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Submission
Review of Alluvial Groundwater Sharing Plans

Introduction:

The Inland Rivers Network ("IRN") is a coalition of environment groups and individuals concerned about the degradation of the rivers, wetlands and groundwaters of the Murray-Darling Basin. It has been advocating for the conservation of rivers, wetlands and groundwater in the Murray-Darling Basin since 1991.

Member groups include the Australian Conservation Foundation; the Nature Conservation Council of NSW; the National Parks Association of NSW; Friends of the Earth; Central West Environment Council; the Coast and Wetlands Society and the Wilderness Society, Sydney.

IRN welcomes the opportunity to comment on the review of six inland alluvial aquifer water sharing plans (WSPs) within the Murray-Darling Basin catchment in inland NSW.

IRN members participated in the development of the groundwater WSPS and were supportive of the initial policy that sustainable yield be set at 70% of recharge so that 30% of the resource be protected for environmental benefits including the maintenance of aquifer integrity and support of groundwater dependent ecosystems (GDEs).

We note that the six plans under review: Lower Gwydir, Lower Macquarie, Lower Lachlan, Lower Murrumbidgee and Lower Murray, were in over-allocated groundwater systems that had experienced over extraction. There is concern that the main report on the implementation of the plans has occurred in the beginning of 2010.

Subsequent summary reports are not consistent in timeframe and do not include all water sources.

This submission will provide some overarching comments on the management of alluvial groundwater systems, the development of Water Resource Plans under the Murray-Darling Basin Plan (the Basin Plan) and some specific comments on the WSPs under review.

We note that the Department of Primary Industries Water (DPI Water) review of the WSPs will focus on the changes required to:

- improve outcomes for the environment and water users;
- improve clarity, practicality and consistency;
- and reduce risks

The Natural Resources Commission (NRC) will advise the Minister for Water on:

- the extent of WSPs contribution to the state priorities for the Local Land Services that relate to natural resource management
- whether changes to the WSPs provisions are warranted.

IRN wishes to note that the terms of reference for this review are very vague and that there is no consistency in information provided on the DPI Water website. Some WSPs have an explanatory guide while others have very limited information other than the replicated fact sheets explaining sustainable yield and financial assistance available for achieving sustainable extraction rates.

There is no consistent reporting on the implementation of the WSPs. Summary reports have not been provided for all groundwater sources. The reporting periods fluctuate over a variety of years.

IRN is concerned that the environmental objectives of the WSPs have not been achieved.

This submission will focus on the issues for consideration relating to healthy and resilient water dependent ecosystems.

Background

The technical and scientific knowledge about groundwater systems in Australia is an area of constant improvement. Over the 10 year period that the WSPs have been in place, new knowledge has been gained on the issues of connectivity, recharge rates and the impacts of climate change.

Improved knowledge about the complexities of the aquifer systems under consideration also provides a basis for reviewing water sharing arrangements.

There is major concern that the long term impacts of over extraction of groundwater is leading to depleted sources.

The issue of depleting groundwater sources in Australia has been identified in a recent international study released by NASA.[1] The study uses data collected from two satellites, launched in 2002, that are able to make detailed measurements of the Earth's gravity field in the Gravity Recovery and Climate Experiment (GRACE).

[1] http://www.groundwater.com.au/news_items/op-ed-declining-groundwater-is-a-big-problem-for-australia

Fluctuations in the gravity field in terrestrial locations occur in response to changes in the total mass of water stored within lakes, soil and groundwater. Using independent data sets, it is possible to remove the effects of lakes and soil water store from the GRACE signal, thereby providing, for the first time ever, large-scale assessments of the changes in total groundwater store within massive aquifers at monthly, seasonal, annual and inter-annual time-scales.

The study showed that during the millennium drought in the Murray-Darling Basin when rainfall rebounded, a decline in groundwater storage continued.

IRN is concerned that the major loss of River Red Gum forests during the millennium drought was caused by the depletion of groundwater systems.

A number of key studies and reviews into groundwater systems and GDEs have been conducted since the gazettal of the WSPs.

The development of the National Atlas of GDEs has provided a comprehensive mapping and information system for planners and decision-makers as a key aim of the Groundwater Action Plan to improve Australia's understanding of GDEs and facilitate how they are considered in water management.

IRN notes that the state-wide Target for Groundwater is:

'*By 2015 there is an improvement in the ability of groundwater systems to support groundwater dependent ecosystems and designated beneficial uses.'*[2]

IRN considers that the review of the WSPs must occur in the context of new information. The analysis of estimated recharge and updated calculation of sustainable yield for each groundwater source is critical for the achievement of the objectives of the National Water Initiative, the Basin Plan, the Water Management Act 2000 and the Commonwealth Water Act 2007.

The issue of connectivity between surface and groundwater is a key requirement in developing WRPs for the Basin Plan. The WSPs are lacking in information on this important issue.

Environmental provisions:

NSW Department of Resources and Energy, 2009, *Water sharing in the main inland alluvial aquifers, Progress report 2006 to 2008* (DRE report) indicates that all plans provide for a portion of the physical water contained in the storage component of each aquifer to be reserved for the environment. However, the initial lack of knowledge about recharge, connectivity and complexity of groundwater systems requires that these provisions be revisited.

IRN is concerned that the Lower Murray WSP has no provision for recharge to be protected to support GDEs. The report indicates that the Lower Murray WSP does not include the shallow groundwater source on which most GDEs are dependent and studies have indicated that no GDEs are dependent on the deep groundwater source.

There is no reference to possible connectivity between the shallow and deep aquifer systems in the Lower Murray groundwater source. The drawdown of the system and extraction of 100% of

[2] NSW Natural Resources Monitoring, Evaluation and Reporting Strategy 2010 - 2015

recharge needs to be reconsidered in the context of connectivity with surface water and shallow overlying aquifer systems.

The area covered by the Lower Murray groundwater source suffered significant loss of River Red Gum forests during the millennium drought. The relationship between groundwater depletion and River Red Gum loss needs to be considered when reviewing the WSPs.

River Red Gums along riverbanks and on floodplains have been identified as a Phraetophytes or groundwater dependent terrestrial ecosystem.[3] Streamside eucalypts eg *E.camaldulensis*, along inland (frequently dry) baseflow rivers and streams in the arid zone are highly dependent on groundwater.[4]

While the remaining five WSPs do make provision to protect a portion of recharge as environmental water for GDEs there is no indication that this has been achieved. The needs of GDEs in these groundwater systems were to be reviewed within five years of commencement of the WSPs as an adaptive management approach to water sharing. The implementation reports have not identified that this review was carried out or that the portion of recharge reserved for the environment has been adjusted to meet the needs of GDEs.

IRN is concerned that widespread loss of River Red Gums and reduction of wetland areas occurred across the Basin during the millennium drought. This is an indication that the provision of environmental water for GDEs during dry times is a critical issue that needs to be better addressed.

Healthy and resilient water dependent ecosystems

To what extent does the water sharing plan contribute to the health and resilience of the groundwater source and associated water dependent ecosystems?

IRN considers that the basic rationale of the WSPs to reduce over-allocation and over-extraction of groundwater is a positive first step towards improving the health and resilience of GDEs.

However, the ongoing use of groundwater for flood irrigation operations is entirely inappropriate in Australia conditions. The increased dependency on groundwater usage in dry times, when surface water allocations are unavailable, continues to threaten the integrity of aquifer systems and health of GDEs.

New information needs to be taken into consideration in the WSP review, particularly the impact of climate change on future water availability in inland NSW.

How can the health and resilience of the groundwater source and associated water dependent ecosystems be improved?

Application of the most recent data available on recharge, connectivity and climate change impacts in consideration of provisions of environmental water for aquifer integrity and GDE health is essential. The development of WRPs under the Basin Plan must make best use of all

[3] NSW Office of Water, May 2012. *Risk assessment guidelines for groundwater dependent ecosystems.* Vol 1 App 2 p21
[4] Ibid App 2 p24

new knowledge. The calculation of sustainable yield for each groundwater source needs to be reviewed.

- How could confidence in the extent, nature and water needs of groundwater dependent ecosystems be improved?

Increased funding for comprehensive research into GDEs to improve current scientific knowledge is essential to increase confidence in the consideration of environmental water needs in groundwater systems.

- Are there concerns about groundwater pressure, levels and water quality?

Connectivity issues such as the relationship of the WSP areas with the Great Artesian Basin, surface water flows, springs and wetlands need further research to improve understanding of the impacts of over extraction on groundwater pressure, levels and water quality.

A revision of sustainable yield calculations will assist in alleviating problems aquifer performance and integrity.

- Are there alternative means for meeting water needs of groundwater dependent ecosystems to that included in the water sharing plans (e.g. through targeted watering using water access licences)?

IRN strongly objects to any consideration of devising 'irrigation' solutions to maintaining GDEs. This concept demonstrates an inherent lack of understanding of ecosystem function and the complexities of environmental values. A GDE cannot be treated in the same manner as a monoculture rice or cotton crop.

The health and resilience of groundwater sources and GDEs relies on accurate analysis of sustainable yield, the reduction of allocations to meet that volume and rules that will prevent over-extraction, particularly in dry times.

Reporting Issues:

While the aim of the WSPs was to return over-allocation to 100% of sustainable yield, the Summary reports provided for some of the groundwater systems do not recognise if the sustainable yield calculations have been reviewed or if over-allocation has been resolved and the possible rule changes that may be needed.

The DRE report identifies that the WSPs provide for the needs of GDEs to be reviewed within 5 years of commencement and the portion of the recharge reserved for the environment to be adjusted to ensure these needs are met.

The Implementation Program (IP) published in the NSW Government Gazette No. 30 in February 2010 provides a set of milestones[5] for the revision of estimated average annual recharge. However, there appears to be no subsequent reporting on whether any of these milestones have been met.

[5] Gazette No 30 IP p 6

The IP identifies that information on GDEs at the start of the WSP was limited. The NSW Office of Water undertook to conduct studies on the identification of GDEs and Aboriginal cultural heritage sites. A set of milestones is provided[6] however, there appears to be no subsequent reporting on whether these studies were undertaken.

The only amendments to the WSP were made in 2011 and not to the relevant clauses 16 or 18 for adaptive change to the volumes of average annual recharge or variation of the environmental health water provision.

IRN presumes that neither of these proposed improvements to the WSPs has been made. The review needs to consider the failure to meet the milestones in the IP.

The main inland alluvial groundwater systems were over-allocated and over-extracted. The main objective of the WSPs is to manage the groundwater sources to sustainable yield. Over the ten year life of the WSPs, entitlements will be reduced so that extractions will be within the sustainable yield. The Summary reports have demonstrated some success of the WSPs in reducing extractions.

Each WSP created a special category of licence called a Supplementary Water Access Licence (SWAL). These were issued to licensees who historically extracted more water than their new entitlement. The volume of water allocated to SWALs was to be progressively reduced through Available Water Determinations (AWDs) through the life of the WSP. While the Summary reports provide the provisions in the WSP for the reduction of SWALs, there is no discussion of their current status or monitoring and compliance of this water usage.

The DRE report outlines that in 2009-2010 after the plans have been in place for 3 years the first assessment of extraction against the long-term average annual extraction limit will be undertaken. Some of the WSPs with Summary reports appear to be performing better than others.

The IP refers to a number of milestones relevant to WSPs clause 28[7] in relation to review of extraction limits, assessment of compliance with extraction limits and review of the basic rights estimate. There appears to be no report available on the achievement of these milestones.

There is no report available with the WSPs whether the milestones in relation to the AWD have been met.[8] This is a significant issue in relation to the WSPs achieving the objective of managing extractions to the sustainable yield.

Amendment to WSP 2011

The only amendments made to the WSPs appear to be in regard to Annual accounting for water extraction and Special access licence rules and conditions.

The adaptive management amendments after a year 5 review appear not to have occurred.

[6] Ibid p 8
[7] Ibid p 17
[8] Ibid p 20

WRPs

The Murray-Darling Basin Authority commissioned a literature review and report on '*Approaches to Achieve Sustainable Use of Groundwater Resources in the Murray-Darling Basin'*[9]

For the alluvial groundwater plans to meet the requirements of the Basin Plan they must consider:

- priority environmental assets and priority environmental functions that depend on groundwater
- significant connectivity to surface water
- structural integrity of aquifer
- hydraulic relationships and properties
- water quality

The condition of the resource and the limits of extraction to maintain environmental health are a key consideration. This requires a greater level of assessment than was undertaken when the WSPs were being developed.

Many of the milestones identified in the IP included studies, assessment and monitoring to improve models, data on GDEs and re-evaluation of recharge rates and sustainable yield.

It is imperative for this work to be completed to inform the development of WRPs to meet the outcomes of the Basin Plan and the Commonwealth *Water Act 2007.*

Connectivity

It is critical for the high level of surface water connectivity of the six groundwater sources covered by the WSPs to be acknowledged in regard to recharge calculations.

Environmental water holdings managed by the Commonwealth to deliver river and wetland health outcomes can become a recharge source for the highly connected alluvial aquifer systems. This free source of water needs to be identified in the determination of sustainable yield, allocations and AWDs.

WSPs

IRN considers that the WSPs have not met their objectives under Part 2 clause 11, particularly in relation to GDEs and cultural heritage values.

1. Lower Gwydir

[9] GHD 2014 Approaches to Achieve Sustainable Use of Groundwater Resources in the Murray-Darling Basin Using Rules and Resource Condition Limits

There is no evidence provided that any review or refined modelling of the average annual recharge value has been conducted in the Gwydir groundwater source to better predict aquifer response and yield. The system is highly connected to surface flows.

IRN considers that the environmental provision of 5,700ML/yr is too low and not based on the most recent scientific knowledge. The opportunity to adaptively manage the environmental allocation during the life of the plan has not been exercised.

There is no evidence that studies of GDEs and Aboriginal cultural heritage has been undertaken in the Gwydir system to better inform that requirements of environmental watering.

IRN notes that the Lower Gwydir summary report 2006 – 2015 identifies that the water extraction for the last 3 years has exceeded compliance with the extraction limit.

The monitoring bore GW036160 is demonstrating a continual decline in water levels.

2. Upper and Lower Namoi

A significant number of studies have been undertaken on the Upper and Lower Namoi groundwater systems. However, there appears to have been no amendments made to the plan under adaptive management provisions other than to amend rules and conditions on Annual accounting for water extraction and Special access licence.

IRN notes that three different methods were used to calculate recharge rates in the WSP. The IP identifies a number of milestones relating to revised analysis of recharge values for the Namoi groundwater systems. It is important for this work to be undertaken as part of the development of the WRP.

IRN considers that the environmental provisions in the WSP ie the long-term average storage component less supplementary water requirements, is entirely inadequate and demonstrates the lack of commitment to protecting aquifer resilience and the environmental health of the system.

It is not evident that subsequent studies into values of GDEs and Aboriginal cultural heritage sites have been conducted in this area.

The connectivity of this groundwater system and its crossover into the Gwydir management area needs to be more clearly defined. The complexity of the zone systems and calculation of sustainable yield needs to be further examined.

Only 3 zones in the Upper Namoi groundwater system appear to have a summary report for 2006 – 2015. The Lower Namoi summary is for 2006 – 2013.

3. Lower Macquarie

The connectivity of the Lower Macquarie groundwater system with the Great Artesian Basin and surface flows of the Macquarie and Bogan Rivers is a significant issue that needs more assessment.

The calculation of average annual recharge for Zone 5 and subsequent amendment of the WSP is an outstanding issue that doesn't appear to have been addressed.

The assessment of recharge across all zones needs to be reviewed and updated.

If an initial study of the Lower Macquarie system was completed in 2009, as per the milestones in the IP, there is no reference provided to this report or a follow up report to be finalised in June 2012.

IRN presumes that this work has not been completed. There appears not to be a recent summary report of this water source for 2006 – 2015.

4. Lower Lachlan

The recharge estimate is based on numerical calculations.

The independent review conducted by the NRC found that the information used to inform the average annual recharge estimate and the provision for groundwater dependent ecosystems contains relatively high levels of uncertainty. Improving the knowledge base is critical to improving the quality of the plan and to providing greater certainty for groundwater users.

Some monitoring bores as reported in the summary report 2006 – 2015 are demonstrating a decline in water levels over time.

5. Lower Murrumbidgee

A Resource Condition assessment report was produced in 2010. This report identified that volumes available for use are still significantly higher than annual extraction plan limits because of carry over rules. This issue needs to be addressed in the WSP review.

The Summary report from 2008 – 2015 does not mention the results of an 18 month study on water quality commenced in 2009 by the NWC.

The results of the State wide study on terrestrial dependency on groundwater were anticipated to be available by December 2010. These have also not been provided in relation to environmental assets in the Lower Murrumbidgee.

This groundwater system and its water sharing rules needs to be reassessed for the development of the WRP

6. Lower Murray

This WSP has no adaptive management provisions. The recharge estimate in this water resource needs to be revised and new studies of GDEs and Aboriginal cultural heritage are needed.

The high connectivity of this groundwater system with river flows needs to be further assessed and quantified.

Conclusion:

IRN considers that the current WSPs for major alluvial groundwater systems will not meet the requirements of WRPs under the Basin Plan.

The NRC must identify a process for developing new WSP that will be consistent with the objects of the Basin Plan and the Commonwealth *Water Act 2007*.

Yours sincerely

B. Smiles

Bev Smiles
President