



## MANAGING WATER RESOURCES FOR AN UNCERTAIN FUTURE

### SECURING WATER SUPPLY AND PROTECTING FRESHWATER BIODIVERSITY IN THE ACT

#### INTRODUCTION

Water for the ACT is supplied from three catchments: the Cotter, Queanbeyan and Murrumbidgee River catchments. Within the supply network, water is stored in three dams on the Cotter River (Corin, Bendora and Cotter) and one on the Queanbeyan River. A key part of the water supply network is the Cotter River, a major left bank tributary of the Murrumbidgee River.

The Cotter River catchment is located almost wholly within the ACT. The majority of the catchment lies within Namadgi National Park. The catchment area has a mixture of sub-alpine, wet and dry sclerophyll forests, perched swamps and valley floor grasslands, containing a range of plant species that are considered threatened, endangered or critically endangered. The Cotter River system also provides critical habitat for several significant aquatic species. Native species include the endangered Macquarie Perch and Trout Cod, and the vulnerable Murray Cod, Two-spined Black Fish and Murray River Crayfish. Historically, land use in the catchment included grazing, forestry, mining and recreational activities. Since the completion of Cotter Dam in 1915, the primary use of the catchment has been as the water supply for Canberra, and the catchment has significant intrinsic and environmental value (ACTEW 2009).

#### A HISTORY OF SUCCESSFUL ENVIRONMENTAL MANAGEMENT

In 1999, environmental flows were introduced into the Cotter River as a requirement of the ACT Water Resources Act, but without clearly defined ecological objectives and only limited information on ecological requirements of the river. A multi-disciplinary group was established, the Environmental Flows Technical Group (EFTG) that included a water utility, the ACT government and research organisations, to develop and monitor environmental flows in the Cotter River using an adaptive management approach. This approach was applied to gain a better understanding of the biological requirements of the Cotter River System and to improve the effectiveness of the delivery of flows designed to achieve environmental benefits (Peat & Norris 2007). It was instrumental in establishing flows designed to meet specific ecological objectives.

The purpose of the EFTG was to manage the possible conflict between ecosystem and human needs for the Cotter River water. Recent major episodic events that occurred in the Cotter River catchment, which include drought, 2003 bushfires and more recently floods, prompted the EFTG to implement active adaptive management and manage possible conflicts between human and ecosystem needs. These natural events require the adaptive management approach to be flexible and adapt to the changing circumstances rather than trying to hold the system in its previous state (Peat & Norris 2007). This allowed flows to be adjusted to meet ecological requirements within the context of the prevailing climatic conditions.

The biological condition of the Cotter River improved with the introduction of environmental flows. The success of the adaptive management program for the Cotter River was noticeable by the re-evaluation of past decisions in light of new scientific information. The success of the program has highlighted the importance of collaboration between the regulator, the water authority and research staff to develop the best outcomes for water supply and the environment (Peat & Norris 2007).

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## THE FUTURE

Recent drought in the ACT focussed attention on future water security for Australia's capital city as it became evident that the current network would not be able to support a growing population under projected climate scenarios. Management of the ACT's water resources is currently defined by the ACT's long term water resources management strategy (Think water, act water, ACT Government 2006). This strategy considers that adaptation initiatives taken to secure Canberra's future water supply need to be sustainable, recognise the independence of social, economic and ecological well-being, consider impacts on others and recognise that meeting today's needs must not be at the expense of future generations to be able to meet their own needs. Thus, multiple initiatives aimed at securing water for the ACT region in a changing climate were considered in light of the objectives of Think water, act water:

1. Provide a long-term, reliable source of water for the ACT and region
2. Increase the efficiency of water usage
3. Promote development and implementation of an integrated regional approach to ACT/New South Wales cross-border water supply and management
4. Protect the water quality in ACT rivers, lakes and aquifers, to maintain and enhance environmental, amenity, recreational and designated use values and to protect the health of people in the ACT and down river
5. Facilitate incorporation of water sensitive urban design (WSUD) principles into urban, commercial and industrial development
6. Promote and provide for community involvement and partnership in managing the ACT Water Resources Strategy.

In 2007, the ACT Government announced a range of new water supply projects to secure water for the ACT region. These projects include the Enlarged Cotter Dam, the Murrumbidgee to Googong Water Transfer and the Tantangara Transfer (ACTEW 2011). These projects are matched by significant investment in protecting aquatic biodiversity.

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## FIELD TRIP PURPOSE

The purpose of the day is to visit:

- An urban wetland with novel design features to allow water levels to fluctuate.
- The lookout to the construction of the enlarged Cotter Dam
- A major recycling project to provide water from the Murrumbidgee into a section of the Cotter River for environmental benefits.

These initiatives are a great example of where science is directly informing the development of policy and the management of our river systems. They exemplify many issues faced by water managers around the country and illustrate how the various eWater products can be used to assist in the decision making processes. During the field trip we will discuss:

- The issues that have been faced in the past with the management of environmental water in the ACT and how science has contributed to policy and management
- Adaptation initiatives to secure future water security and how the best available science has been incorporated into solutions (including specifically commissioned science)
- Future issues that the ACT will have to deal with to manage freshwater biodiversity in a changing climate
- Lessons from the successful inclusion of science in policy.

## SCHEDULE

Time	Location	Topic	Speaker
12:45	Assemble Bus Interchange (Bay 6) Civic		
13:00	Depart Bus Interchange		
13:20	Arrive Banksia St Wetland	Welcome and introduction to the field program and the speakers for the day;	<b>Ralph Ogden</b> (eWater CRC) <b>Fiona Dyer</b> (Institute for Applied Ecology)
		Urban water management in the ACT: Canberra's Integrated Urban Waterways Program	<b>Edwina Robinson</b> (ACT Government, Environment and Sustainable Development)
13:50	Depart Banksia St wetland		
14:30	Arrive Cotter Dam Site		
14:45	Walk to Cotter Dam Lookout	An introduction to the ACT's water resource infrastructure; Water security needs and the construction of the ECD	<b>Chris Hepplewhite</b> (ACTEW Corporation)
		The management of endangered fish and the ECD	<b>Ben Broadhurst</b> (Institute for Applied Ecology)
15:30	Return to Cotter Reserve	A novel approach to environmental water: M2C	<b>Fiona Dyer</b> (Institute for Applied Ecology)
16:00	Depart Cotter Reserve		
16:30	Arrive Bus Interchange (Bay 6) Civic		

## WHAT TO BRING:

This is a field trip and will go ahead, regardless of the weather. Please be prepared.

It is expected that you will bring appropriate clothing for stomping around the banks of rivers and creeks, including:

- sensible shoes/boots for walking,
- a hat, and
- a waterproof coat.

Please check the weather forecast prior to coming to Canberra to finalise the number of layers you think you will need.

We will have a supply of water on the vehicles and water bottles for the participants. Please bring your own afternoon tea.

We have a very interesting program planned and you may wish to bring a camera to record that moment when one of us lands derriere first in the water.

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## THE SPEAKERS

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### DR RALPH OGDEN

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Dr. Ralph Ogden is the Chief Scientist with eWater and the Senior Science Adviser at the National Water Commission, which is a one-year secondment. Prior to this he was an executive in the eWater Cooperative Research Centre (CRC) (2005-2012), where initially he was in charge of product development and then later the Urban and Ecological Management streams of R&D. He came to eWater after a stint as Director of Knowledge Exchange in the CRC for Freshwater Ecology, 2002-2005, and time in research positions with CSIRO Land & Water and the University of Canberra.

Ralph has extensive experience in translating science into a form useful for water managers, through directing teams developing software products and performing knowledge exchange. Ralph also led the establishment of professional practices in software tool development in the early stages of the eWater CRC, and the creation of modelling products for urban water systems, ecological assets, and the optimisation of decision making in water management. 'Knowledge exchange' activities in the CRC for Freshwater Ecology ranged from targeted application of science to specific problems, to the creation of guidelines reflecting general management principles. Prior to these management roles, Ralph was a researcher specialising in understanding the effects of land use on floodplain lake ecology and river-floodplain habitats.

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### DR CHRIS HEPPLEWHITE

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Chris Hepplewhite is the Water Quality and Research and Development Manager for ACTEW Corporation, Canberra's water utility. Chris is an organic geochemist with more than 15 years experience in analytical chemistry and drinking water treatment. He has worked on a wide variety of research projects involving natural organic matter in water and how it impacts treatment process as well the fate and transport of organic carbon and nitrogen in water. His current role encompasses the quality of water in entire water cycle including upland streams, reservoirs, treatment and distribution to customers as well as sewage collection, transport, treatment and discharge to the environment. He is particularly interested in how to manage balancing water quantity and quality with sustainability or the water/energy/environment nexus.

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### DR FIONA DYER

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Dr Fiona Dyer is a senior research fellow with the Institute for Applied Ecology at the University of Canberra. Fiona is a freshwater scientist with more than 15 years experience in physical and chemical processes and assessment at the riverine and catchment scale. Fiona has experience in physical (hydraulic and geomorphic) responses to flow variation as well as sediment and nutrient movement within rivers. Fiona has worked across a range of riverine environments in south-eastern Australia, from the upland rivers of the Murrumbidgee catchment to the lowland rivers of the Wimmera catchment. Her scientific expertise has been used in setting environmental flow releases for ecological outcomes in the Cotter River and the Wimmera River system and the development and implementation of monitoring programs to assess the efficacy of these releases. Her current research interests are predicting the consequences of changing climates for water quality and ecological responses.

## EDWINA ROBINSON

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Edwina Robinson has worked as the Urban Waterways Coordinator with the ACT Government for the past three years. In that time she has assisted in the project management and planting of the Banksia Street, O'Connor Wetland and community engagement for the Dickson and Lyneham wetlands. She is currently managing the construction of The Valley Ponds, Gungahlin – three interconnected wetlands on a tributary of Ginninderra Creek. Edwina studied Landscape Architecture and Ecology at the University of Canberra and is passionate about creating public landscapes that improve the local environment and enhance the experiences of residents.

## BEN BROADHURST

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Ben Broadhurst is a freshwater scientist with over 8 years experience in freshwater fish monitoring and assessment. He specialises in monitoring and assessment of threatened fish populations, and assessing movement and behaviour of freshwater fish. Ben has worked in a variety of locations, though the bulk of his experience is in upland catchments in south-eastern Australia. The projects Ben has worked on have been varied and include: Delivering environmental flows to large biota; Constructed homes for threatened fish in an enlarged reservoir; Assessment of the effects of a reservoir enlargement; predation of Macquarie perch by Cormorants.

Ben is currently a research officer at the Institute for Applied Ecology at the University of Canberra. He is responsible for leading an assessment program which is looking to describe effects of reservoir enlargement on threatened fish species. Ben's current research interests are fish community assessment, fish movement and behaviour, and fish conservation.

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## FIELD TRIP SPONSORS

This Field Trip has coordinated with the support and cooperation of the following organisations:



### **ACTEW Corporation**

ActewAGL House  
Level 5, 40 Bunda St  
Canberra City ACT 2600  
(+61 2) 6248 3111



**Institute for  
Applied  
Ecology**

*Ecological solutions for  
a healthy environment*

### **Institute for Applied Ecology**

University of Canberra Building  
3, Level C, Room 1  
ACT 2601  
(+61 2) 6201 2795



**ACT**  
Government  

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**Environment and  
Sustainable Development**

### **Environment and Sustainable Development (ACT Government)**

Environment and Sustainable Development  
GPO Box 158  
Canberra City ACT 2601  
12 22 81

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## FURTHER READING

ACTEW (2009). *Enlargement of the Cotter Reservoir and associated works. Environmental Impact Assessment*. ACTEW Corporation, Canberra.

ACTEW (2011). ACT Water Supply System. Available from <http://www.actew.com.au>.

ACT Government (2006). Think Water, Act Water: Strategy for sustainable water resource management in the ACT. January 2006. Available from <http://www.thinkwater.act.gov.au>.

Lintermans, M. (2012). Managing potential impacts of reservoir enlargement on threatened *Macquaria australasica* and *Gadopsis bispinosus* in southeastern Australia. *Endangered Species Research* 16, 12-16.

Nichols S, Norris R, Maher W, Thoms M, (2006) Ecological effects of serial impoundment on the Cotter River, Australia. *Hydrobiologia* **572**, 255-273.

Norris R and Nichols S (2011) Environmental flows: achieving ecological outcomes in variable environments. In 'Water Resources Planning and Management'. (Eds Q Grafton, and K Hussey) Cambridge University Press.

Peat, M., Chester, H. and Norris, R. (2005) River ecosystem response to bushfire disturbance: interaction with flow regime. *Australian Forestry* **68**, 153 – 161.

Peat, M. and Norris, R. (2007) Adaptive management for determining environmental flows in the Australian Capital Territory. In 'Proceedings of the 5<sup>th</sup> Australian Stream Management Conference. Australian rivers: making a difference'. (Eds Wilson, A.L., Dehaan, R.L., Watts, R.J., Page, K.J., Bowmer, K.H., & Curtis, A.) Charles Sturt University, Thurgoona, New South Wales.

Youtube Video "Caring for Maccas" if you are keen: <http://www.youtube.com/watch?v=V3GxTcl0-Ds>