The Proposed Murray-Darling Basin Plan:

Scientific Statement – April 2012

The Murray-Darling Basin Authority faces an immense challenge to balance and reconcile many diverse, changeable and often conflicting demands in developing a Murray-Darling Basin Plan as a blueprint for a sustainable future. The environmental health of the Basin and the socio-economic prosperity of local communities and the nation are inseparable. Most people agree that river diversions have exceeded the bounds of sustainability and that water must be recovered for the environment. Water recovery delivers significant ecological and economic benefits and remains the centrepiece of the proposed Basin Plan (the proposed Plan, released on 28 November 2011). That the water volume required for recovery is highly contentious must not be allowed to outweigh the reality of Murray-Darling crisis or reduce the urgency for action. In this statement, we comment on the draft Plan released on 28 November 2011 and reaffirm the need for a Basin Plan and for an effective process of implementation.

The Proposed Plan

- ***Environmental water.*** The proposed Plan provides for 2750 GL (as a long-term average) to be restored to the environment each year, through application of Sustainable Diversion Limits. Modelling by the Murray-Darling Basin Authority (MDBA) and State agencies shows that this level of recovery meets only some of the targets ('Environmental Water Requirements') established to protect key environmental assets and functions[1,2]. The number of targets met is increased by higher volumes of water (e.g. 3500, 4000 GL)[3]. More details are required on the environmental targets met or not met by different water-recovery scenarios. Indeed, it is not clear why the Basin Plan should not meet all targets, in keeping with the *Water Act 2007*. There are significant economic as well as ecological benefits for the nation with increased water recovery. A 2800 GL scenario was estimated to cost $542 million to irrigation but with estimated benefits of $3-8 billion for habitat ecosystem services, up to $1 billion for carbon sequestration, more than $330 million for aesthetic appreciation, $30 million for avoidance of damage and $160 million for tourism[4].

- ***Constraints need assessment.*** The proposed Plan cites physical, legal, administrative and policy constraints on volumes of water that can be delivered to the environment. These include flooding of land and other structures (e.g. bridges, roads), and reservoirs with limited outlets and operating rules (e.g. carry-over restrictions). Options for removal of all such constraints

should be included in modelling for water-recovery scenarios and assessed and prioritised as part of a strategic review of 'infrastructure'. They should not limit the opportunities for recovering rivers.

- ***Groundwater should not underwrite surface–water use.*** Plans for increased groundwater access (about 2600 GL/year) could undermine the effects of surface-water recovery by diverting the water before it reaches the rivers. Evidence is needed to show that groundwater extraction will have little or no effect on river flows and the long-term sustainability of groundwater resources. Groundwater and surface-water resources should be managed together, given that groundwater often underpins surface water flows.

- ***Climate-change provisions should be part of the Plan.*** The 2750 GL water-recovery scenario is based on modelled historical inflows and climatic data and not future climate change scenarios, but human-induced climate change affects Australian environments, including rivers, and the outcomes of the Basin Plan[5,6]. There is unequivocal evidence that global temperatures are rising[7], and there will be corresponding changes in patterns of rainfall, evaporation and stream runoff[8]. Climate-change science was not adequately incorporated in the 2010 recommendations for Sustainable Diversion Limits, and has been ignored in the proposed Plan[1]. Without adequate allowances for climate change, water reserves (particularly planned environmental water[9]) would decrease and salt export would be impeded, undermining the Basin Plan. Governments would need to consider further buy-back of water to offset this future risk.

- ***Ecological targets need better definition.*** The hydrological modelling in the proposed Plan refers to 'Environmental Water Requirements' for key environmental assets (e.g. Ramsar sites)[10] and key ecological functions. These are less well-defined for functions than they are for assets, and there is a need to clarify definitions and the links between hydrological and ecological variables. It is ecological criteria, rather than hydrological ones, that underpin the concept of the Basin Plan. The rationales for selection of assets and functions also need more explanation[1], with particular regard for the implications of meeting some rather than all targets.

- ***Flows in unregulated rivers need to be protected.*** Unregulated streams in the Basin are vulnerable to flow interceptions, including the cumulative impacts of small diversions like farm dams, and to groundwater extractions. These are meant to be accounted for in Sustainable Diversion Limits as part of the proposed Plan, but they are likely to receive limited auditing and will need more protection. Also, downstream trading of licenced interceptions could reduce flows without properly accounting for losses. Protection is required to ensure that Basin Plan

outcomes are not affected, and that water is conserved for the environment and downstream users.

The Need for a Basin Plan

- ***State of the environment***. Rivers, wetlands and woodlands throughout the Basin are degraded and, despite recent flooding, have not fully recovered. Australian taxpayers incur major costs (externalities) as a result. For example, in recent years governments have spent more than $800 million combatting problems from lack of water (drought, over–allocation) in the Lower Murray, and requiring a desalination plant for Adelaide[11]. Planning should minimise these costs.
- ***Planning for dry periods***. The Millennium Drought (2002–10) exposed serious problems in water resource management, leading to intensified pressures on environmental assets[11] and suspension of water planning[12]. Recurrent droughts and floods are inherently part of the regional climate; their frequency and intensity are expected to increase under climate change, and the ecological and economic consequences need to be managed in concert.
- ***Extended time scales***. A Basin Plan would allow planning over decadal and longer time scales, beyond the scope of most political and economic perspectives. Many ecological processes and environmental changes operate at these long time scales.
- ***A long-term vision***. A Basin Plan is needed to supervise and coordinate planning in the State jurisdictions, in the interests of sustainable, Basin-wide outcomes. The Plan's long-term 'vision' needs to be elaborated as goals, providing a guiding framework for Strategic Adaptive Management. This would link local, regional, jurisdictional and Basin-wide scales of management, and it would link management, monitoring and science in a shared, collaborative effort.

Implementing the Basin Plan

- ***Adaptive management*.** 'Adaptive management' is often treated as an aspirational goal but it should be an integral framework for planning, monitoring and review, and should *engage* managers, researchers and stakeholders. The Proposed Basin Plan promises such an approach. Anything less than a Strategic Adaptive Management framework would perpetuate past problems.
- ***Other threats*.** The proposed Plan is concerned mainly with water management, but water is a prerequisite rather than a complete remedy for recovery of rivers and wetlands. Other threats, for example, include barriers to fish movements, impacts of land use, invasive species,

deteriorating water quality and floodplain development. These require coordinated action and compliance by the States, who have primary responsibility for land management. This is a further reason to foster development of an adaptive management framework, linking land and water resource management.

References

1. Young, W.J., Bond, N., Brookes, J., Gawne, B. and Jones, G.J. (2011). Science review of the estimation of an environmentally sustainable level of take for the Murray-Darling Basin. Final Report to the Murray-Darling Basin Authority. CSIRO, Canberra.
2. Lamontagne S., Aldridge K.T., Holland K.L., Jolly I.D., Nicol J., Oliver R.L., Paton D.C., Walker K.F., Wallace T.A., Ye Q. (2012). Expert panel assessment of the likely ecological consequences in South Australia of the proposed Murray-Darling Basin Plan. Goyder Institute for Water Research Technical Report Series 12/2, Adelaide.
3. CSIRO (2011). A science review of the implications for South Australia of the Guide to the proposed Basin Plan: synthesis. Goyder Institute for Water Research Technical Report Series 11/1, Adelaide.
4. CSIRO (2012). Assessment of the ecological and economic benefits of environmental water in the Murray–Darling Basin. Water for a Healthy Country National Research Flagship. CSIRO, Canberra.
5. Garnaut, R. (2008). Garnaut Climate Change Review. Cambridge University Press.
6. IPCC (2012). Managing the risks of extreme events and disasters to advance climate change adaptation. A Special Report of Working Groups I and II of the Intergovernmental Panel on Climate Change [Field, C.B., V. Barros, T.F. Stocker, D. Qin, D.J. Dokken, K.L. Ebi, M.D. Mastrandrea, K.J. Mach, G.-K. Plattner, S.K. Allen, M. Tignor, and P.M. Midgley (eds)]. Cambridge University Press.
7. Bureau of Meteorology (2012). State of the Climate 2012, http://www.bom.gov.au/announcements/media_releases/ho/stateClimate2012.pdf (accessed 10/4/12).
8. Alexandar, L. and Tebaldi, C. (2012). Climate and weather extremes: observations, modelling and projections, *The Future of the World's Climate* [A. Henderson-Sellers and K. McGuffie (eds)]. Elsevier, Amsterdam, pp. 253-288
9. CSIRO (2008). Water availability in the Murray-Darling Basin. A report to the Australian Government from the CSIRO Murray-Darling Basin Sustainable Yields project. CSIRO, Canberra.
10. Murray-Darling Basin Authority (2012). Assessing environmental water requirements for the Basin's rivers. http://mdba.gov.au/draft-basin-plan/science-draft-basin-plan/assessing-environmental-water-requirements (accessed 2/4/12).
11. Kingsford, R.T., Walker, K.F., Lester, R.E., William J. Young, Fairweather, P.G., Sammut, J. and Geddes, M.C. (2011). A Ramsar wetland in crisis - the Coorong, Lower Lakes and Murray Mouth, Australia. *Marine and Freshwater Research* **62**: 255-265.
12. NWC (2009). Australian water reform 2009: second biennial assessment of progress in implementation of the National Water Initiative, September 2009. National Water Commission, Canberra.

Signatories

Spokespeople

Professor Richard Kingsford, Director, Australian Wetlands and Rivers Centre, University of New South Wales
Professor Max Finlayson, Director of the Institute for Land, Water and Society, Charles Sturt University
Professor Ann Henderson-Sellers, Environment and Geography, Macquarie University
Dr Rebecca Lester, School of Life and Environmental Sciences, Deakin University
Dr Ross Thompson, Deputy Director, Australian Centre for Biodiversity, School of Biological Sciences, Monash University
Associate Professor Keith Walker, School of Earth and Environmental Sciences, The University of Adelaide (Adjunct)

Dr Kane Aldridge, School of Earth and Environmental Sciences, The University of Adelaide
Emeritus Professor Angela Arthington, Australian Rivers Institute, Griffith University
Professor Andy Baker, Connected Waters Initiative Research Centre, Australia, and National Centre for Groundwater Research and Training (NCGRT), University of New South Wales
Dr Stephen Balcombe, Australian Rivers Institute, Griffith University
Associate Professor Leon Barmuta, School of Zoology, University of Tasmania
Professor Andrew Boulton, University of New England (Adjunct)
Professor Robert Bourman, School of Earth and Environmental Sciences, University of Wollongong
Dr Kate Brandis, Australian Wetlands and Rivers Centre, University of New South Wales
Dr Sam Capon, Australian Rivers Institute, Griffith University
Dr Jane Catford, School of Botany, University of Melbourne
Dr Yung En Chee, School of Botany, University of Melbourne
Dr David Crook, Research Institute for Environment and Livelihood, Charles Darwin University
Dr Shaun Cunningham, Australian Centre for Biodiversity, Monash University
Professor Peter Davies, Director of Centre of Excellence in Natural Resource Management, University of Western Australia
Professor Jenny Davis, School of Biological Sciences, Monash University
Professor Peter Fairweather, School of Biological Sciences, Flinders University
Associate Professor Brian Finlayson, Department of Resource Management and Geography, University of Melbourne
Dr Kirstie Fryirs, Department of Environment and Geography, Macquarie University
Dr Georgia Garrard, School of Botany, University of Melbourne
Dr Michael Geddes, School of Earth and Environmental Sciences, The University of Adelaide
Joan Gibbs, School of Natural and Built Environment, University of South Australia
Associate Professor John Harris, Department of Environmental Management and Ecology, La Trobe University (Adjunct)
Dr Geoff Heard, School of Botany, University of Melbourne
Dr Bill Humphreys, Senior Curator, Western Australian Museum
Dr Paul Humphries, School of Environmental Sciences, Charles Sturt University
Dr Anne Jensen, Environmental Consultant, Adelaide
Dr Kim Jenkins, Australian Wetlands and Rivers Centre, University of New South Wales
Dr Alison King, Research Institute for Environment and Livelihood, Charles Darwin University
Professor David Keith, Australian Wetlands and Rivers Centre, University of New South Wales
Associate Professor Bryce Kelly, School of Biological, Earth and Environmental Sciences, University of New South Wales
Professor Sam Lake, School of Biological Sciences, Monash University
Dr Simon Linke, Australian Rivers Institute, Griffith University

Associate Professor Mark Lintermans, Institute for Applied Ecology, University of Canberra
Dr Tara Martin, ARC Centre of Excellence for Environmental Decisions, University of Queensland
Professor Wayne Meyer, Environment Institute, University of Adelaide
Emeritus Professor Tom McMahon, Department of Civil and Environmental Engineering, University of Melbourne
Dr Kerri Muller, Applied Ecologist, Principal Kerri Muller NRM
Dr Lucy Nairn, Australian Wetlands and Rivers Centre, University of New South Wales
Dr Jonathan Nevill, Aquatic Resources Policy Analyst, Sandy Bay, Tasmania
Dr John Porter, Australian Wetlands and Rivers Centre, University of New South Wales
Dr S. Topa Petit, School of Natural and Built Environment, University of South Australia
Dr Tim Ralph, Department of Environment and Geography, Macquarie University
Dr Tom Rayner, Australian Wetlands and River Centre, University of New South Wales
Mr Julian Reid, Fenner School of Environment and Society, Australian National University
Dr Shiquan Ren, Australian Wetlands and Rivers Centre, University of New South Wales
Associate Professor Belinda Robson, School of Environmental Science, Murdoch University
Dr Rob Rolls, Australian Rivers Institute, Griffith University
Dr Libby Rumpff, ARC Centre of Excellence for Environmental Decisions, School of Botany, University of Melbourne
Associate Professor Darren Ryder, School of Environmental and Rural Science, University of New England
Dr Fran Sheldon, Australian Rivers Institute, Griffith University
Dr Russell Shiel, School of Earth and Environmental Sciences, The University of Adelaide
Dr Mike Stewardson, Department of Infrastructure Engineering, University of Melbourne
Associate Professor Phil Suter, School of Life Sciences, La Trobe University
Dr Jim Thomson, School of Biological Sciences, Monash University
Professor Brian Timms, Australian Wetlands and Rivers Centre, University of New South Wales (Adjunct)
Dr Mirela Tulbure, Australian Wetlands and Rivers Centre, University of New South Wales
Dr Danielle Warfe, Research Institute for Environment and Livelihood, Charles Darwin University
Dr Skye Wassens, Institute for Land, Water and Society, Charles Sturt University
Professor Andrew Western, Department of Infrastructure Engineering, University of Melbourne