

INTRODUCTION

This appendix is provided as a guide to environmental flows. Environmental flows is a general term that can be taken to mean a variety of things, including *environmental water provisions* as defined in the Australian Water Resources 2005. The aim of the appendix is to help readers understand how environmental flows are allocated and provided for in each of the States and Territories of Australia. It also helps to explain their relationship to the presentation of water supplied to the environment by the economy as presented in the supply and use tables found in Chapter 2.

The 2000–01 Water Account presented information on environmental flows defined as water delivered (released) for the purpose of the environment in accordance with a specific plan prepared in conjunction with and/or approved by the appropriate environmental (resource) regulator. The 2004–05 Water Account again includes information on the water supplied or allocated to the environment in the supply and use tables but we have not termed this environmental flows. This is because many environmental flows provided for by water providers and water management agencies under various State and Territory legislation are not allocated or recorded in a way that currently enables them to be easily included in a water accounting format. There is currently work in this area under the NWI and it is hoped that in the future environmental flows can be incorporated into a water accounting format.

BACKGROUND

In the 1994 water reform agreement, COAG recognised the environment as a legitimate user of water, acknowledging a need in all jurisdictions to arrest widespread natural resource degradation caused by historical and current patterns of water use (NCC 2004). One of the aims of the NWI is to implement an integrated management system of water resources which explicitly provides water for the environment and other public benefit outcomes. Environmental outcomes may include maintaining ecosystem function, biodiversity, water quality and river health targets, where as other public benefits includes mitigation of pollution, indigenous and cultural values, recreation, fisheries, tourism, navigation and amenity values.

States and Territories use different methods of allocating environmental flows that reflect the different geographic, climatic and ecological conditions, and past water management practices (Land and Water Australia 2003, NWC 2006b). Methods of allocating environmental water include:

- providing specific quantities of water to the environment through ecological licences and allocations.
- placing limits and rules on extractive water licenses, and
- strategic management of flow regimes and water quality.

Due to the differences in allocation methods, and the relative complexity involved in the processes of environmental flow definition, provision and reporting, it is difficult to quantify and present data on environmental flows in a nationally consistent manner (SKM 2006). The 2000–01 Water Account presented information on environmental flows, but this was only the volume of water released by water providers for environmental purposes. The same information is presented for 2004–05 but has been re-named provision of water for the environment in recognition that this does not represent all environmental flows.

BACKGROUND *continued*

Since the publication of the 2000–01 Water Account, the NWI has required the jurisdictions to develop annual environmental water accounting arrangements, that include:

- reporting on environmental water rules and whether or not they were activated in a particular year;
- the extent to which these rules were implemented;
- the overall effectiveness of the use of resources in the context of the environmental and other public benefit outcomes sought and achieved; and
- implementing a compatible register of new and existing environmental water.

During 2004–05 the jurisdictions were at various stages of developing and implementing arrangements for providing water for the environment and accounting, limiting the availability of data on environmental flows. This is expected to improve as nationally accepted frameworks and definitions are developed.

SUMMARY OF
ARRANGEMENTS

The following paragraphs summarise the various methods used for the provision of water for the environment and other public benefit outcomes in Australia. Descriptions of the methods used for allocating environmental flows in each State and Territory are provided as well as data on environmental flows for 2004–05 where available.

New South Wales

The New South Wales *Water Management Act 2000* provides for three categories of environmental flows:

- environmental health water, where water is allocated for fundamental environmental health and must be provided at all times;
- supplementary environmental water, where water is committed for a specific environmental purpose, but under normal circumstances can be used for other purposes; and
- adaptive environmental water, which is water granted under a water access licence for specified environmental purposes and can be traded or converted to an extractive use.

Water Sharing Plans establish rules for the assignment of environmental water and in total aim to return an average of 220 GL of water to the environment each year. Broad level catchment plans are being prepared for the unregulated rivers and groundwater sources that are not covered by Water Sharing Plans. These plans will develop a standard set of water sharing rules based on catchments with similar characteristics (DIPNR 2005).

Despite drought conditions across much of inland New South Wales in 2004–05, the environmental flow rules in each Water Sharing Plan were implemented in all of the seven regulated river systems with the exception of the Lachlan. For the twenty unregulated river Water Sharing Plans, cease to pump rules are used during very low flow conditions and were implemented during 2004–05 in fourteen plan areas (DIPNR 2005). The main environmental provision for groundwater sources is protecting the long-term storage component and a proportion of the recharge from extraction.

In 2004–05, the first Aboriginal cultural access licence was granted in New South Wales. Under the Murrumbidgee Water Sharing Plan, 2,150 ML of water was granted for the inundation of a culturally significant wetland (DIPNR 2005).

Victoria

Water for the environment in Victoria is held primarily in environmental water reserves, which is the share of water resources set aside to maintain the environmental values of a water system (DSE 2004). This volume of water has been established by setting limits on diversions through:

- conditions on bulk entitlements specifying minimum and/or flushing flows;
- surface and groundwater license rules established in water management plans;
- caps on bulk entitlements, placed on the total volume diverted and/or the rate of diversion; and

Victoria continued

- in some regulated rivers a bulk entitlement may provide water specifically for the environment.

Bulk entitlements for the environment may be held in storage such that all or part of the entitlement can be traded on the temporary water market where this does not affect the achievement of the objectives of the environmental water reserve. Water can also be provided to the environment through private donations from the community.

The Victorian river basins located in the Murray Darling Basin use the restrictions placed on the consumptive use of water by the Murray Darling Basin Cap (see http://www.mdbc.gov.au/nrm/the_cap) to set the environmental water reserve. In unregulated rivers and aquifers, environmental water reserves are provided by managing existing diversions through Stream Flow Management Plans and Groundwater Management Plans, which identify the environmental flow requirements for the plan area. Environmental flows in unregulated streams are protected by placing rosters and restrictions on private diverters who pump from the river in summer and by limiting the number of farm dams in winter. The use of groundwater is managed through the licensing regime and where necessary, restricting use to maintain groundwater levels to meet the requirements of the environmental water reserve. The ability to meet environmental flow requirements is subject to maintaining a reasonable level of supply reliability for existing users.

Queensland

The *Water Act 2000* provides for Water Resource Plans to manage Queensland's water resources. These plans make provisions for the natural processes that underpin river health, as well as considering the social and economic aspects of water management. Environmental flow objectives are set out in Water Resource Plans to sustain healthy aquatic ecosystems when tradable water entitlements are to be established. Water Resource Plans are implemented by Resource Operations Plans. These establish tradable water entitlements and detail the management arrangements and rules, including for how natural flows are to satisfy environmental flow objectives. Plans are to be reviewed every ten years to assess whether they have provided adequate environmental flows for Queensland's Rivers. Plans have been completed for 12 of the 21 river basins in Queensland.

Environmental flow objectives have performance indicators for low, medium and high-flow characteristics. Environmental flow objectives range from setting limits as to the extent of time when the river should be dry through to the frequency of flood events of varying magnitudes. A similar approach is used for groundwater where objectives are being set in terms of water levels that sustain the groundwater discharges needed to maintain ecological systems (see http://www.nrw.qld.gov.au/wrp/pdf/general/u_wrp.pdf).

South Australia

Environmental flows in South Australia are achieved through environmental water requirements which are the hydrological regimes needed to sustain the ecological values of aquatic ecosystems, including their processes and biological diversity, at a low level of risk (DWR 2000). Environmental water provisions are those parts of the environmental water requirements that can be met at any given time, after considering existing users' rights, social and economic impacts. These provisions are sought for water courses, riparian zones, wetlands, flood plains, estuaries, cave and aquifer ecosystems. In cases where current environmental water provisions are not sufficient to meet the requirements of water-dependent ecosystems, the aim of the policy is to progressively increase environmental water allocations until they do.

Prescription of a water resource is used in South Australia when the level of water use and the declining condition of an area's water resources indicate that sustainable management is needed. All water users of a prescribed water resource require a licence, which specifies how much water is allocated to the user and may specify other conditions or controls. 'Use limits' are estimated for prescribed water resources, which

South Australia continued

describes the maximum annual volume of water that can be made available for human activities and industry without seriously impacting on the environment (DWR 2000). These limits are based on typical conditions, and may be above sustainable use in circumstances such as extended periods of drought. In July 2005, six major catchment and groundwater areas in South Australia were prescribed resources.

Western Australia

The Western Australian *Environmental Water Provisions Policy 2000* describes the principles and processes to be applied to determine how much water should be retained for the environment when allocating and reviewing water use entitlements. As in South Australia, ecological water requirements and environmental water provisions (as defined above) are used to allocate water for environmental and other public benefit outcomes. Western Australia also has social water requirements, which are the elements of a water regime that are identified to meet social values, and mitigation water requirements, which are elements of the water regime that are identified to improve diminished water quality. Both social and mitigation water requirements may form part of the environmental water provisions. Environmental water provisions can not be traded in Western Australia.

In areas proclaimed under the *Rights in Water and Irrigation Act 1914*, the Western Australian Government ensures that water use is within sustainable limits through the issuing of licenses to approved users. Licence holders may only take water for the purpose and in the way specified by the licence so that allocation limits are not exceeded and the environment is not compromised. Further allocations to new or existing consumptive users will only occur where environmental water provisions are being met.

Tasmania

Water for ecosystems in Tasmania is allocated within the framework of the *Water Management Act 1999* and its associated *Water for Ecosystems Policy*. Environmental flows are delivered through a rules basis on water licences and allocations, with minimal water volumes maintained in streams and bores. Environmental water can be held as an entitlement for environmental and other public benefit outcomes, however none have been registered as at July 2005 (Jackson 2006, personal communication).

Water for the environment in Tasmania is defined in terms of environmental water requirements and environmental water provisions, which are the same as the ecological water requirements and environmental water provisions used in South Australia and Western Australia. Water Management Plans prescribe the environmental water requirements for a catchment's water resources. These plans have been partially or fully completed for many Tasmanian rivers. Environmental water requirements have been implemented for the waterways in 5 of the 48 Land and Water Management Catchments, which represents an approximate 10% progress towards full assessment and implementation (Read 2006, personal communication).

Mechanisms are currently being introduced to manage groundwater areas, especially where groundwater use may exceed the yield capacity of the aquifer. Groundwater management plans will be developed for the State's groundwater management regions. During 2004–05 work commenced on the development of management procedures, including licensing and metering of bores in areas of high groundwater use.

Northern Territory

Water Allocation Plans for surface and groundwater in the Northern Territory include contingent allocations for the environment which provide a conservative and sustainable balance between environmental needs and other water uses (NCC 2001). To ensure that water extraction remains within the estimated sustainable yield, licences are issued only after accounting for environmental needs.

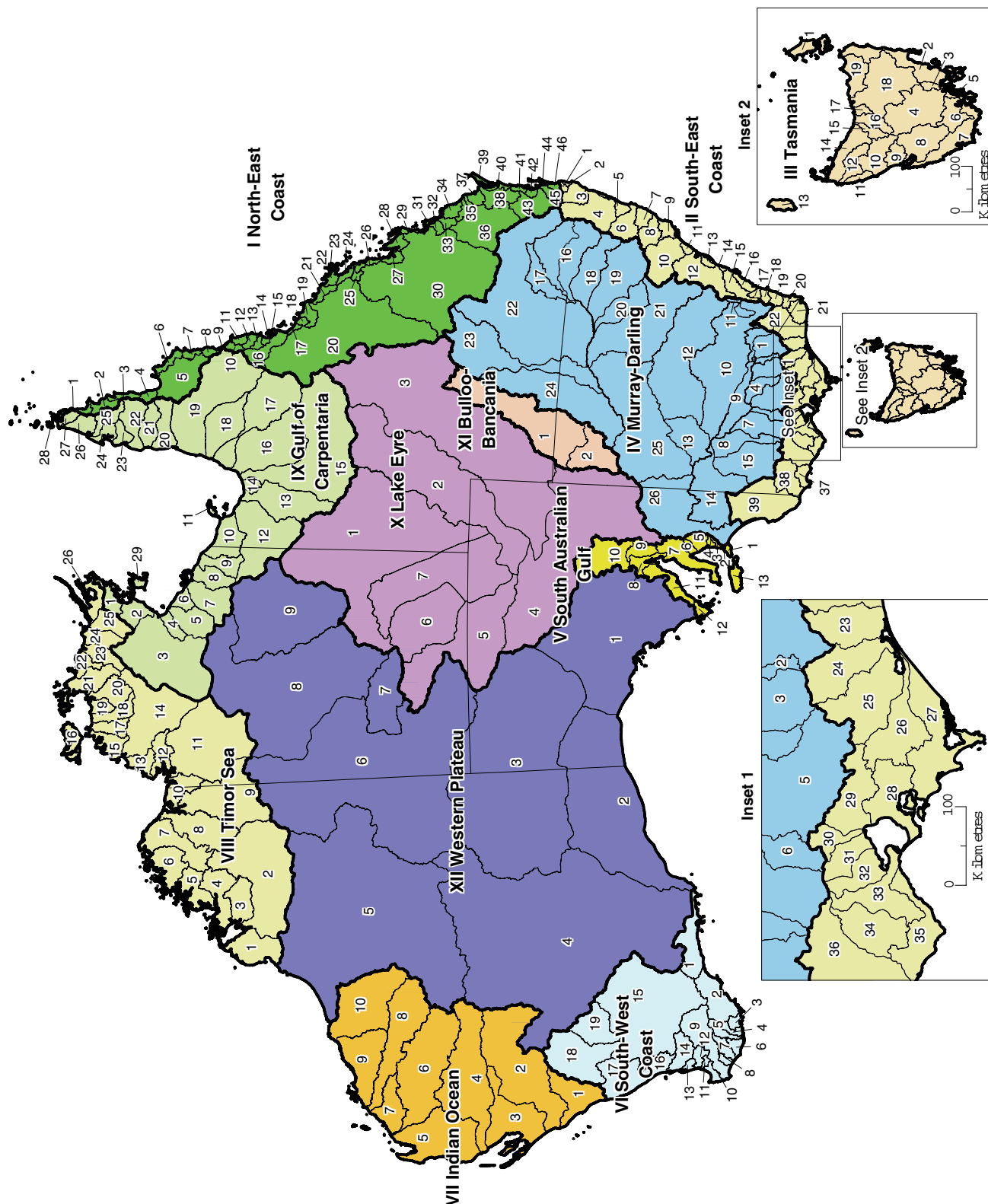
Northern Territory continued

There are highly variable environmental conditions in the Northern Territory, from tropical environments of the Top End in the north, through the semi-arid mulga scrubs and mallee, to the sand dunes of the Arid Zone in the centre. Surface water extraction in the Top End is limited to no more than 20% of streamflow at any time. Groundwater extraction licences are limited so that groundwater extraction generally does not exceed 20% of the total recharge rate. In the Arid Zone, licences are generally limited so that no more than 80 per cent of the aquifer storage will be depleted over at least one to two hundred years.

The Northern Territory's Integrated Natural Resource Management Plan (DIPE 2005) estimated that over 99% of mean annual flow remains available for environmental and cultural uses in 24 of the 31 rivers in the Top End of the Northern Territory. Over 90% of average annual recharge to 10 of the 16 groundwater provinces in the Northern Territory is considered to be available to sustain environmental and cultural values (DIPE 2005).

Australian Capital Territory

In the ACT, some of the water resources fall under the jurisdiction of the ACT, NSW and the Commonwealth, others fall solely under the jurisdiction of the ACT. Water can only be used for other purposes in the ACT once environmental flow requirements have been met. Environmental flows are required to be supplied in the context of the ACT Water Resource Management Plan. "Think Water, Act Water" describes the ACT's water resources, including the flows required to meet the environmental needs of individual rivers and aquifers. In 2005, draft Environmental Flow Guidelines were prepared, which set out the environmental flow requirements needed to maintain aquatic ecosystems (Environment ACT 2005). Only limited groundwater extraction occurs and is limited to 10% of groundwater recharge in each subcatchment (Environment ACT 2005).



XI Bulloo-Bancannia

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|---|-----------------------|----|--------------------|
| 1 | Greenough River | 6 | Ashburton River |
| 2 | Murchison River | 7 | Onslow Coast |
| 3 | Wooramel River | 8 | Fortescue River |
| 4 | Gascoyne River | 9 | Port Hedland Coast |
| 5 | Lyndon-Minitla Rivers | 10 | De Grey River |

VIII Timor Sea

- | | | | |
|---|---------------------|----|-------------------------------|
| 1 | Cape Leveque Coast | 14 | Daly River |
| 2 | Fitzroy River (WA) | 15 | Finniss River |
| 3 | Lennard River | 16 | Bathurst and Melville Islands |
| 4 | Isdell River | 17 | Adelaide River |
| 5 | Prince Regent River | 18 | Mary River (NT) |
| 6 | King Edward River | 19 | Wildman River |
| 7 | Drysdale River | 20 | South Alligator River |
| 8 | Pentecost River | 21 | East Alligator River |
| 9 | Ord River | 22 | Goomadeer River |
| 0 | Keep River | 23 | Liverpool River |
| 1 | Victoria River | 24 | Blyth River |
| 2 | Fitzmaurice River | 25 | Goyder River |
| 3 | Moyle River | 26 | Buckingham River |

IX Gulf of Carpentaria

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|---|-----------------|----|----------------------|
| 1 | Koolatong River | 16 | Norman River |
| 2 | Walker River | 17 | Gilbert River |
| 3 | Roper River | 18 | Staaten River |
| 4 | Towns River | 19 | Mitchell River (QLD) |

II South-East Coast

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|----|----------------------------|----|----------------------|
| 1 | Tweed River | 21 | East Gippsland |
| 2 | Brunswick River | 22 | Snowy River |
| 3 | Richmond River | 23 | Tambo River |
| 4 | Clarence River | 24 | Mitchell River (VIC) |
| 5 | Bellinger River | 25 | Thomson River |
| 6 | Macleay River | 26 | Latrobe River |
| 7 | Hastings River | 27 | South Gippsland |
| 8 | Manning River | 28 | Bunyip River |
| 9 | Karuah River | 29 | Yarra River |
| 10 | Hunter River | 30 | Maribymong River |
| 11 | Macquarie-Tuggerah Lakes | 31 | Werribee River |
| 12 | Hawkesbury River | 32 | Moorabool River |
| 13 | Sydney Coast-Georges River | 33 | Barwon River |
| 14 | Wollongong Coast | 34 | Lake Corangamite |
| 15 | Shoalhaven River | 35 | Otway Coast |
| 16 | Clyde River-Jervis Bay | 36 | Hopkins River |
| 17 | Monuya River | 37 | Portland Coast |
| 18 | Turross River | 38 | Glenelg River |
| 19 | Bega River | 39 | Millicent Coast |
| 20 | Towamba River | | |

V South Australian Gulf

- 1 Fleurieu Peninsula
- 2 Myponga River
- 3 Onkaparinga River
- 4 Torrens River
- 5 Gawler River
- 6 Wakefield River
- 7 Broughton River
- 8 Mambray Coast
- 9 Willochra Creek
- 10 Lake Torrens
- 11 Spencer Gulf
- 12 Eyre Peninsula
- 13 Kangaroo Island

VI South-West Coast

- | | | | |
|----|-----------------|----|-------------------|
| 1 | Esperance Coast | 11 | Preston River |
| 2 | Albany Coast | 12 | Collie River |
| 3 | Denmark River | 13 | Harvey River |
| 4 | Kent River | 14 | Murray River (WA) |
| 5 | Frankland River | 15 | Avon River |
| 6 | Shannon River | 16 | Swan Coast |
| 7 | Warren River | 17 | Moore-Hill Rivers |
| 8 | Donnelly River | 18 | Yarra Yarra Lakes |
| 9 | Blackwood River | 19 | Ninghan |
| 10 | Busselton Coast | | |

X Lake Evre

- 1 Georgina River
- 2 Diamantina River
- 3 Cooper Creek
- 4 Lake Frome
- 5 Finke River
- 6 Todd River
- 7 Hay River