



UNIVERSITY OF
CANBERRA

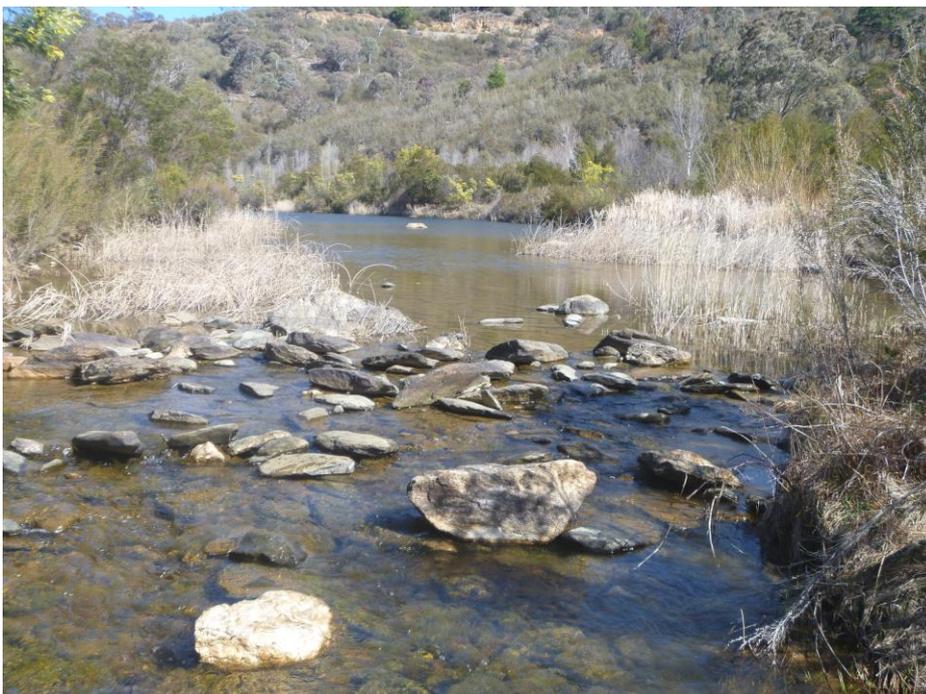


INSTITUTE FOR
APPLIED ECOLOGY

BIOLOGICAL RESPONSE TO FLOWS DOWNSTREAM OF CORIN, BENDORA, COTTER AND GOOGONG DAMS

Spring 2018

Summary report to Icon Water



Prepared for: Icon Water

Produced by:

Institute for Applied Ecology

appliedecology.edu.au

University of Canberra, ACT 2601

Telephone: (02) 6206 8608

Facsimile: (02) 6201 5651

Authors:

Ugyen Lhendup, Ben Broadhurst and Rhian Clear

Inquiries regarding this document should be addressed to:

Ben Broadhurst

Institute for Applied Ecology

University of Canberra

Canberra 2601

Telephone: (02) 6206 8608

Facsimile: (02) 6201 5651

Email: ben.broadhurst@canberra.edu.au

Document history and status				
Version	Date Issued	Reviewed by	Approved by	Revision Type
Draft	29/10/18	Project team	Ben Broadhurst	Internal
Draft	5/11/18	John Hyam		External
Final	2/7/19		Ben Broadhurst	

EXECUTIVE SUMMARY

SPRING 2018 RESULTS AND CONCLUSIONS

- Discharge across the region in the six months prior to sampling was far less in spring 2018 than spring 2017, largely due to below average rainfall during this period in 2018.
- Water quality parameters at below dam test sites and reference sites were largely within guideline levels in spring 2018, with the exception of nitrogen oxides (NO_x), total nitrogen (TN) and total phosphorus (TP) which were above guideline levels at four of the five test sites.
- Test sites QM3 did not meet the environmental flow ecological objective of <20% cover of filamentous algae in riffle habitats. It is likely that low discharge associated with low inflows resulted in lack of flow disturbance and increase in filamentous algae growth. Despite having similar hydrology to QM2, QM3 is a wider, lower energy riffle, rendering this site more susceptible to high filamentous algae growth.
- Two of the test sites were assessed as band A and met the environmental flow ecological objective of AUSRIVAS band A. Three of the test sites were assessed as AUSRIVAS band B in spring 2018 and did not meet the environmental flow ecological objective of AUSRIVAS band A.

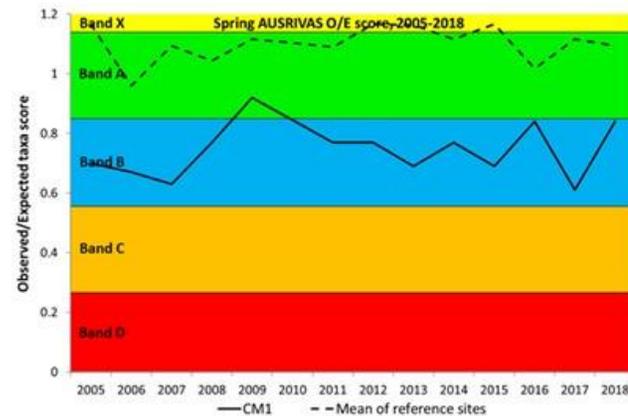
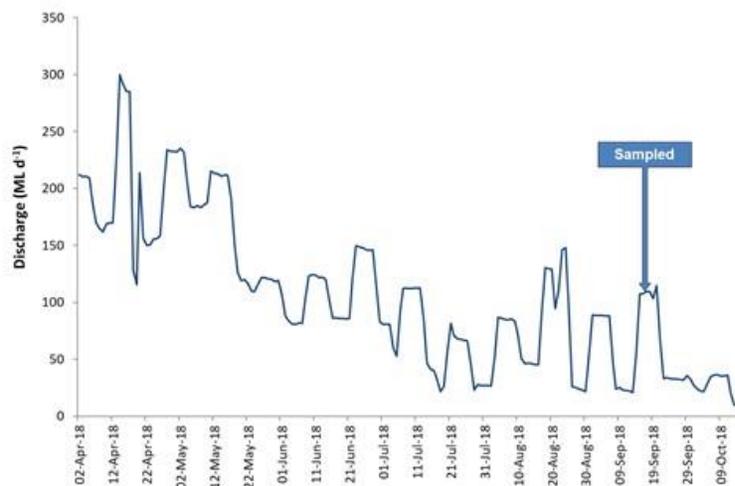
Filamentous algae cover and AUSRIVAS band scores for the test sites (green shading indicates environmental flow objective met, orange shading indicates environmental flow objective not met).

	Riffle filamentous algae cover (%)	AUSRIVAS band (O/E score)
Site	Spring 2018	Spring 2018
CM1 (Corin Dam)	< 20	B
CM2 (Bendora Dam)	< 20	B
CM3 (Cotter Dam)	< 20	B
QM2 (Googong Dam)	< 20	A
QM3 (Googong Dam)	~40	A

CM1 – Spring 2018

Downstream of Corin Dam

Environmental flow ecological objective	Autumn 2018	Spring 2018	Objective met?
AUSRIVAS band A	Band B	Band B	No
<20% filamentous algae cover in riffle habitat	<20%	<20%	Yes



* Denotes values outside guideline levels



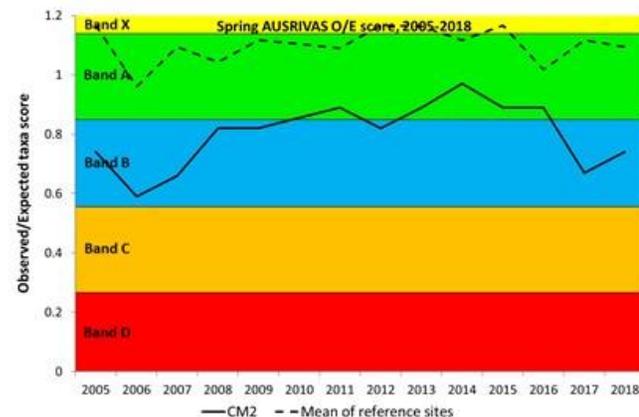
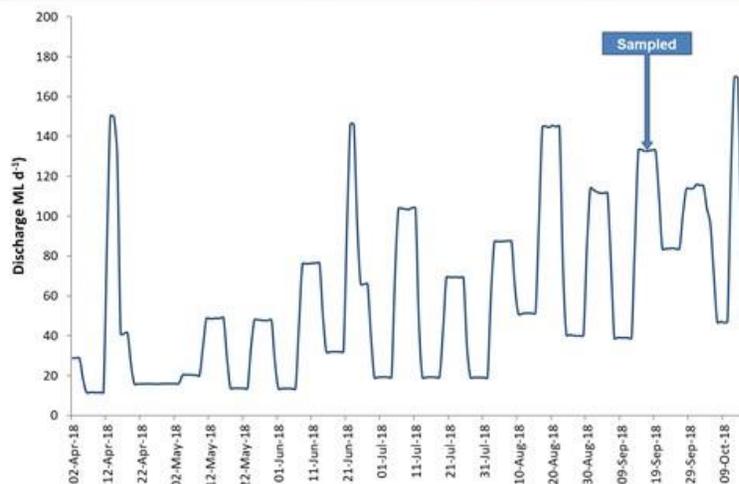
Temp. (°C)	EC (µs cm⁻¹)	pH	D.O. (mg l⁻¹)	Turbidity (NTU)	Alkalinity (mg L⁻¹)	NH₄⁺ (mg L⁻¹)	NOx (mg L⁻¹)	TN (mg L⁻¹)	TP (mg L⁻¹)
9.03	28	7.07	9.74	0.0	4	0.006	0.017	0.17	0.01



CM2 – Spring 2018

Downstream of Bendora Dam

Environmental flow ecological objective	Autumn 2018	Spring 2018	Objective met?
AUSRIVAS band A	Band B	Band B	No
<20% filamentous algae cover in riffle habitat	<10%	<10%	Yes



* Denotes values outside guideline levels



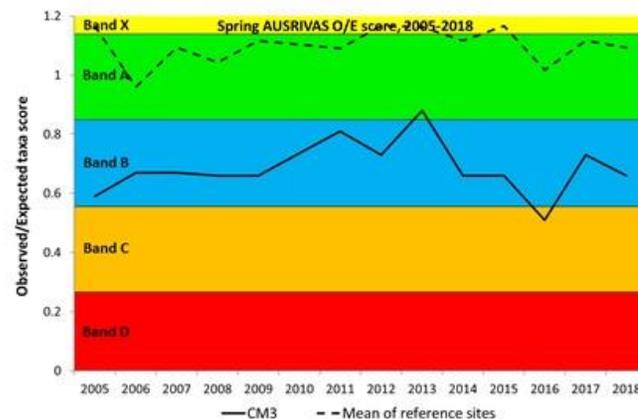
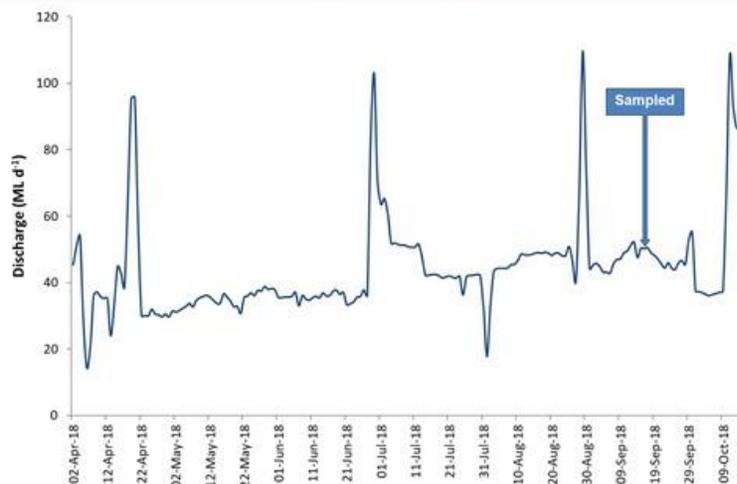
Temp. (°C)	EC (µs cm ⁻¹)	pH	D.O. (mg l ⁻¹)	Turbidity (NTU)	Alkalinity (mg L ⁻¹)	NH ₄ ⁺ (mg L ⁻¹)	NO _x (mg L ⁻¹)	TN (mg L ⁻¹)	TP (mg L ⁻¹)
7.82	26	6.80	10.72	0.0	4	0.005	<0.002	0.1	0.006



CM3 – Spring 2018

Downstream of Cotter Dam

Environmental flow ecological objective	Autumn 2018	Spring 2018	Objective met?
AUSRIVAS band A	Band B	Band B	No
<20% filamentous algae cover in riffle habitat	<10%	<20%	Yes



* Denotes values outside guideline levels



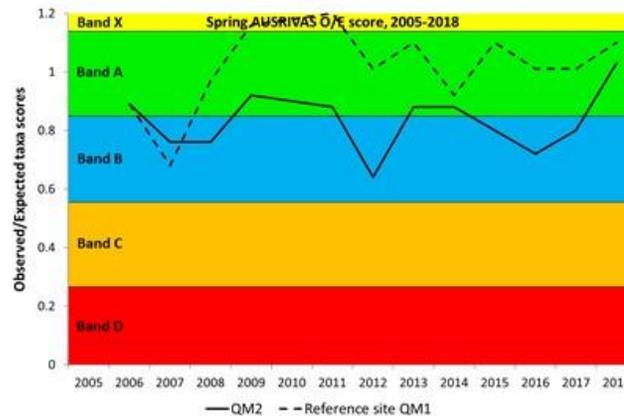
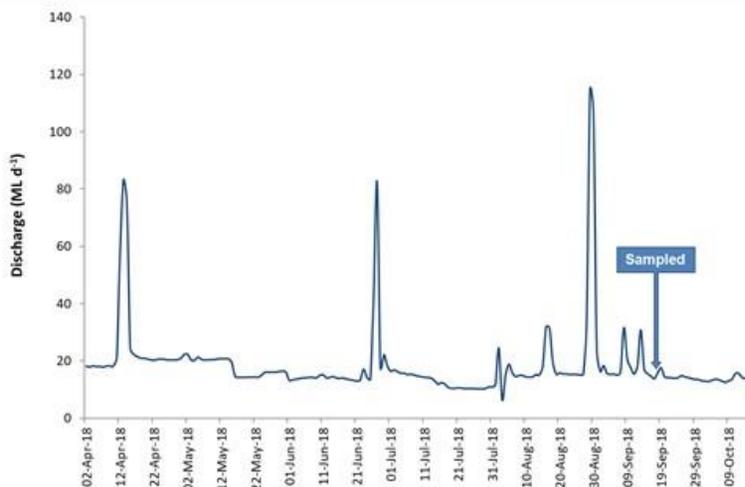
Temp. (°C)	EC (µs cm⁻¹)	pH	D.O. (mg l⁻¹)	Turbidity (NTU)	Alkalinity (mg l⁻¹)	NH₄⁺ (mg l⁻¹)	NOx (mg l⁻¹)	TN (mg l⁻¹)	TP (mg l⁻¹)
13.3	117	7.70	10.31	7.4	8	0.007	0.002	0.29	0.023



QM2 – Spring 2018

Downstream of Googong Dam

Environmental flow ecological objective	Autumn 2018	Spring 2018	Objective met?
AUSRIVAS band A	Band B	Band A	Yes
<20% filamentous algae cover in riffle habitat	<10%	>20%	No



* Denotes values outside guideline levels



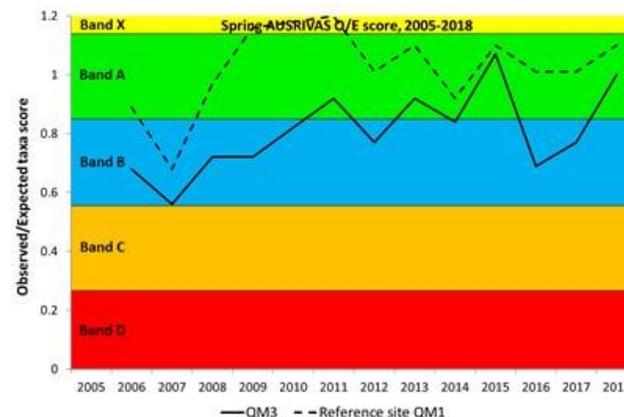
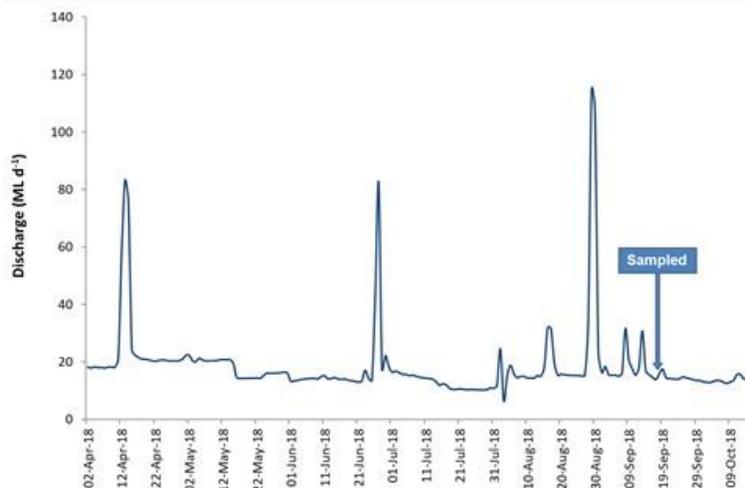
Temp. (°C)	EC (µs cm ⁻¹)	pH	D.O. (mg l ⁻¹)	Turbidity (NTU)	Alkalinity (mg L ⁻¹)	NH ₄ ⁺ (mg L ⁻¹)	NO _x (mg L ⁻¹)	TN (mg L ⁻¹)	TP (mg L ⁻¹)
11.57	120	8.14	11.01	0.0	20	0.021	<0.002	0.34	0.007



QM3 – Spring 2018

2km Downstream of Googong Dam

Environmental flow ecological objective	Autumn 2018	Spring 2018	Objective met?
AUSRIVAS band A	Band C	Band A	Yes
<20% filamentous algae cover in riffle habitat	<10%	<10%	Yes



* Denotes values outside guideline levels



Temp. (°C)	EC (µs cm ⁻¹)	pH	D.O. (mg l ⁻¹)	Turbidity (NTU)	Alkalinity (mg l ⁻¹)	NH ₄ ⁺ (mg l ⁻¹)	NOx (mg l ⁻¹)	TN (mg l ⁻¹)	TP (mg l ⁻¹)
12.14	172	7.74	10.63	0.0	24	0.016	<0.002	0.35	0.009



