# Report to the Department of Climate Change, Energy, the Environment and Water:

# Annual Performance Report (2023) against the Enlarged Cotter Dam Fish Management Plan Version 4

Version 1.00, 21 December 2022

# Document management

### Document summary

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### Document development

| | Name | Position | Date |
|---|---|---|---|
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| Reviewed and Approved by | Tim Chaseling | A/g Manager Environment and Sustainability | 20/12/2023 |
| | | | |

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| Version | Author | Date | Description | Approval |
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| 1.00 | Michael Harrison | 18.01.2022 | Draft | |

# 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 Department of Climate Change, Energy, the Environment and Water 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.'*

Icon Water has completed the requirements of the ECD FMP V4 and associated sub-plans throughout the reporting period (2023 calendar year).

This performance report is structured against each of the sub-plans.

This Performance Report should be read with the ECD FMP V4 on Icon Water's website.

# 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 on 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.

| 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 |

**Table 1 - EPBC Listing Status**

Icon Water's approach to managing threatened aquatic species is documented through a series of ECD Fish Management Plans and projects, as shown in **Figure 1**. The ECD Fish Management Plan continues to be reviewed every five years, in line with Icon Water's adaptive management principles.

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."*

| Objective | Controls |
|---|---|
| Risks mitigation | Protect threatened aquatic fauna and their habitats arising from the construction and operation of the enlarged Cotter Dam. |
| Adaptive Management | Scientifically based, using adaptive management and use of expertise. |
| Stakeholder involvement | Robust peer review and public transparency |
| Compliance | Regularly updated on the basis specified in the approval conditions |
| | Developed as part of the overall requirements of the ECD |

**Table 2. ECD Fish Management Plan version 4 (and relevant sub-plans) objectives and controls**

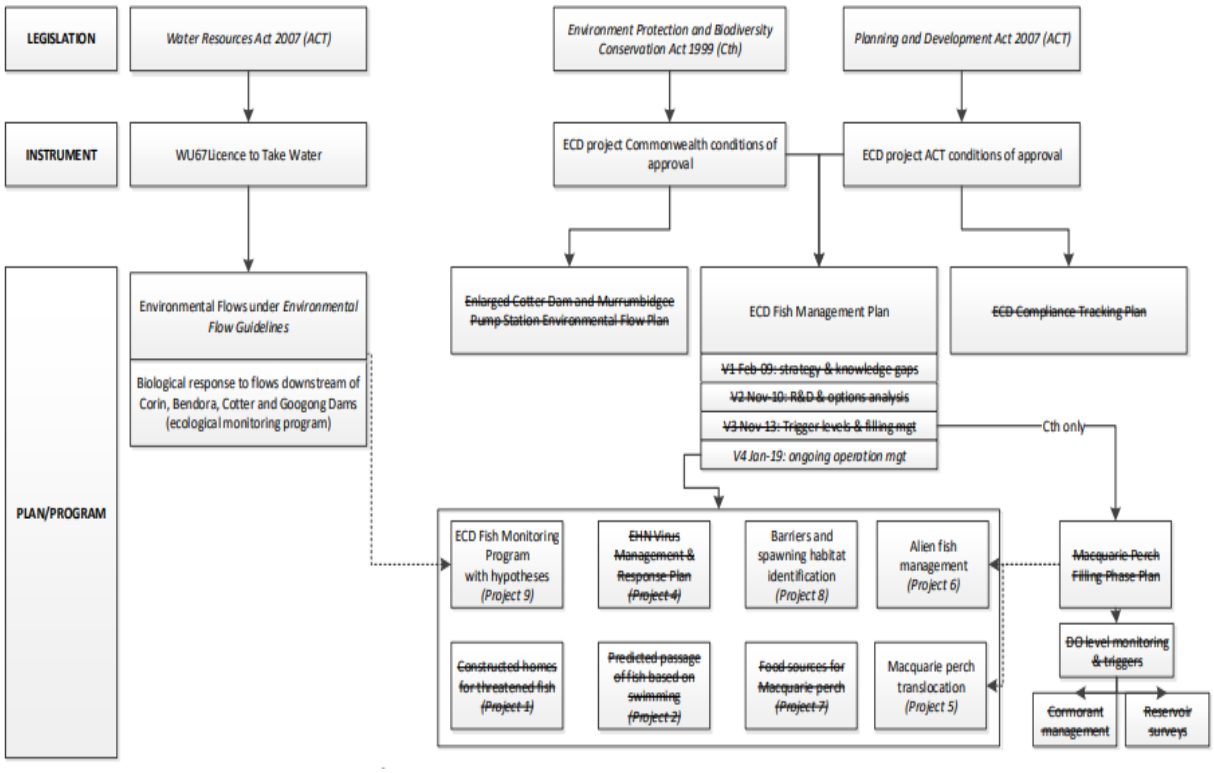
[1] Murray cod have not been detected in the Cotter River and are not included in this version of the FMP

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

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<br>Noting ECR and ECD refer to same site |
| Appendix H | ECD Emergency Inspection and Translocation Plan |
| Appendix I | Cotter Reservoir Alien Fish Management Plan |

**Figure 1. ECD framework**




# FMP Working Group

The delivery of the FMP V4 was overseen by the FMP 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 WG, which met on 14 September 2023.

In November 2021, Icon Water prepared a position paper on the Macquarie Perch Translocation Program, which the FMP WG reviewed. After stakeholder feedback, it was decided to discontinue further translocations from the ECD to other locations. Monitoring will continue for the remaining timeframe under the approval activity conditions. Macquarie Perch was not translocated from the ECD in 2023.

# ECD Fish Monitoring – Technical Report July 2023

The following key results from the monitoring were reported through the 2023 FMP technical report and the spring data report.

**Adult Macquarie Perch**

- The relative abundance of adult Macquarie perch captured in 2023 rebounded from very low captures in 2022 (Gill netting)
- A mark-recapture study of the population size of adult Macquarie perch in Cotter Reservoir returned an estimate of 1152 individuals, with 95% confidence between 544 and 2659 individuals.
- The relative abundance of adult Macquarie perch captured by boat electrofishing in 2023 was the second lowest since monitoring began in 2014.
- The body condition of adults remains higher during filling and early operational phases compared to baseline.
- There was no difference in Catch-Per-Unit-Effort (CPUE) among monitoring phases, however 2023 was a relatively low capture for the operation monitoring phase.
- There was no difference in the condition of adult Macquarie Perch in 2023. The condition of adult Macquarie perch captured in gill nets was significantly higher in the filling phase than in baseline or operational.

**Young of Year (YOY) (Fyke netting & snorkelling)**

- Encouragingly, successful recruitment to the young-of-year stage was detected for the sixth consecutive year in 2023, albeit at a relatively low level.
- There is a continuation of improvement in the CPUE of YOY compared to the filling phase; however, 2023 captures of YOY Macquarie perch were the same as all other years.
- Snorkelling was undertaken on the 19th December 2023, to look for early juvenile Macquarie perch. The first four pools upstream of the headwater of Cotter Reservoir were surveyed. In total 18 juvenile Macquarie perch were observed.
- Access to suitable spawning habitat was achieved even though all reservoirs on the Cotter River were full, and flows were operating unregulated.
- The young-of-year abundance at the reference site (Kissops Flat) was low in 2023. Bushfires in the catchment around Yaouk and Adaminaby over the summer of 2019 / 2020 may still impact Macquarie perch recruitment in 2023.

**Juveniles (1+ and older)**

- Captures of juvenile Macquarie perch in 2023 were similar to other years except for 2010 and 2011, which had significantly higher abundances.
- The abundance of juvenile Macquarie perch in Cotter Reservoir has been relatively stable since 2018, which suggests the ECD is providing suitable conditions for the early survival and growth of Macquarie perch recruit's.
- A strong class of juvenile Fish captured in the last five years (2018 – 2023) suggests good annual recruitment conditions through to 1 – 3 year-old individuals.

**Summary**

- It is likely a recruitment shadow from the spawning seasons of 2014 and 2015 (there were three years of recruitment failure) resulted in low catches of adult Macquarie Perch in 2019 – 2020.
- There were no Two-spined blackfish captured in the bait traps set in the Cotter Reservoir in 2023
- The abundance and size of rainbow trout in the ECD in 2023 were similar to any other year of monitoring.
- Brown trout was low in 2022, in contrast to the previous five years, which had recorded very

high abundances. Stomach monitoring could not take place to help reveal predator potential.

- Goldfish abundance has been low since 2017, following a boom during filling and the first year of the operational phase.
- Piscivorous birds have been relatively stable in their species composition and abundance in the ECD. Cormorant counts were conducted monthly from June to December 2023 inclusive. As with previous years of the monitoring program, abundances (especially great cormorants and little pied cormorants) have increased between June and December.
- Emergent macrophyte stands were again detected along the shoreline of Cotter Reserve at 6 locations.
- Food resources sampling of Cotter Reservoir was undertaken in spring on the 25/10/23. Edge samples were taken from woody debris, rock and bare shore habitats in each third of the reservoir. 50 m linear plankton tows were conducted in each third of the reservoir. Food resources samples will be processed in early 2024.

# Operational Risks to native fish and mitigation actions

Management measures and controls were identified in the FMP technical report 2023 and are presented in FMP V4 with their relevant number and risk ratings according to the risk assessment.

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

**H1. Loss of food resources**

Current Controls

- Constructed rock reef provides a substrate for food.
- Inundated native hardwood and shrub habitats left in situ provide a source of nutrient loads.
- The larger area of shallow fringing habitat in the reservoir provides habitat for food.

Potential Additional Controls

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

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 fluctuates, making the potential additional controls impractical at this stage.
- Macrophytes have already returned to the ECD at several locations.

**H2. Cold Water Pollution**

Current Controls

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

Potential Additional Controls

- Explore options for the use of variable offtakes and release at Bendora

Reservoir. Status

- Water temperature and other water quality parameters are monitored upstream and in the Corin and Bendora Reservoirs.
- Reservoir levels were very high between 2021 - 2023, with all dams spilling and mostly natural flows.

**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 FMPWG approval.
- Report illegal fishing to PCS (Parks and Conservation Service), 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 ECD Fish Monitoring Program to define trigger levels and inform adaptive management controls of alien Fish.
- Educate Icon Water contractors working in the catchment and inspect work sites to reduce the risk of alien fish eggs being transferred to 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 FMPWG.

Status

- Rainbow trout size and abundance remain similar between years, and Brown trout were low in 2022 in Cotter Reservoir. There have been previously confirmed cases of Brown trout predation on YOY Macquarie Perch.
- Trout and other alien Fish will continue to be monitored by the ECD Fish Monitoring Program. If required, further meetings will occur between EPSDD and IW to assess response actions.
- EPSDD have agreed to implement some trial trout control options in the Cotter River.

**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 exhibit signs of infection.
- Educate (Toolbox Talk) Icon Water staff and contractors working in the catchment and enforce compliance with wash-down procedures.

Potential Additional Controls

- None identified.

Status

- All Icon Water staff in the catchment have attended a Toolbox Talk about the vehicle and equipment wash-down procedures by the Work Instructions 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 the EHN Virus and other threats.

**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 using the destratification operation plan to reduce the impact of low dissolved oxygen in the water column.

Potential Additional Controls

- None identified.

Status

- Regular monitoring of the cormorant population is continuing. As reported in the latest ECD Fish Monitoring Technical Report, cormorant abundances are stable, with some shifts in their distribution within the ECD, driven by nesting aggregations of Little Pied Cormorants.
- Destratification mixers were offline during the first half of 2020-21 and late 2022. Two out of three units have come back online in early 2023.

**M4. Drawdown of reservoir and sedimentation of river reach**

Current Controls

- The ECD Fish Monitoring Program monitoring report informs reservoir operating level and inflow management during spawning.
- Environmental flows, including riffle and pool maintenance flushes.

Potential Additional Controls

- None identified.

Status

- Environmental flows from Bendora Dam have been released by the License To Take Water (WU67) and the Environmental Management Plan. However, most, if not all, of the flows in the 2023 period have been natural flows and far more than customarily controlled flows.

**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 are informed by the ECD Fish Monitoring Program monitoring report, and the Annual Spawning Management Plan developed with subject matter experts and endorsed by the FMPWG.
- Compliance with licensed environmental flows by Icon Water's License to Take Water.

Potential Additional Controls

- Continue to gather information and conduct research to inform the adaptive management of reservoir levels, and river flows to mitigate the impact of instream barriers.

Status

- Annual spawning management plan developed and implemented.
- Compliance with licensed environmental flows by Icon Water's License to Take Water.

# References

Broadhurst, B. T., Clear, R. C., Fulton, C. and Lintermans, M. (2022). *Enlarged Cotter Reservoir ecological monitoring program: technical report 2022*. Institute for Applied Ecology, University of Canberra, Canberra.

## Annexure 1

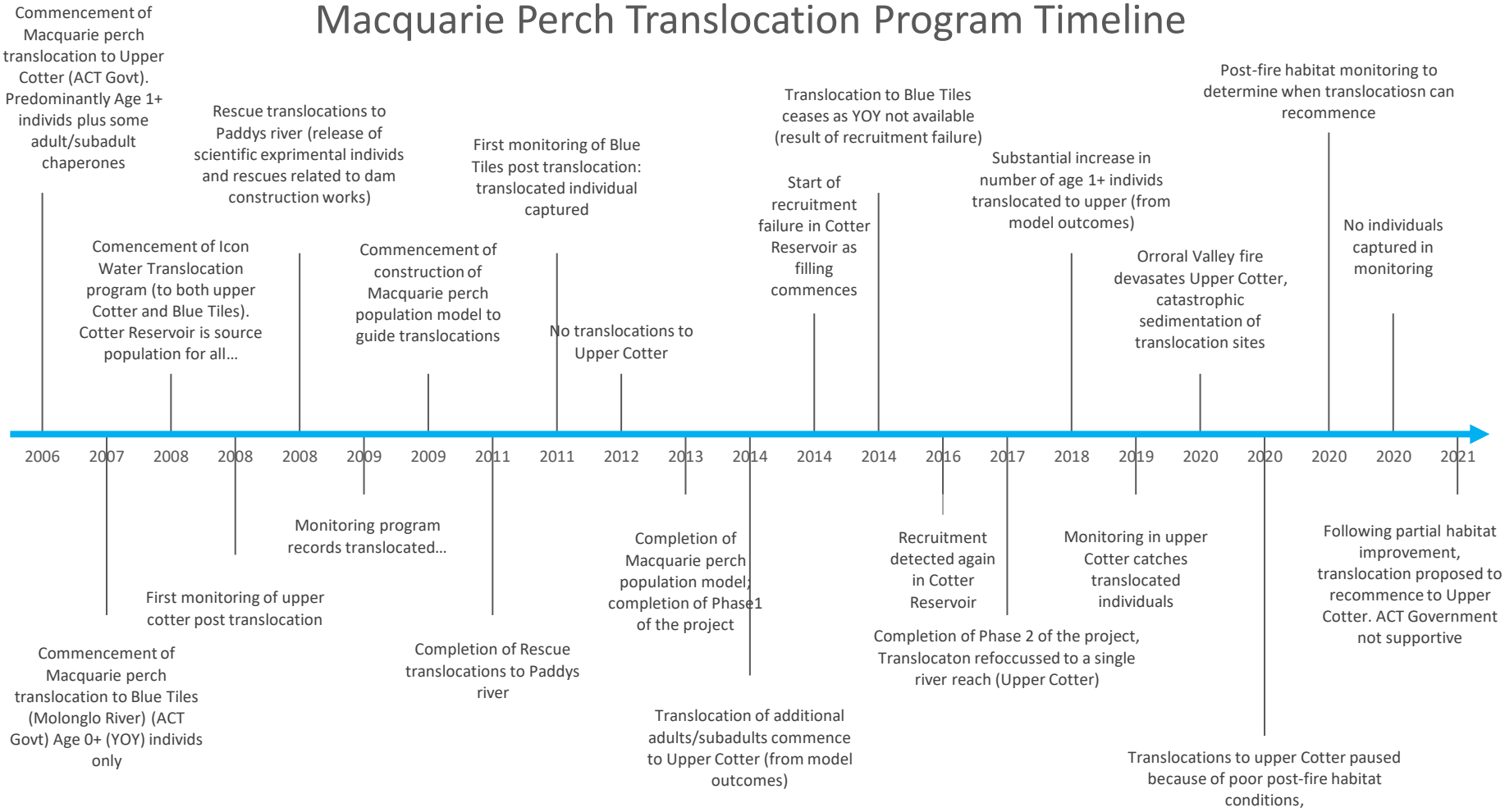
The ten management questions that underpin the Enlarged Cotter Reservoir Ecological Monitoring Program are:

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) because 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 because 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 adult trout's abundance, distribution and size composition in the enlarged Cotter Reservoir due to 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 due to 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 due to the filling and operation of the ECD?
8. Has there been a significant change in the abundance, distribution, and species composition of piscivorous birds near the enlarged Cotter Reservoir due to the filling and operation of the ECD?
9. Have macrophyte beds been re-established in the ECD?
10. Are there adequate food resources (particularly decapods) for the Macquarie Perch following the filling and operation of the ECD?


**Figure 1.** Location of source (Cotter Reservoir) and existing release reaches for Macquarie perch in the ACT.

**Annexure 2**

# Macquarie Perch Translocation Program Timeline



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