Report to the Commonwealth Department of the Environment:

Annual Performance Report (2015) against the Enlarged Cotter Dam Fish Management Plan Version 3

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Introduction

This performance report outlines Icon Water's performance against Version 3 of the Enlarged Cotter Dam (ECD) Fish Management Plan (FMP) V3 as required under the Commonwealth Department of the Environment's conditions of approval:

'*The person taking the action must implement the Plan. Every year the person taking the action must submit to the Minister a report covering performance against the Fish Management Plan. The date of the first report must be provided on 19 January 2011, with each subsequent report to be provided 12 months from the date of the previous report'*

Icon Water has completed all the requirements of the ECD FMP V3 and associated sub-plans throughout the reporting period (2015). This performance report is structured against each of the sub plans.

This Performance Report should be read in conjunction with the ECD FMP Version 3 available on Icon Water's public website at http://www.iconwater.com.au/Sustainability-and-Environment/Environmental-compliance/Operational%20compliance%20reports/Cotter-Dam-operational-compliance.aspx.

Background

As a condition of approval for Icon Water to construct and operate the ECD, the Commonwealth Environment Minister directed Icon Water to manage the potential environmental impacts to five threatened native aquatic species in the Cotter River system, particularly the rare and threatened species protected under the *Environment Protection and Biodiversity Conservation Act 2000*. The specific fish species identified by this direction are:

- Macquarie Perch (*Macquaria australasica*) Threatened
- Trout Cod (*Maccullochella macquariensis*)
- Murray Cod (*Maccullochella peelii*)
- Two-spined Blackfish (*Gadopsis bispinosus*) Rare
- Murray River Crayfish (*Euastacus armatus*).

In order to minimise and manage threats to threatened aquatic species a series of ECD Fish Management Plans are being prepared by Icon Water. To date three versions of the ECD Fish Management Plan have been completed. The final report (ECD Fish Management Plan V4) will be compiled once the reservoir has reached full water holding capacity.

Version 1 of the Fish Management Plan (FMP) documented projects providing information required for the management of threatened aquatic species. Version 2 of the FMP provided information and measures, based on the results of Version 1 projects, to help protect aquatic communities in the Reservoir and Cotter River during the construction of the ECD. Version 3 of the FMP, valid since November 2013, focuses on the ongoing management of threatened aquatic species during the filling and operational phase of the ECD.

The overarching objective of the FMP V3 is:

"*To ensure that the filling and operation of the Enlarged Cotter Reservoir does not compromise the maintenance and rehabilitation of native fish and crayfish species*."

The FMP (and associated sub-plans) is:

- designed to prevent or mitigate risks to threatened aquatic fauna and their habitats arising from the construction and operation of the enlarged Cotter Dam
- scientifically based, using adaptive management
- robust in terms of stakeholder involvement, peer review and public transparency

- timely and updated on the basis specified in the approval conditions
- developed as part of the overall requirements of the Enlarged Cotter Dam
- effective in terms of use of resources and expertise whilst at the same time ensuring the protection of threatened species.

The FMP sub plans are:

- ECD Fish Monitoring Program
- Management of Macquarie Perch During Filling Phase Plan
- Alien Fish Management Plan
- EHN Management & Response Plan.

ECD Fish Monitoring Program

The ECD Fish Monitoring Program is a key requirement of the ECD FMP V3. The Fish Monitoring Program focusses on 10 management questions that aim to determine the impact of the filling and operation of ECD on populations of the two focal species (Macquarie perch and Two-spined blackfish) and potential threats (predators and competitors) in the ECD and river upstream.

The 10 management questions that underpin the Enlarged Cotter Reservoir Ecological Monitoring Program are:

1. Has there been a significant change in the abundance and body condition of Macquarie perch in the enlarged Cotter Reservoir (Young-of-Year, juveniles and adults) as a result of the filling and operation of the ECD?
2. Has there been a significant change in the abundance, body condition and distribution of the Macquarie perch in the Cotter River above and below Vanitys Crossing as a result of the filling and operation of the ECD?
3. Have Two-spined blackfish established a reproducing population in the enlarged Cotter Reservoir and are they persisting in the newly inundated section of the Cotter River?
4. Has there been a significant change in the abundance, distribution and size composition of adult trout in the enlarged Cotter Reservoir as a result of the filling and operation of the ECD?
5. Has there been a significant change in the abundance and size composition of trout in the Cotter River upstream of the enlarged Cotter Reservoir as a result of the filling and operation of ECD?
6. Are Two-spined blackfish and Macquarie perch present in trout stomachs in the Cotter River?
7. Has there been a significant change in the abundance and distribution of non-native fish species in the enlarged Cotter Reservoir as a result of the filling and operation of the ECD?
8. Has there been a significant change in the abundance, distribution and species composition of piscivorous birds in the vicinity of the enlarged Cotter Reservoir as a result of the filling and operation of the ECD?
9. Have macrophyte beds re-established in the enlarged Cotter Reservoir?
10. Are there adequate food resources (particularly decapods) for the Macquarie perch following the filling and operation of the enlarged Cotter Reservoir?

A team from the University of Canberra and the Australian National University conducted monitoring work in 2015 on behalf of Icon Water. The report titled *Enlarged Cotter Reservoir Ecological Monitoring Program: Technical Report 2015* describes the results of the monitoring. Thie findings presented for this ECD FMP performance report (from the monitoring program) therefore relate to the period of monitoring conducted in 2014/15 and drawing comparison to previous 2013/14 monitoring period and other scientific knowledge. A summary of the work is provided below.

No discernable change was detected in the population of Macquarie perch in the ECD between Phase 1 (2010-2013) and Phase 2 (2014 onwards), with one important exception being the absence of young-of-year in the first year of filling. This indicated spawning or early recruitment failure in the lower catchment. At the time of the 2013 spawning season (late spring/early summer) the filling ECD

headwaters were situated in the middle of a series of large impassable natural barriers. These barriers have likely precluded Macquarie perch from reaching suitable spawning habitat resulting in spawning failure for 2013/2014. In 2014/2015 the water level of the ECD was close to a medium-sized barrier which may have provided interrupted access to suitable upstream spawning habitat. Of note however were low levels of recruitment observed in both filling years in some/most of the Cotter River sites upstream of the ECD, which may suggest a catchment wide phenomenon occurring (relatively localised as young-of-year were detected in the reference site on the upper Murrumbidgee River in both 2014 and 2015). Water temperature and flow in the lower Cotter did not appear to be outside recent norms in 2014 and 2015, though neither can be fully discounted as being causal at this stage.

During the snorkelling survey conducted in November 2015, eleven pools were sampled from the small pool immediately upstream of the head waters of Cotter Reservoir up to and including the pool immediately upstream of Vanitys Crossing with no Macquarie perch larvae or juveniles observed in any of the pools surveyed. (Broadhurst at al. 2015b).

As Macquarie perch are a long-lived species, failure to recruit to the population for one to two years is of some conservation note, but doesn't yet warrant a targeted management response. Further consecutive years of failure may however result in greater concern and more serious effects on the population.

Two-spined blackfish continued to be rare in the ECD, with only a few individuals being detected in the newly inundated section of the reservoir in the first two years of monitoring. During the snorkelling survey for juvenile Macquarie perch conducted in November 2015 a relatively large number (186) of early juvenile stage (20 – 25 mm in length) Two-spined blackfish were observed. (Broadhurst at al. 2015b). This result is encouraging but it is too early to determine whether or not this species has persisted in the newly inundated section of the reservoir, or whether a recruiting population will establish in the ECD. Continuation of targeted monitoring over the coming years will provide further insight into these aspects of the population of Two-spined blackfish.

Abundance, distribution and size of adult trout, both in the river and in the reservoir habitat showed no discernable difference since reservoir filling commenced. Brown trout are still a rare capture in the catchment, with Rainbow trout comprising the majority of all trout captures. Predation of Two-spined blackfish and Macquarie perch was not detected. At this stage, filling of the ECD has not resulted in any discernable change in the trout population, though a change (if any) would be expected to better detected over the course of multiple years.

Alien species other than trout continue to be detected in the ECD, with Goldfish accounting for the vast majority of captures. Abundance of Goldfish has increased since filling commenced, most likely in response to increased availability of food resources. Although Goldfish themselves probably pose little threat to Macquarie perch and Two-spined blackfish, the effects of increases in their abundance on increasing the size and abundance of potential predators and competitors could be of concern if Goldfish abundances continue to rise.

Piscivorous birds have been relatively stable in their species composition and abundances in ECD since filling commenced, though some subtle differences in distribution have occurred. There has been an increased number of Great cormorants and Little pied cormorants in section 4 (downstream of the Pierces Creek junction), which is most likely due to the establishment of a nesting site and associated roost. Cormorant abundances exceeded the thresholds in the Cormorant Management Plan and cormorant nesting occurred in the Cotter Catchment for the first time on record in early 2014 and then again in late 2014 and early 2015. Breeding colonies of cormorants have far higher energy requirements than non-breeding colonies and the establishment of a breeding colony of cormorants in the ECD could increase predation pressure on adult and sub-adult Macquarie perch. Cormorant management activities were undertaken as part of the Cormorant Management Plan, with mixed results (refer to following section).

Monitoring for question 9 "Have macrophyte beds re-established in the ECD" has not yet commenced as the reservoir is currently filling and no macrophytes have been observed whilst conducting other work around the perimeter of the reservoir.

Food resources of Macquarie perch (primarily decapods and microcrustaceans) were found to differ between the baseline study and the first year of filling, but the second year of filling has seen an increase in decapods abundances in both seasons. Decapods were found to be an important food

item of adult Macquarie perch and may be an important antecedent factor in spawning success as body condition was found to be related to fecundity for this species. The return of decapod abundance back to comparable levels in autumn 2014 suggests that the absence of decapods in the sample collected spring 2013 may reflect a sampling anomaly or annual variation, with no evidence to relate it to reservoir filling at this stage. Certainly, decapod abundances found in late 2014 support this theory.

The Fish Monitoring Program for 2015/16 is stil underway and the findings will be presented in the ECD FMP Performance Report in January 2017.

Management of Macquarie Perch During Filling Phase Plan

The *Management of Macquarie Perch During Filling Phase Plan* (a sub plan of the ECD FMP) describes the management actions and mitigation measures to be undertaken in the ECD to manage the potential impacts of adverse dissolved oxygen conditions on the Macquarie perch population.

Icon Water has three monitoring buoys in the reservoir which constantly measure temperature and dissolved oxygen levels at a depth of three metres. Data from the buoys is available for monitoring and analysis by Icon Water staff via an online portal. SMS alerts are also sent automatically to Icon Water when DO levels approach or exceed trigger values. During 2015 none of the DO triggers defined in the Filling Plan were exceeded.

During 2015 actions triggered under the *Management of Macquarie Perch During Filling Phase Plan* were implemented. These included:

- Monthly reservoir inspections were conducted in 2015 to assess the numbers of cormorants present/nesting in the Cotter Reservoir perimeter. The cormorants are a known predator of Macquarie perch, particularly under low dissolved oxygen conditions when Macquarie perch rise closer to the reservoir surface.
- Cormorant management– certain actions are required to be implemented by the management plan when defined cormorant trigger points are reached. These protocols range from more intensive cormorant monitoring, through to cormorant disturbance and culling. During 2015 trigger points were reached for intensive cormorant monitoring but no cormorant disturbance activities or destruction of nests were conducted.

The *Management of Macquarie Perch During Filling Phase Plan* also identifies emergency translocation as a last resort management measure should water quality in the Cotter Reservoir become inhabitable. Emergency translocation was not required during 2015.

In 2015 Icon Water engaged a specialist consultant to advise on the potential remediation of barriers in the Cotter River which may be an impediment to Macquarie perch movement to access suitable spawning sites. The area under consideration is from the full supply lever of the ECD to the confluence of the Cotter River and Condor Creek, downstream of Vanities Crossing. Following a site inspection three small barriers were modified by manually manipulating rocks and sandbags to reduce flow velocity and to maintain critical fish passage pathways. However, these works are temporary and may be destroyed by moderately increased or high flows. The sites will be re-inspected in 2015/16.

Alien Fish Management Plan

The Cotter Dam Enlargement Fish Risk Assessment identified a likely increase in alien fish numbers in the Cotter Reservoir following construction of the ECD and identified the importance of managing trout and Redfin perch impacts on Macquarie perch (*Macquaria australasica*) and Two-spined blackfish (*Gadopsis bispinosus*).

The risk assessment also identified the need for an Alien Fish Management Plan (under the ECD Fish Management Plan), which was consequently developed (November 2013) and includes management and mitigation measures to ensure predation risks to native fish are managed. The development and implementation of the adaptive Alien Fish Management Plan ensures Icon Water meets its regulatory

obligations with regard to the management of alien fish species in the Cotter Reservoir and upstream Cotter River.

The Alien Fish Management Plan identifies the need for monitoring of alien fish numbers in the Cotter Reservoir and river. This work was undertaken in late 2015 though the ECD Fish Monitoring Program (specifically related to management questions 4, 5, 6 and 7). The results have not been finalised and will be provided in the next ECD Performance Report in 2017.

A formal options analysis will be undertaken to determine what management measures could be implemented should alien fish numbers increase to unsustainable levels. Several management options have already been proposed for more detailed consideration, and include:

- Targeted netting of trout spawning runs for consequent removal the Cotter River directly upstream of Cotter Reservoir
- A trout trap on the Cotter River immediately upstream of Cotter Reservoir, designed to trap spawning trout for consequent removal from the Cotter system
- Targeted angling efforts during trout spawning season for consequent removal from the Cotter system
- Targeted riverine electrofishing in the Cotter River directly upstream of Cotter Reservoir.

These options will be discussed further at the Fish Management Plan Working Group and Steering Committee meeting(s) in 2016 in order to better understand the environmental, social and financial implications of their implementation. Additional options may also be identified for examination.

EHN Management & Response Plan

Epizootic Haematopoietic Necrosis (EHN) Virus is a ranavirus, a member of the Iridoviridae Family, and is associated with sudden high fatality rates in fish (especially during spring and summer). The Macquarie perch is a species known to be highly susceptible to EHN mortality.

Icon Water operates within the Cotter catchment, where EHN Virus is not known to be present. While Icon Water was constructing the ECD, the risk of transporting the virus into the reservoir and catchment was far greater than during standard operations; and consequently, rigorous protocols and mitigations measures were applied throughout the construction period. It is accepted that Icon Water's operations post construction of the ECD are not a major contributor to the risk of EHN Virus entering the catchment in contrast to other land management practices and recreational pressures. In order to ensure appropriate mitigation of the risk, Icon Water has established the EHN Management & Response Plan to ensure that the risk, albeit small, is monitored and managed.

The EHN Management & Response Plan requires Icon Water to monitor for signs of EHN Virus infection in fish in the Cotter Reservoir and upstream river. This requirement was fulfilled via the Cotter Fish Monitoring Program in 2015. During the course of the 2015 monitoring, all fish collected were 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). No evidence of the virus was detected in the fish samples collected.

Icon Water has developed a work instruction for staff and contractors working near or in waterways in the Cotter catchment. This work instruction includes measures to be taken to avoid the spread of the EHN Virus and is a mandatory induction requirement for staff and is included in contractors' contract conditions.

Icon Water is also required to notify the ACT Government of any suspected EHN Virus infections; however no signs of infection were identified in 2015.

References

Broadhurst, B. T., Clear, R. C., Fulton, C. and Lintermans, M. (2015). *Enlarged Cotter Reservoir ecological monitoring program: technical report 2015*. Institute for Applied Ecology, University of Canberra, Canberra

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