the spread of the disease and has a recorded 70% mortality rate from the EHN Virus.

Monitoring

The ECR Fish Monitoring Program includes sampling for a range of alien and native fish species within and upstream of the Cotter Reservoir. During the course of this monitoring all fish, including Redfin perch, which are collected will be inspected for signs of EHN infection (e.g. bleeding near the fins or gills, swelling of the stomach and erratic swimming near the surface of the water) and if disease symptoms are present will be tested for the virus. More details of signs of EHN infection are described in Appendix 1.

2.3. Development of an EHN Virus Response Plan

The basis for an EHN Virus Response Plan was discussed at the EHN Virus Workshop held by Icon Water (then ACTEW) and Bulk Water Alliance (BWA) in October, 2009. The workshop was attended by Icon Water staff, University of Canberra researchers, as well as BWA construction, fish management and environmental personnel. Leading the workshop were experts from the University of Sydney's Faculty of Veterinary Science, namely Professor Richard Whittington and Dr Joy Becker.

Based on Professor Richard Whittington's advice at this workshop, the management approach to the EHN Virus was based upon the framework provided by the *Aquavetplan Operational Procedures Manual: Decontamination* (2008), "*Aquavetplan*" being the abbreviation for the Australian Aquatic Veterinary Emergency Plan.

Applying the principles from the *Aquavetplan* manual, the Cotter reservoir would be classed as an "*open system*", i.e. dam and a river, populated by a mixture of native and alien fish, in a large area with only very limited, or no control over fish movement. The response to a disease outbreak would differ from that applied to other systems (e.g. closed, semi-closed or semi-open systems, as defined by *Aquavetplan*), which would be typified by a fish farm or aquaculture site.

The *Aquavetplan* manual acknowledges that once the EHN Virus enters an open water body (e.g. major reservoir); there will be very few options available for its eradication. This is due largely to the open nature and large size of the Cotter Reservoir and its catchment. This was confirmed by Professor Richard Whittington during the EHN Virus workshop.

Suggested methods included in the *Aquavetplan* for eradication of the virus once it enters a water body are:

- Eradication by destocking (culling) of fish;
- Control and eradication, including physical methods and possible use of fish toxicants and;
- Decontamination or disinfection of the affected area.

Should Redfin perch (as a major vector for the EHN Virus) be detected in the Cotter Reservoir, Icon Water will call upon the expertise of Professor Richard Whittington and his team to identify the most suitable measures, as described in the *Aquavetplan*, to respond to the presence of the virus, noting that options may be limited.

The *Aquavetplan* may be accessed online from:

http://www.agriculture.gov.au/animal/aquatic/aquavetplan

Given the difficulties in applying Aquavetplan principles to the Enlarged Cotter Reservoir, Icon Water focus is on excluding the virus. Measures to help exclude the virus, during the filling and operational phase, include:

- Educating the general community and Icon Water staff about the threat posed by the EHN Virus and the procedures they are required to follow should EHN Virus be suspected within the Enlarged Cotter Reservoir; and
- Notifying the appropriate authorities if the presence of the EHN Virus in the Cotter Reservoir is confirmed (refer Section 3.2).

Once EHN Virus has entered a water body it is considered impossible to eradicate (Whittington *et al*. 2007).

In other words, once the presence of the EHN Virus in the Cotter Reservoir is confirmed (e.g. by the presence of diseased Redfin perch), it will be virtually impossible to successfully eradicate the virus from the reservoir. The activities proposed in the following section of the Response Plan, deal with Icon Water's measures (in response to the threats applied by the organisation) in keeping the virus out of the reservoir, and focus on prevention rather than cure and pre-emptive action rather than reaction.

Accordingly, the measures, monitoring and inspections documented in this Response Plan focus on possible ways to prevent the EHN Virus from entering the Cotter catchment, upstream of the Enlarged Cotter Dam.

3. Icon Water Management and Response Plan

3.1. Awareness and Training

Awareness and training for Icon Water staff working in the Cotter catchment is an essential measure to minimise the spread of the EHN Virus arising from Icon Water's operations. Icon Water staff and contractors need to clearly understand the risks associated with the introduction of EHN Virus into the Cotter Reservoir. Accordingly, an EHN Virus awareness program and an associated Work Instruction has been implemented to increase the understanding of the potential risks of EHN Virus to threatened fish species in the Enlarged Cotter Reservoir.

The awareness program covers the following topics:

- What is the EHN Virus?
- What are the risks associated with EHN Virus?
- What are the implications if the EHN Virus is introduced into the Cotter Reservoir?
- Where the EHN Virus is currently found and how is it spread?
- What can be done to prevent EHN entering the „EHN Virus free" zone of the Cotter catchment and how can I ensure that I do not transfer EHN Virus? (I.e. how do I comply with the Work Instruction?)

3.2. Reporting and Notification

If Redfin perch or dead fish are detected in the reservoir or the Cotter River upstream of the impoundment the Icon Water Environment & Sustainability Manager will be notified. The Manager (or delegate) will then request the ACT Government to conduct the necessary sampling and testing to determine the presence, or absence, of the EHN Virus in fish.

If the EHN Virus is confirmed to be present in the Cotter Reservoir, it is expected that the ACT Government would then notify the relevant agencies at State, Territory, National and International levels. According to the Department of Agriculture, Fisheries and Forestry (DAFF) publication, *Aquatic Animal Diseases Significant to Australia: Identification Field Guide (3rd ed),* a fisheries pathologist will be contactable in the event of fish kill or disease.

The World Organisation for Animal Health (Office International des Epizooties) (OIE) would also need to be notified in accordance with Australia's international obligations.

4. References

Australian Government, Department of Agriculture, Fisheries and Forestry: Biosecuirty. 2016. *Aquatic Animal Diseases Significant to Australia: Identification Field Guide 4th Editiion: Epizootic haematopoietic necrosis (EHN)*. Australian Government, Canberra.

Broadhurst, B. T., Clear, R. C., Fulton, C. and Lintermans, M. (2017). *Enlarged Cotter Reservoir ecological monitoring program: technical report 2017*. Institute for Applied Ecology, University of Canberra, Canberra.

Broadhurst, B. T., Clear, R. C., Fulton, C. and Lintermans, M. (2018). *Enlarged Cotter Reservoir ecological monitoring program: technical report 2018*. Institute for Applied Ecology, University of Canberra, Canberra.

Langdon, J. S., Humphrey, J. D., Williams, L. M., Hyatt, A. D. and Westbury, H. A. 1986. First virus isolation from Australian fish: an iridovirus-like pathogen from redfin perch Perca fluviatilis L. *Journal of Fish Diseases 9:* 129-135.

Reddacliff, L.A., & Whittington, R.J. (1996). Pathology of Epizootic Haematopoietic Necrosis Virus (EHNV) infection in rainbow trout (Oncorhynchus mykiss) and redfin perch (Perca fluviatilis L.). Journal of Comparative Pathology 115, 103–115.

Whittington, R., Becker, J., Tweedie, A. and Gilligan, D., 2007. *Susceptibility of previously untested fish species to EHN Virus, and the epidemiology of EHN Virus in the Murray Darling Basin.* Presentation given at the Fisheries Research & Development Corporation's Aquatic Animal Health Subprogram Conference, 25–27 July 2007, Cairns, Australia.