Report to the Commonwealth Department of the Environment and Energy: Annual Performance Report (2019) against the Enlarged Cotter Dam Fish Management Plan Version 4

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Document management

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Document development

	Name	Position	Date
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Version control

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1.00	John Hyam		Final	Benjamin Bryant

Contents

Introduction

This report outlines Icon Water's performance against Version 4 of the enlarged Cotter Dam (ECD) Fish Management Plan (FMP V4) as required under the Commonwealth Department of the Environment and Energy'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 V4 and associated sub-plans throughout the reporting period (2019 calendar year). This performance report is structured against each of the sub plans.

This Performance Report should be read in conjunction with the ECD FMP V4 available on Icon Water's website at:

http://www.iconwater.com.au/~/media/files/icon-water/key-publications/cotter-reservoir-fish-management-plan-fmp-version-4.pdf

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 threatened species protected under the *Environment Protection and Biodiversity Conservation Act 1999 (Cth)* (EPBC Act). The specific fish and crayfish species to be managed are listed below.

Table 1 - EPBC Listing Status

Species	EPBC Act Listing Status
Macquarie Perch (*Macquaria australasica*)	Endangered
Trout Cod (*Maccullochella macquariensis*)	Endangered
Murray Cod (*Maccullochella peelii*)[1]	Vulnerable
Two-spined Blackfish (*Gadopsis bispinosus*)[2]	-
Murray River Crayfish (*Euastacus armatus*)	Endangered

Icon Water's approach to minimise and manage threats to threatened aquatic species is documented through a series of ECD Fish Management Plans and projects as shown in **Figure 1**. To date four versions of the ECD Fish Management Plan have been completed. The final plan (ECD FMP V4) has been approved by the Department of the Environment and Energy and is the subject of this 2019 report.

Version 1 of the FMP documented the projects that provide 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 focused on the ongoing management of threatened aquatic species during the filling and operational phase of the ECD.

[1] Murray cod have not been detected in the Cotter River and are not included in this version of the FMP

[2] Listed as vulnerable in the ACT under Section 91 of the Nature Conservation Act 2014.

Version 4 is the final version during operations and there are no further versions of the FMP proposed, as the planning construction and filling phases have all been completed. However, in line with Icon Water's adaptive management principles, the plan will be reviewed at least every five years and updated following any significant changes to the operation of the dam, or associated measures/practices (e.g. environmental flow releases from Bendora Dam), or the status of threatened fish within the reservoir and the river upstream.

The objective of FMP V4 is "*To ensure that operation of the Cotter Dam for the supply of community drinking water continues to support aquatic communities, particularly threatened 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 ECD, and
- effective in terms of use of resources and expertise whilst at the same time ensuring the protection of threatened species.

The following sub plans are contained in the following appendices to the FMP:

Appendix E: Cotter Reservoir EHN Virus Management Plan

Appendix F: Cotter Reservoir Destratification System Process Operating Plan

Appendix G: Enlarged Cotter Reservoir (ECR) Cormorant Management Plan

Appendix H: ECR Emergency Inspection and Translocation Plan

Appendix I: Cotter Reservoir Alien Fish Management Plan

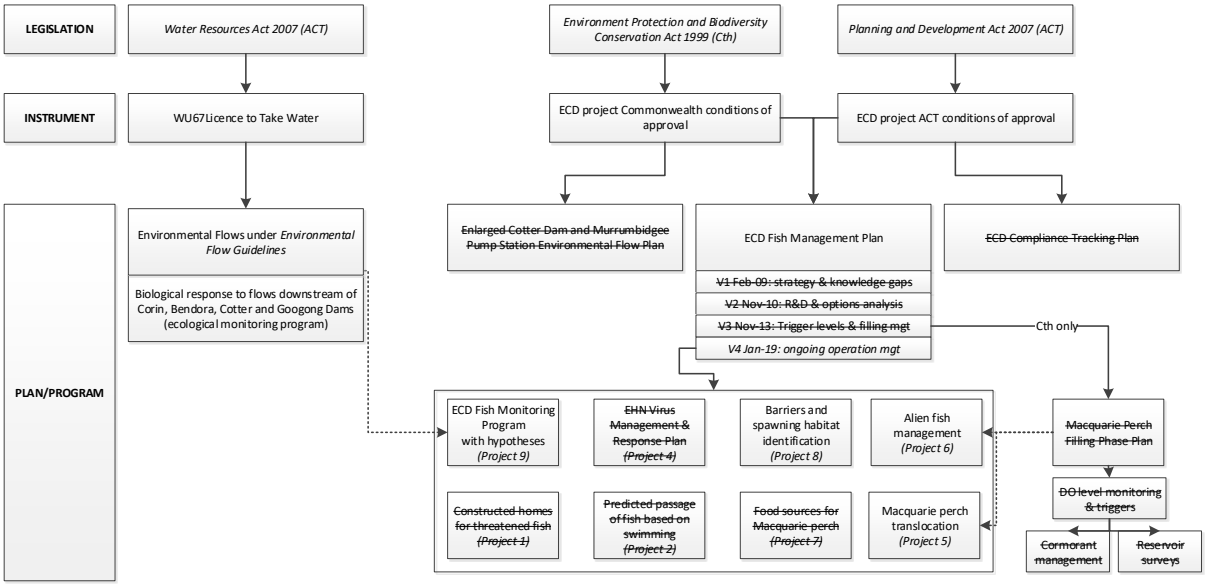

Figure 1. ECD FMP Framework[3]

[3] Strike-through means completed or achieved.

FMP Steering Committee and Working Group

The delivery of the FMP V4 is overseen by the FMP Steering Committee (SC) and Working Group (WG), chaired by Icon Water and comprising representatives and subject matter experts from the Commonwealth Government, ACT Government and the University of Canberra.

Icon Water has continued to meet with and report to the SC and the WG. During the reporting period, the WG met on the 31st July 2019. The Commonwealth representative (Timothy Kaminskas) attended the meeting.

ECD Fish Monitoring – Technical Report July 2019

The following key results from the monitoring were reported at the FMP WG meeting on 31st July 2019:

Adult Macquarie perch (gill netting)

- Macquarie perch CPUE was significantly different among years (2015, 2016 and 2017) and was significantly higher compared to all other years)
- There was no difference in CPUE among monitoring phases
- Condition of adults in 2019 was not different to any other year (though was lowest since filling began)

Fyke netting (Cotter Reservoir)

- Young of year (YOY) detected for the third year in succession
- 2017 (1+) and 2016 (2+) cohorts well represented in fyke net catches which indicates good conditions for growth and survival

Young of year (YOY)

- There was a significant difference in YOY abundance between years (largely unrelated to phase)
- Captures of YOY in 2019 were significantly less than prefilling years 2010, 2012 and 2013 (which were exceptionally high)
- 2019 not different to the prefilling year of 2011

Juveniles (1+ and older)

- There was a significant difference in juvenile Macquarie perch abundance between years
- Operational years had significantly lower CPUE of juveniles than the early baseline years of 2010 and 2011

Summary (Macquarie perch Cotter Reservoir)

- Low abundances of adult Macquarie perch in 2018 and 2019
- Likely recruitment shadow from spawning seasons of 2014 and 2015 (there were three years of recruitment failure)
- This resulted in low catches of most commonly captured size classes in capture methods
- Young of year detected for the third year in succession
- Juveniles from 2016 and 2017 well represented indicating that conditions in the ECR are conducive to the sustainable recruitment of this species

Summary (other monitoring results)

- Macquarie perch YOY detected at every Cotter River site
- Rainbow trout size and abundance and size remains similar between years (for Cotter Reservoir and Cotter River)
- Brown trout continue to increase in abundance in ECR. Three prior to 2016, total of 25 captured in 2018 and 2019
- Two Brown trout contained YOY Macquarie perch (following the first ever detection of Macquarie perch predation in 2018). This is a cause for some concern given the increase in abundance of Brown trout in the ECR since operational phase
- Cormorant abundances were largely stable. Some shifts in their distribution within ECR, driven by nesting aggregations of Little Pied Cormorants
- Goldfish continue to decline since filling which indicates that productivity is slowing
- Declines in goldfish abundance, coupled with consecutive years of detection of Brown trout predation on Macquarie perch suggest prey-switching may be occurring
- If prey-switching is occurring in Brown trout, it may also be occurring in cormorants. Re-examination of cormorant diet would be helpful to confirm this
- Food resources variable across years, with decapod abundances very low during first three years of operational phase. Abundances increased in 2019 to be similar to other phases

Operational Risks to native fish and mitigation actions

Management measures and controls were identified in the FMP WG risk assessment workshop and are presented in FMP V4 with their relevant number and risk rating according to the risk assessment.

This section shows the high (H) and medium (M) level risks and status of the management actions undertaken by Icon Water in 2019 to mitigate these risks.

H1. Loss of food resources

Current Controls

- Constructed rock reef provides substrate for food
- Inundated native hardwood and shrub habitat left in-situ provides source of nutrient loads
- Larger area of shallow fringing habitat in reservoir provides habitat for food.

Potential Additional Controls

- Trials of reed bed establishment and riparian revegetation around selected areas of the reservoir. The enlargement of the reservoir has altered reservoir food resources (loss of reed beds).

Current status

- The current controls are considered adequate as there is a healthy native fish population in the reservoir. In addition, while the reservoir is being used as a water supply source the level is fluctuating which makes the potential additional controls impractical at this stage.

H2. Cold Water Pollution

Current Controls

- Monitoring of water temperature upstream and in the reservoir and selective environmental releases (as practicable) from Bendora Reservoir in accordance with Icon Water's Licence to Take Water.

Potential Additional Controls

- Implement targeted Bendora Reservoir thermal spill release (from Corin Reservoir)
- Explore options for use of variable offtakes and release at Bendora Reservoir.

Current status

- Water temperature and other water quality parameters are monitored upstream and in the Corin and Bendora Reservoirs. Reservoir levels were very low in 2019 which severely impacted the ability to selectively abstract water.

M1. Increased abundance of Alien Fish

Current Controls

- Implement management options described in section 3.2 of the Alien Fish Management Plan (Appendix I) following approval by the FMP SC
- Report illegal fishing to PCS who as the land manager is the delegated authority for pursuing compliance matters
- Implement controls described in section 3 of the EHN Virus Management Plan related to fish vectors of EHN virus (e.g. Redfin perch)
- Implement the ECR Fish Monitoring Program to define trigger levels and inform adaptive management controls of alien fish
- Educate Icon Water contractors who are working in the catchment and inspect work sites to reduce the risk of transfer of alien fish eggs on vehicles and equipment.

Potential Additional Controls

- Monitor for trout predation on Macquarie perch larvae, and if trout are demonstrated to impact larvae, implement additional management options described in the Alien Fish Management Plan following approval by the FMP SC.

Current status

- As reported in the latest ECD Fish Monitoring Technical Report, Rainbow trout size and abundance remains similar between years and Brown trout continue to increase in abundance in the Cotter Reservoir. There has been a confirmed case of Brown trout predation on YOY Macquarie perch.
- Trout and other alien fish will continue to be monitored by the ECD Fish Monitoring Program.

M2. EHN Virus

Current Controls

- Report illegal fishing to PCS who as the land manager is the delegated authority for pursuing compliance matters
- Implement controls described in Section 3 of the EHN virus management plan
- Inspect Fish Monitoring Program Reports to inform potential management actions if threatened fish are exhibiting signs of infection
- Educate (Toolbox talk) Icon Water staff and contractors who are working in the catchment and enforce compliance with wash-down procedures.

Potential Additional Controls

- None identified.

Current status

- All Icon Water staff who work in the catchment have attended a Toolbox talk about the vehicle and equipment washdown procedures in accordance to the Work Instruction in Icon Water's Integrated Management System.
- The Icon Water Catchment Protection and Land Management Team communicate regularly with PCS on catchment risks and actions relating to EHN Virus and other threats. In 2019 PCS drained and sanitised a small dam in the Lower Cotter Catchment which had been infected with Redfin perch.

M3. Increased Great Cormorant Predation

Current Controls

- Constructed rock reef provides shelter/refuge habitat for Macquarie perch
- Native submerged hardwood provides shelter/refuge habitat
- Implement the monitoring and management actions specified in the Cormorant Management Plan
- Operate the destratification mixers in accordance with the Destratification operation plan to reduce the impact of low dissolved oxygen in the water column.

Potential Additional Controls

- None identified.

Current status

- Regular monitoring of the cormorant population is continuing. As reported in the latest ECD Fish Monitoring Technical Report, cormorant abundances are largely stable with some shifts in their distribution within the ECR, driven by nesting aggregations of Little Pied Cormorants
- Destratification mixers continue to be operated to maintain adequate dissolved oxygen levels.

M4. Drawdown of reservoir and sedimentation of river reach

Current Controls

- Reservoir operating level and inflow management during spawning informed by ECR Fish Monitoring Program monitoring report
- Environmental flows including riffle and pool maintenance flushes.

Potential Additional Controls

- None identified.

Current status

- Environmental flows from Bendora Dam have been released in accordance with the Licence To Take Water (WU67) and the associated Environmental Management Plan.

M5. Exposure of instream barriers during Macquarie perch spawning season exacerbated by water level and flow

Current Controls

- Reservoir operating level and inflow management during spawning informed by ECR Fish Monitoring Program monitoring report and the Annual Spawning Management Plan developed in conjunction with subject matter experts and endorsed by the FMP WG
- Compliance with licenced environmental flows in accordance with Icon Water's Licence To Take Water.

Potential Additional Controls

- Prepare guidelines that detail the target for spawning in successive years
- Management of barriers (requires annual identification of relevant barriers) including mitigation options (e.g. flows, fishways, translocation)
- Continue to gather information and conduct research to inform the adaptive management of reservoir levels and river flows in order to mitigate the impact of instream barriers. This includes: resuming the acoustic monitoring project; continuing riffle spawning habitat identification of important spawning habitats; and, installation of a pit tag station in the alien fish management structure (i.e. fish trap).

Current status

- Annual spawning management plan developed and implemented
- Compliance with licenced environmental flows in accordance with Icon Water's Licence To Take Water
- Acoustic monitoring project has been implemented for a fourth year in increase knowledge about the potential impact of barriers during low river flow conditions.

References

Broadhurst, B. T., Clear, R. C., Fulton, C. and Lintermans, M. (2018). *Enlarged Cotter Reservoir ecological monitoring program: technical report 2019*. Institute for Applied Ecology, University of Canberra, Canberra.

Annexure 1

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 Vanity's 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?

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