



# Shepherding water for the environment

## Progress of the NSW water shepherding project, 2011

### WHAT IS WATER SHEPHERDING?

Water shepherding is the delivery of a volume of water from a nominated licence location to a downstream delivery location where it can be made available for use by the environment. The volume delivered to the downstream location will be reduced to take into account evaporation and transmission losses between the two points.

### THE WATER SHEPHERDING MEMORANDUM OF UNDERSTANDING

Consistent with the National Water Initiative and the Intergovernmental Agreement on Murray-Darling Basin Reform, both New South Wales and the Commonwealth governments are committed to restoring the health of rivers and wetlands in the Murray Darling Basin. Both governments entered into a bilateral memorandum of understanding in relation to shepherding water for the environment (the MoU) in July 2010.

Under the MoU the parties have committed to develop water shepherding arrangements which will:

- optimise the use of all Commonwealth environmental water for the environment
- provide the capacity to deliver water to high priority environmental assets, and
- in the case of in-stream environmental watering, provide protection for environmental flows to pass through the system as far as transmission losses allow.

Entitlements and allocations held by other water users will not be enhanced nor diminished as a result of environmental watering actions and shepherding of environmental water under the MoU.

A NSW water shepherding project team was created within the NSW Office of Water to develop an implementation plan for introducing water shepherding in NSW, specifically in the Barwon-Darling River, the Menindee Lakes and downstream of Menindee. This plan is to be consistent with the MoU and is anticipated to be completed by mid 2012. The ability to implement water shepherding in the river systems downstream of the Barwon-Darling will be subject to agreement between jurisdictions to amend the Murray Darling Basin Agreement.

The project team, in conjunction with the Commonwealth, is currently developing a methodology to introduce shepherding consistent with the MoU.

### WATER SHEPHERDING TRIALS

The Commonwealth have sought to have the water available under their Toorale entitlements transferred, or 'shepherded', down the Barwon-Darling River, through the Menindee Lakes and into the Murray River system for environmental watering. NSW agreed to trial water shepherding of the purchased Toorale water on a without prejudice basis, meaning these trials were not to set any precedents for water shepherding into the future. The Toorale trials involved the *Water Act 1912* licences associated with Toorale Station, located on the junction of the Warrego and Darling Rivers in north-west NSW.

Due to the operation of the Menindee Lakes and the Darling River system under dry conditions in 2009-2010, some of the legal and licensing issues associated with shepherding were able to be set aside for the trial events. As a

result trials could be undertaken to demonstrate the likely considerations for shepherding water from a downstream Barwon-Darling location through Menindee Lakes to the Lower Darling and Murray Rivers.

NSW conducted three shepherding trials. Each was successful in shepherding volumes of water from Toorale Station to downstream locations. These trials considered transmission and evaporation losses when calculating volumes that could be made available for environmental purposes at the downstream locations. Flow events in the Barwon-Darling triggered the access conditions of the Toorale licences, making water available to conduct the shepherding trials.

The trials shepherded the following volumes of water:

- In March 2009, 11,400 ML was shepherded from Toorale Station, resulting in 5,976 ML being available for environmental use in the River Murray
- In the summer of 2009/2010, 38,000 ML was shepherded from Toorale Station, resulting in 30,400 ML being delivered to the Menindee Lakes
- In September 2010, 7,672 ML was shepherded from Toorale Station, resulting in 6,580 ML being released to the Great Darling Anabranch.

## WATER SHEPHERDING THROUGH THE BARWON-DARLING

As part of the MoU, the water shepherding team in consultation with the joint NSW / Commonwealth Water Shepherding Working Group investigated various potential methods for the implementation of water shepherding. The ability to implement these methods was based on the assumption that a Water Sharing Plan for the Barwon-Darling Unregulated River Water Source under the *Water Management Act 2000* would be implemented. Four options for shepherding water through the Barwon-Darling were identified as follows:

1. Minimal change
2. End of system accounting
3. Planned environmental water
4. Managed system

### Option 1 - Minimal change

Under this option there would be no change to the NSW legislative framework or the Murray Darling Basin Agreement. Licences purchased by the Commonwealth could remain inactive, which would result in a long term increase in flows at the end of the system. There would be no protection of specific flow events through the system and no accounting of the volume that reaches the end of system. A report on the long term increase in end of system flows as a result of the water being left in the river could be undertaken.

The Commonwealth licences that left water in the river to be used for environmental purposes would be recognised as licensed environmental water for the purposes of auditing compliance of the water source with the long term annual average extraction limit (LTAAEL) established by the water sharing plan. Water use for environmental purposes would not be accounted as extraction. The LTAAEL under a water sharing plan would be varied by the amount of any change to the amount of water committed as licensed environmental water.

Licences would continue to exist and remain in the ownership of the Commonwealth. This licensed water may be extracted at sites in the Barwon-Darling or traded, subject to compliance with any conditions on the licence or associated approvals and in accordance with the *Water Management Act 2000*, its regulations, orders and the rules established by the water sharing plan.

There would be no shepherding of water as envisaged under the MoU and no recognition of any increased end of system flows as a result of the Commonwealth environmental water being left in the system. Commonwealth environmental water could not be recognised, extracted or used downstream of the Barwon-Darling water source.

This method is essentially a 'do nothing' option to demonstrate what would occur if an alternate shepherding approach was not considered.

## Option 2 - End of system accounting

This option would establish an accounting mechanism that is structured around a licensing and dealing framework to shepherd water to the end of the Barwon-Darling system and for the volume reaching the end of system to be accounted and potentially recognised downstream.

Commonwealth licences continue to exist however they would be classed as Licensed Environmental Water for accounting purposes. These licences would remain in the ownership of the Commonwealth and may be extracted at sites in the Barwon-Darling or traded, subject to compliance with any conditions on the licence or associated approvals and in accordance with the *Water Management Act 2000*, its regulations, orders and the rules established by the water sharing plan.

The movement of water to the end of the system may be achieved by allowing the Commonwealth to transfer an allocation from its licences held in the Barwon-Darling water source to a water shepherding licence at the end of the water source. This movement of shepherded water to the end of system would be achieved by following a set of agreed rules. These may include rules to account for losses between the original licence location and the end of the system and a set of access rules for the shepherded water allocation at the end of system.

The movement of shepherded water beyond the Barwon-Darling system would be achieved when the access rules for the shepherded water are triggered by specific flows at the end of system. When this happens the volume to be shepherded will be debited from the shepherding licence allocation account and credited to an account downstream of the Barwon-Darling water source. This would require appropriate amendments to the Murray Darling Basin Agreement and relevant water sharing plans and other NSW instruments to facilitate this recognition of shepherded water downstream.

## Option 3 - Planned environmental water

This option involves the Commonwealth's licences being surrendered and permanent changes being made to the water sharing plan rules to incorporate the increased flows in the river attributable to the non-extraction of the Commonwealth licences.

The conversion of the Commonwealth licences to planned environmental water would increase flows throughout the system in the long term by a reduction to the LTAAEL. There is also potential for flows to increase in the short term through modifications to the planned environmental water rules and licence access rules throughout the system.

The proposed modification to the access rules and the reduced LTAAEL would be designed to deliver more water to the end of system on average. Also, rules could be created that are designed to target specific flow ranges, seasonal conditions or specific wetlands.

To minimise third party impacts, modifications to the access rules would need to be made so that any changes to the frequency of access and the volume extracted in smaller events are minimal. In practice this may be impossible to achieve and is complicated in the Barwon-Darling because of the variation of inflows along the system. A change in access rules that adequately accommodates one scenario of inflows may achieve nothing or escalate the impacts in another scenario.

This proposed methodology did not meet one of the main requirements outlined in the MoU, as the reliability and access characteristics of the licences (including the ability to trade) held by the Commonwealth were not retained. It may be an option that could be considered in whole or part in the future but was not considered viable given current circumstances and legislative constraints on water owned by the Commonwealth.

## Option 4 - Managed system

This option is an active management approach that enables water shepherding events to be managed on a daily basis (fully managed system) or to enable water shepherding of events when required, with default operating conditions applying during all other periods (intervention management).

An active management approach would enable the Commonwealth to nominate the period, time and volume that it would like to shepherd water from its licensed location to a point downstream. This approach would provide protection for all or parts of a particular flow event to provide flexibility to maximise the environmental benefit.

This option is unique in having this combination of characteristics. Commonwealth environmental water would be protected from extraction by other licence holders by variations to the commence-to-pump conditions or through application of rules, such as daily flow shares for each licence holder.

The flexibility of being able to manage water shepherding on an event basis requires continuous monitoring and modelling of the system to replicate various flow scenarios. This is required to predict flow behaviour during a shepherding event to mitigate adverse third party impacts in the system and to ensure accurate monitoring and modelling of the proportion of the end of system flow that has been shepherded.

The administration of this method would be complex, as it requires access announcements to all licence holders during a shepherding event to inform them of when and how much water they can extract on a daily basis. This is particularly complicated in the Barwon-Darling where some licence holders have unique licence access conditions. The implementation of this option would require revision of all of these licence access conditions to enable event based water shepherding to occur without causing adverse impacts to these licence holders.

It is the most complex of the methods considered and would have significantly higher implementation and ongoing management and operational costs than the other options. It is considered a high risk option to implement because it relies on an ability to model the variability in the system on a real time basis with a high accuracy so as to avoid causing adverse third party impacts. River management of this nature has not been tested on a large unregulated system like the Barwon-Darling River system. Accordingly, there is a much greater risk of implementation failure with this option.

### Preferred option

After considering the four options, the Water Shepherding Taskforce agreed upon option 2 – end of system accounting - for further detailed analysis in the next project phase.

The reasons why this method was selected for further investigation include:

- It is consistent with the requirement in the MoU that shepherding would neither enhance nor diminish entitlements and allocations held by water users in NSW
- It is a transparent, rules based approach utilising existing frameworks established under the *Water Management Act 2000* and water sharing plans
- It is consistent with the preference in the MoU that, where practical, water shepherding be implemented through a rules based system rather than an event based system
- It is consistent with the requirement in the MoU that the reliability and access characteristics of the licences (including the ability to trade) held by the Commonwealth are retained
- Subject to the operation and possible amendments of the Murray-Darling Basin Agreement, the option provides a clear basis for the accounting and shepherding of Commonwealth environmental water at Menindee Lakes without diminishing existing State shares of inflows.

The Commonwealth representatives on the working group noted that the choice of option 2 – end of system accounting at this stage does not preclude investigation or adoption of alternative approaches in the future, including option 4 – a fully managed system.

The NSW water shepherding team is now further developing option 2 - the end of system method - to address the legal and licensing issues, accounting, water delivery, modelling and monitoring, trading, interstate water sharing arrangements, cap management and the treatment of overbank flows. NSW is also considering how water shepherded from Queensland and tributaries flowing into the Barwon-Darling Rivers could be accommodated.

### WATER SHEPHERDING FROM THE MENINDEE LAKES

The ability to recognise shepherded Commonwealth environmental water downstream of the Barwon-Darling system is influenced by the operation and management of the Menindee Lakes, in accordance with the Murray-Darling Basin Agreement and the NSW Murray and Lower Darling Regulated Rivers Water Sharing Plan.

Accordingly, the ability to shepherd Commonwealth environmental water from the Barwon-Darling into and through the Menindee Lakes scheme will be subject to multi-jurisdictional agreement, potentially including amendments to the Murray-Darling Basin Agreement. Amendments to NSW legislative instruments such as the Water Sharing Plan for the NSW Murray and Lower Darling Regulated Rivers water sources will also need to be considered.

The NSW water shepherding team is now further developing options for the recognition of shepherded water downstream of the Barwon-Darling system. These options include consideration of the following:

1. holding shepherded Commonwealth environmental water in a predefined storage right in the Menindee Lakes
2. holding shepherded Commonwealth environmental water in airspace in the Menindee Lakes (either shared NSW & Victoria airspace or NSW airspace only)
3. shepherded Commonwealth environmental water flowing through the Menindee Lakes without storage as transparent or translucent flows.

The options around recognition of shepherded Commonwealth environmental water downstream of the Barwon-Darling will further consider and analyse issues such as:

- Avoiding third party impacts on State shares, NSW share and any downstream users
- Losses, including evaporation losses through the Menindee Lakes and downstream
- Multi-jurisdictional agreement to amend the Murray-Darling Basin Agreement
- Operational, accounting and access rules for the water when the Menindee Lakes are under NSW control and for when Menindee Lakes are under Murray-Darling Basin Authority control
- Identification of legal and licensing requirements including possible changes to water sharing plans and trading rules to enable an option to be implemented
- A mechanism to move water from the Barwon-Darling water source to the Menindee Lakes in the Lower Darling water source and to water sources further downstream
- Management of shepherded Commonwealth environmental water under different scenarios of water availability, including normal circumstances and periods of special accounting, in times of critical human water needs conditions and in extreme or unprecedented circumstances.

## INTERIM WATER SHEPHERDING ARRANGEMENTS

Under the MoU, in the period before permanent shepherding arrangements are agreed, NSW will use best endeavours to shepherd Commonwealth environmental water in the Barwon-Darling consistent with the MoU and subject to the *Water Management Act 2000* and *Water Act 1912*.

The NSW Office of Water is investigating the extent to which shepherding is possible in the interim under NSW legislation, including the water sharing plan rules and Murray Darling Basin Agreement. It is expected that this interim work will be completed later in 2011.