



I N L A N D
R I V E R S
N E T W O R K

PO Box 528, PYRMONT NSW 2009
phone 0428 817 282
email inlandriversnetwork@gmail.com
web inlandriversnetwork.org
ABN 34 373 750 383

The Natural Resources Commission
GPO Box 5341 Sydney NSW 2001

By email nrc@nrc.nsw.gov.au

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Submission to Review of the *Water Sharing Plan for the Gwydir Unregulated River Water Sources 2012*

The Inland Rivers Network (IRN) is a coalition of environment groups and individuals concerned about the degradation of the rivers, wetlands and ground waters 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; Colong Foundation for Wilderness; and Healthy Rivers Dubbo.

Introduction

IRN welcomes the opportunity to participate in the Natural Resources Commission (NRC) review of the *Water Sharing Plan for the Gwydir Unregulated River Water Sources 2012* (the WSP or the plan). IRN notes that the WSP has been amended several times since 2012, notably in 2020. References below to clauses or schedules are to the current version.

The 2017-2020 drought demonstrated the importance of water not only to the human residents but also to the ecosystems. Most rural landholders plus people and water-dependent businesses in many of the smaller towns were critically short of water in 2019. Uralla and the rural people who came to town for water had to be supplied with bottled water from late 2019 because the lack of surface flows combined with lowering of groundwater levels that resulted in Uralla's water supply having a high concentration of

arsenic derived from groundwater layers that normally remained trapped. Examples of the impacts of lack of water on ecosystems in the upper Gwydir and unregulated tributaries include death of big fish that were the genetic heritage of their populations and mature riverbank trees that had survived previous droughts. Careful management of water to enable recovery of ecosystems is now critical because their resilience was reduced. Two good years of rainfall have started the process, but it will take much more than this to replace the big old fish lost in the last few decades and regrow mature trees that hold riverbanks and riparian ecosystems together. Ecosystems stand little chance of recovery to a similar or historical level of resilience if we can't improve management of available water before and during the next drought.

IRN recognises that the unregulated creeks and rivers in the Gwydir area are the essential sources of water for alluvial aquifers and the regulated river and its effluents which could not otherwise be important water sources for ecosystems and people.

They are also important contributors to the Barwon River and therefore the Darling-Baaka River, Lower Murray River and estuary. Arguments about how much was contributed pre-development aside, recent examples of the importance of Gwydir system outflows include early March 2007 during drought when all outflows from a storm centred on Myall Creek catchment were directed via Carole Creek and Mehi River towards the Barwon which had been reduced to shrinking pools: they arrived after flows from a storm elsewhere which filled pools, then Myall Creek's outflows followed and resulted in the first overflow of Bourke weir for about a year.

The water sources managed through this WSP are also important contributors of water and suspended or dissolved organic and chemical matter to all the riparian and floodplain lands and their ecosystems.

1. To what extent do you feel the plan has contributed to environmental outcomes?

1A General comments

The plan, including its implementation and enforcement have had significant but seriously limited success in this regard. The full extent of these limitations cannot be gauged without access to comprehensive monitoring data. The plan and the environmental assets it aims to protect were severely tested by droughts both from 2017 to early 2020 and earlier in the term of this plan but the last 2 years have had good rainfall with potential to enable recovery. We suspect from the patchy information available to us that ecosystems have only made the first steps towards recovery. In so far as water use has been one factor in the long-term trend of decline, we suspect this WSP has not arrested that decline.

Presence after the drought of aquatic and other water-dependent species may be primarily attributable to the evolved resilience of the species and presence before the drought of healthy individuals and suitable habitats. For example, Bells Turtle was found surviving the

drought in a deep pool at the head of the Gwydir River near Uralla¹: they have evolved to move to the most reliable pools as the river dries up.

However, survival was enabled by the existence of rules governing the use of water, including the WSP, combined with the willingness of most landowners to fully or substantially comply. This was particularly important to individual survivors dependent on the continuous presence of water. The scarcity and value of water in late 2019 was such that every pool, however deep, could have been pumped dry for use on site or sale to others if social and legal constraints had not existed. Most essential was the willingness of people who could see a pool of water to leave that water for fish, for whatever else they valued or to do what they felt was right. The existence and public knowledge of the WSP's constraints on pumping from pools was an important element of that willingness.

A related important factor was limitation on the number, volume and capacity of access licences that has been in place for some time, without which extraction from the limited flows during the drought would have increased dramatically, leaving less for ecosystems and people downstream.

The big question now is what will survive in future following each additional decade of global warming and local climate change, given that health of species and ecosystems has already been compromised? Predictions referred to in the Draft Gwydir Regional Water Strategy indicate that periods of drought may occur more frequently in the future; total inflows could be significantly less in some future drought than previous record minimums.

Clause 14 of the WSP claims to recognise the effects of climate variability by having provisions to manage sharing of water to keep within the long-term average (LTAAEL) and sustainable diversion limit (SDL) if there is an increase in average extraction, however, if average inflows decline as is most likely, this does little to maintain the environment's share as either a percentage or long-term average volume. It will enable the environment's share to decline.

LTAAEL is an estimated volume extracted, derived by computer modelling, not principally from measured use, because many users on unregulated streams were not required to measure and submit accurate records of volumes used until very recently. Without meters there was no definitive way to determine whether extraction had increased during the period of this WSP (e.g. by increased use of previously approved pumps) so this aspect of the plan could not be implemented. As meter data becomes available LTAAEL may be disputed and possibly adjusted. If use has increased in the last 1 or 2 decades any adjustment of LTAAEL could eat into the shares supposedly protected for the environment and downstream users.

The definition of Planned Environmental Water (WSP Part 4 cl 16 (c)) *'by reference to the water that is not committed after the commitments to basic landholder rights and for sharing and extraction under any other rights have been met'* demonstrates that water for environmental health of the river system has the lowest priority in the WSP.

¹ Bruce Chessman, aquatic wildlife consultant, pers. com.

Fortunately, various clauses of the WSP do protect water for the environment in critical places such as pools and very low flows are protected in some places. These protections have been essential but will not be adequate as climate change bites harder. As discussed below, it is IRN's view that the provisions of this WSP did not provide strong enough protection of low flows to maintain presence of water and achieve the outcomes that are needed or the specific objectives now included in the WSP.

The regulatory regime and WSP also failed to include floodplain harvesting. The objectives cannot be achieved without control of when, where and how much floodplain harvesting occurs. Environmental outcomes from this plan are needed on the floodplain of the lower Gwydir and its effluents, and along the Barwon and Darling-Baaka Rivers and their floodplains. It is clear that the environments of the Barwon and Darling-Baaka suffered terribly from lack of inflows, not just due to drought but also upstream diversions. The Barwon-Darling naturally had much more sustained flows and ecosystems that depend on flowing water, not just pools². It was the combination of high, medium and low inflows from every tributary, including gradual seepage out of alluvial groundwaters recharged by all the floods, that sustained the flows. Dams, pumps and floodplain harvesting have reduced some high flows and greatly reduced the moderate and sustained low flows. The failure to constrain floodplain harvesting has had serious unacceptable outcomes.

1B Specific provisions to protect pools

Clause 43 (4) and (5) prohibit taking of water under an access licence from a natural in-river pool or off-river pools when the volume of that water is less than the "full capacity" of the pool, except by aquifer interference, in the limited water sources where flow classes apply, and in specified circumstances. IRN is pleased that licences previously exempted from this rule via Schedule 1A have ceased to be exempt. This rule is very important for aquatic ecosystems, surrounding vegetation, and terrestrial fauna, including those like koalas that depend on surrounding vegetation being kept alive by limiting the number of pools that dry out and the duration of drying. Therefore loopholes in the rule should be removed. The definition of full capacity allows pumping if there is visible inflow but no outflow or outflow but no inflow, for example if there is a very small inflow, perhaps less than the evaporation rate or a pump taking more than the inflow.

The definition should be changed to require that there be visible flow at both the inflow and outflow. Since it is not always practical to check effects on outflow frequently and sudden cessation of flow is detrimental to animals using riffles or flowing areas, for all pumps large enough to assess the relative flow rates of the pump and the stream, to require that pumping not occur unless both inflows and outflows exceed the pump capacity.

1C Inadequate protection of low flows and brief flow events

Protecting water in pools does not meet the needs of ecosystems of riffles and other inter-pool areas, enable fish to move out of small pools before they dry up. Very low flows should always be protected, and occasional higher flows are also needed. In the upper and mid-Gwydir tributaries the high flows are not at risk but brief storm flows can be consumed in

² Mallen-Cooper, M. and Zampatti, B. (2020) *Restoring the ecological integrity of a dryland river: Why low flows in the Barwon–Darling River must flow*. Ecological Management & Restoration VOL 21 NO 3

drier periods by the combination of shrinking pools and pumps. The plan only protects low flows in a few locations.

Clause 42 together with 43(2) partially protects low flows in just 4 of the 28 water sources in Table B. We are unaware of any additional water sources where flow classes may have commenced in since 2012. If this clause applied in any additional water sources they should have listed when the plan was last amended. No licensees in these 4 water sources may take water when flows are less than the specified level. In 3 water sources this does protect some low flows.

In Halls creek that level is “no visible flow” at Bingara i.e. so “very low” that it is only underground! All Halls Creek licensees may take water on any day when there is, was or will be visible flow. Protecting flows through sand and gravel in the bed of a stream is important for the organisms that live in the “hyporheic” zone and for other species that may feed on some of them when they are able to. However, the rule does not ensure that Halls Creek contributes more than a dribble or intermittent trickle to the Gwydir (the limited capacity of pump). The rule is presumably intended to ensure that at least part of some brief flow events do pass all the pumps upstream and reach Bingara so those closest to the source of inflows don’t get it all. NRC should investigate what is the geomorphic character of Halls Creek, both at Bingara and particularly further upstream, to assess how often the requirement for visible flow at Bingara translates to protecting sufficient flow to maintain aquatic processes and ecosystems In Halls Creek. It fails to protect connectivity with the Gwydir, for example for fish that need to get out before pools dry up: stronger protection is needed.

Ideally, very low and low flow classes should be defined in all streams and protected with reference to accessible gauges – with both protected from any large irrigation or industrial uses, low flow available for stock and small licences and very low flows protected for environmental and domestic needs. In practice it will take some time to establish flow classes in all water sources so initially conditions that protect low flows should be set for the larger pumps and the water sources with a relatively high level of storage and extraction should be prioritised (e.g. Roumalla Creek, Upper Gwydir, etc; some of the streams in the west of the catchment).

All licences that do not have individual conditions or are not in a water source where very low flow classes protect surface flows should be subject to an additional rule that no pumping occur unless there has been visible flow for at least 24 hours³. This will ensure inflows can fill pools and go past to fill other pools, provide at least some low flow to riffle areas, and that when there is a brief pulse of higher flow it can assist fish trying to move or contribute to other ecological processes. It will briefly give priority after a cease to flow period to the environment and people with basic rights, which meets the priorities of the *Water Management Act 2000*.

1D In-river dams and dam pools

Clause 47 (1A) prohibits approval of such dams in 8 of the 28 water sources to which this WSP applies. NRC should investigate the reasoning behind this and why it applies to these only. While dams enable storage of water between storms and for drier periods, emptied

³ This rule is not a new idea. It applies in Tenterfield Ck in the Border Rivers.

dams absorb flows when they may be most wanted downstream. Even small in-river dams tend to have significant adverse impacts on riverine ecosystems. There are already far too many blockages to fish passage. Their benefits tend to be at expense of people and ecosystems downstream. A prohibition makes it easier for people to avoid wasting their time and that of people who would assess the applications, so extension of the ban should be considered and elsewhere an EIS should be required even for small dams.

NRC should review licensed in-river dam pools and the conditions and exemptions that apply to each. The WSP does not specify what those conditions are. The conditions should be listed in the WSP, not kept secret, because the water being taken is a publicly owned resource; conditions should be seen to be fair, and the public should be able to assist in identifying any non-compliance particularly in relation to dams across reserved riverbeds. The extent to which these dams reduce achievement of each targeted environmental object of the WSP should be assessed and recommendations made in relation to reducing impacts. Any social and economic benefits or disbenefits to the wider community of the structure and its use should also be considered, and recommendations made to reduce impacts.

1E Flows to meet critical need in or after drought

All streams need a “first flush” protection rule to prevent pumping when there has been a prolonged dry period downstream until a significant flushing flow has passed that meets critical downstream needs. This should implement the priorities in the *Water Management Act 2000* which put environmental and town water needs ahead of irrigation and similar industrial uses. Such flows should be protected by “active management” in the same way as releases of held environmental water.

1F Inadequate protection of wetlands

There are provisions to protect wetlands but their effectiveness is limited both by the omission of a large number of wetlands from Schedules 4 and 5 and by lack of any provisions to prevent impacts on wetlands downstream of proposed water supply works. Similarly, there is no provision to ensure that dams neither take water from wetlands nor cause them to be inundated for long periods when they would naturally have a regime of wetting and drying to which their ecosystems are well adapted.

2. To what extent do you feel the plan has contributed to social outcomes?

The plan contributed by protecting some water for various social needs but tended to prioritise irrigation and licensed extraction for irrigation and various other purposes over social needs. An example is the failure to properly protect even very low flows upstream of Bundarra’s town water supply, which had adverse effects on the quality and security of that water supply in the recent drought. All upstream licence conditions appear to require only visible flow. Given that conditions do not require flow to exceed their pump capacity or the town’s needs, and that pump operators cannot be constantly watching to see if they cause cessation of flow at their pump site or at a different specified location, flow may cease as a result of pumping by one or several pumps. While Bundarra did not run out of water this time, it could next time unless the next WSP protects more flows.

Similarly, the lack of low flow protection means that stock and domestic users sometimes miss out on water because irrigation is effectively given priority: when there is a tiny visible inflow to a pool it may not even exceed evaporation plus use by stock, evaporation and other natural processes. People with larger pump capacity would still be allowed to pump. The next inflow has to refill this pool before any can go further downstream to refill other pools.

The failure to protect low flows and ensure effective connections between pools by storm flows during dry periods adversely affects people's enjoyment of the rivers, the fish populations that people like to see or catch, recreation and tourism.

The cumulative effects of this throughout the catchment and in many ordinary dry seasons as well as in severe droughts should be assessed.

Collarenebri and Walgett did run out of water. Perhaps this was due to the combination of the drought with decades of reduction of high flows by floodplain harvesting as well as of high and moderate flows by dams and regulated diversions and of groundwater alluvial groundwater use upstream such that low flows were no longer sustained and pools dried up sooner. If so, the failure of this plan to greatly restrict floodplain harvesting would have been a contributing factor.

Aboriginal outcomes.

We note that NRC had not asked "do you feel the plan has contributed to Aboriginal outcomes" although the plan has specific Aboriginal objectives. These are economic as well as social objectives.

The plan has seriously failed to meet its Aboriginal Objectives. IRN is disappointed that, so far as we are aware, no 'Aboriginal cultural' access licence has been granted. The plan has not protected sufficient low flows to protect and enable recovery of fish populations and thereby enable fishing and maintain or improve other cultural practices in the plan area or downstream. The portion of flows protected, while better than none in contributing to partial achievement of the objectives, did not protect enough high flows (e.g., from harvesting in the floodplain water sources) to meet the needs of Aboriginal people downstream.

3. To what extent do you feel the plan has contributed to economic outcomes?

We feel the plan has contributed to economic outcomes in a lopsided way – economic outcomes for some more than others.

It has assisted in the sharing of water between extractive users and gone some way to sharing the economic benefits of extractive use. By limiting increases in extractive use (at least in theory – with poor enforcement for most of the term of the plan and without meters it is impossible to gauge actual effects) the plan did keep some water flowing into both Copeton Dam and into the mid-Gwydir River, mainly for big extractive users producing cotton but also with other economic benefits. Some of the economic benefits of cotton

production are realised locally (e.g. in and around Moree) while other benefits go into city economies far away.

When outflows from Halls Creek, Warialda Creek and Horton River exceed 500ML/day they are shared 50:50 between irrigation and environmental uses, mostly going to the Lower Gwydir and Gingham wetland. This benefits wetland grazing enterprises; waterbirds like ibis that in turn have economic benefits for rural producers both locally and far away; tourism. There are many other economic benefits from all the natural flows in or from unregulated streams, such as from the survival and replenishment of fish populations, fishing, tourism and not having to buy every meal; and even from flooding, such as replenishing evaporation-free groundwater stores and distributing soil nutrients.

The economic benefits from instream flows and wetland or floodplain flows have tended to diminish, both within the Gwydir catchment and downstream. To properly assess economic outcomes these must be considered along with the costs of assisting people who struggled more because their water supplies were diminished, including at Collarenebri and Walgett and places where cattle producers and village residents were under great stress like Bundarra. Opportunity costs of distinguishing inevitable effects of the drought from additional effects due to human reduction of flows before, during and after droughts would be very difficult, especially in relation to unregulated tributaries. However, NRC should at least consider this issue, rather than only looking at the economic benefits of extractive use as this plan's economic performance indicators proposed. NRC should also consider the opportunity costs of the of the focus of water management being primarily on supplying one flood-irrigated crop – cotton, rather than on a diverse range of highly efficient in-stream and extractive uses.

As climate change tends to reduce flows, unless the plan is improved in ways that reduce this lopsided effect, the shares will tend to increasingly favour those who are licensed users either with big licences or in the upper sections of water sources, at the expense of both those downstream and the people who would gain more economic benefit from water for stock or from water staying in streams like tourism and improved ibis and fish populations.

4. To what extent do you feel the plan has contributed to meeting its objectives?

The economic objectives draw attention to the bias of the plan towards maintaining extraction levels by irrigated agriculture and other large business users and maximising trading, rather than towards town, stock and domestic use or management for the benefits of keeping flows going along their natural course. We discuss this and make suggestions for further improvements in 5A below.

Many of our responses to questions above are indicative of our view that the WSP only made a limited contribution towards meeting its objectives. The provisions of the WSP did not provide strong enough protection of pools and low flows to achieve the environmental objectives of the WSP.

The objectives cannot be achieved without control of floodplain harvesting that includes alteration or removal of some structures, substantial reduction of the volumes extracted and constraints on the timing of harvesting determined in relation to the needs of local ecosystems and the social, cultural, ecological and other environmental needs downstream.

5. What changes are needed to the water sharing plan to improve outcomes?

5A Objectives

All the objectives should expressly include meeting downstream needs, or this should be a separate objective. It should not be simply assumed that there will be more than enough water such that whatever leaves the individual water sources will enable downstream environmental, economic, Aboriginal and social objectives to be met by downstream WSPs. Nor should it be assumed that keeping extraction within LTAAEL and SDL will suffice because this ignores the timing of extraction relative to downstream needs. Current strategies do contribute towards achieving this unspecified objective, however, specifying the need to meet downstream objectives would assist in improving the rules in the plan and their implementation. 2019's extreme drought conditions and critical water supply situation everywhere from Uralla in the head of the Gwydir to the Lower Murray, and the consequent need to suspend normal rules, demonstrated the need to give a much higher priority to protecting more of such flows as occur early in a drought and reducing the risk that critical conditions develop.

The objectives should expressly recognise the dependence of economies and people in the plan area and downstream on the environments of both the catchment lands and the watercourses, floodplains and waters.

The WSP's objectives are unlikely to be met without adequate, effective and ongoing enforcement, combined with encouragement for compliance.

NRC should consider how to promote willingness of licence holders in rural communities to leave water for the environment and for people downstream.

Additional objective: Rehydrating catchment lands

An additional objective of sustaining and, if possible, improving stream inflows over the long term is needed. Climate change is likely to make rainfall and runoff more episodic, less sustained and possibly significantly less in total. Farm dams already trap some runoff, notably after hot or dry weather, reducing stream inflows. More farm dams may be built in response to climate change: government incentives have encouraged this. IRN hopes these dams will not exceed the current 10% limit described as a "harvestable right", although some properties may already trap more than this share. Sustaining stream inflows will therefore be hard but this is fundamental to achieving the other objectives of the WSP.

If carbon levels in soils of the cropping and cleared grazing lands in the catchments is increased, instead of continuing to decrease, those soils will act as better sponges with better infiltration and higher water holding capacity. This will not only reduce atmospheric carbon and assist production from those lands, but also reduce the variability of flows, delaying then, when water tables rise, sometimes sustaining stream inflows. Increasing soil carbon will also reduce erosion and improve water quality. Promoting the benefits of increasing soil carbon to catchment landholders would be environmentally preferable from environmental and downstream water users' perspectives to the building of more farm dams or dams on streams.

Rehydration of the landscape in this way should be considered as part of water sharing especially in the context of small unregulated streams. Landholders in the catchments could

benefit but should not be able to take an unfair share of water by getting approval for any dams in excess of the 10% limit.

In the Gwydir tributaries there are a number of passionate and experienced advocates for regenerative agriculture including increasing soil carbon and associated landscape rehydration, such as people connected with Bingara's The Living Classroom and The Carbon Farm (e.g. Rick Hutton), and Southern New England Landcare's Soil Health Forum and Balala Brushgrove Landcare Group (e.g. Tim Wright). You could contact them for more information.

Environmental objectives:

We support the existing objectives, however the broad environmental objective 10 (1) is not broad enough: it should be extended to expressly enable and contribute to protection and enhancement of ecological condition of all downstream water sources and water-dependent ecosystems. Note 3 to 10 (2) (b) recognises that connectivity may include between the water sources in this WSP and other water sources. Currently there are rules to protect some flows for downstream water users and ecosystems of the Gwydir regulated rivers, Barwon, Darling/Baaka and Lower Murray such as the long-term extraction limits, however they do not necessarily protect flows at the times when they are most needed downstream. In 2019 when fish in the Barwon were dying and Collarenabri ran out of water, some WSP rules had to be suspended to enable such inflows as occurred to pass the pumps and contribute with flows from other water sources to achieving environmental and social objectives for, and on route to, the Barwon. There would be less risk to those downstream environments and people if the WSPs for all upstream water sources expressly included objectives and proactive provisions to protect them.

The plan should manage and share water to meet the needs of all water-dependent species and ecological communities including naturally common and uncommon ones as well as threatened species. It is important for ecological processes and human values that common species stay common and that no more species become threatened. The environmental targets, strategies and provisions in the plan should reflect this. The targeted objectives should list all ecological communities that are dependent on river flows, including those dominated by River Oak, Carbeen, Black Tea-tree and Weeping Bottlebrush, as well as the previously listed threatened communities.

The target environmental objectives should expressly include such additional water-dependent threatened entities as have been identified, before or after commencement of the Plan, under the Biodiversity Conservation Act and considered to occur in the Plan area.

Economic objectives

Economic objectives could become a subset within social objectives, putting agricultural outcomes alongside those for towns, stock and domestic users and recreational users. Performance indicators in clause 11 (5) should be broadened by adding and measuring the economic benefits of the environmental share of water including unextracted water. For example, this includes benefits of tourism and of local people enjoying recreational use of healthy ecosystems and fish populations that keep those people living healthy happy and economically beneficial lives in the local community. We note that local economies include economic interactions of people who have surface water dependence without being

involved in agriculture or industry – notably through domestic water needs. The economic as well as social costs of failing to protect sufficient natural flow should be included, notably in downstream communities where there are less tourists and higher rates of antisocial behaviour and mental health issues when there are no inflows.

The targeted economic objectives should be extended to expressly include maintaining access to water by towns and people generally, not just for businesses and landholders, and maintaining water quality within target ranges for drinking water and recreation. This is not just a social issue – it is just as important to the economy as agricultural use.

The objectives could include other economic issues such as ensuring that the presence and use of surface water contributes to the diversity and resilience of local economies.

Water trading should not be a top priority objective. Water trading should be enabled and permitted only to the extent that it does not impinge on achievement of other environmental, social, Aboriginal and economic objectives. Trading in some parts of NSW has had adverse environmental⁴, social and economic effects because neither the market nor those administering the transfer are required to consider key “externalities”. IRN appreciates that the restrictions on trading in this WSP are better than no restrictions, however a deliberate focus on avoiding adverse effects is needed. The targeted objective “to maintain, and where possible improve, water trading opportunities for surface water-dependent businesses” should therefore be replaced with ensuring that any water trading will not reduce achievement of environmental, social, Aboriginal and economic objectives. Appropriate strategies and clauses to implement this should be added to the WSP. Different criteria for evaluating achievement of the revised objective would be needed, replacing the current assumption that counting numbers, prices and volumes transferred is informative evaluation.

Aboriginal cultural objectives

IRN supports the existing Aboriginal cultural objectives. Appropriate actions and focus on implementation to actually achieve them are much needed.

Social and cultural objectives

The existing objectives are fine but other objectives, notably economic, should be better integrated with them as discussed above.

5B Suggested changes to operative clauses to improve outcomes

- Ban all pumping until a meter is fitted to a pump and unless the meter is functioning, regardless of the diameter of the pump intake so all users can learn from their readings,

⁴ E.g. purchase and movement of all the access entitlements in the Walgett area upstream to near Mungindi reduced flows in the intervening reach of Barwon River. Trading in the Southern Basin has had some perverse outcomes. While trading and the cost of buying entitlements help people to consider some values of water, they prioritise economic uses, and impose increased costs on recovering water for environmental and Aboriginal objectives.

as well as river managers and planners. Small pumps don't need the expensive pumps and data uploading now required for medium and large pumps: they could be recorded monthly and submitted annually.

- Change clause 43 (1) to prohibit instead of allow aquifer interference activities that involve drawing down of pools in periods of no or low river flow. No new aquifer interference that may reduce river flows in dry periods should be permitted. Where existing aquifer interference has affected stream flow in periods of low flow, or that would otherwise have had low flows, means to prevent this or at least reduce and mitigate it should be planned and implemented.
- No-one should be permitted to pump from an in-river or off-river pool when it is below full capacity, except under clause 43 (13) (a), (b), (b1) or (e). Delete "or from off river pools" from clause 43 (13) (d). Schedule 1A and clause 76 (1A) should be deleted.
- The definition of 'full capacity' should be changed to exclude pumping when either visible inflow or outflow has ceased to ensure that pumping, combined with use by stock, evaporation and other natural processes, do not exceed in excess of inflows "full capacity is when there is **both** visible inflow and visible outflow."
- Improve connectivity and provide for environmental, stock and domestic needs by extending protection of low flows to all unregulated streams, focussing initially on water sources with pumping capacity, volumetric entitlements or on-farm storage works that are largest relative to stream flows
- Require all licences that lack specific low flow protection, and licences in Halls Creek, to not commence pumping after any cease-to-flow period until there has been visible flow for at least 24 hours
- Provide "first flush" protection for all streams by adding rules for all licenses that protect the first flows after prolonged drought and provide active management to protect these flows for environmental, social and cultural benefits of instream flow as far downstream as possible.
- No new or enlarged in-river dams on stream orders 3 or higher should be permitted without public exhibition of an environmental impact statement. Extension of the list of water sources in which no such new dams will be permitted should be considered and, as a minimum, a full EIS should be required.
- Conditions should apply to each existing or new in-river dam, at least if on a stream of third or higher order, to limit adverse effects of the dam on achievement of environmental objectives. These conditions should be listed in the WSP either as standard conditions or specific conditions for particular dams.
- Water quality is referred to in the objectives clause of this WSP, yet it has no provisions directly referring to water quality. The replacement WSP should include clear provisions to manage and improve water quality.

- Add ‘end of unregulated system’ targets in relation to outflows from the unregulated floodplain streams
- Add conditions to improve lateral and longitudinal connectivity of watercourses through the floodplain
- Greatly reduce and limit the impacts of floodplain harvesting:
 - Manage floodplain harvesting through specific rules that limit diversion or harvesting to times when it is clear that **all** downstream needs have been or are sure to be met
 - Rules must include and not be limited to specific first flush flow protection rules and rules to ensure frequent downstream connectivity and
 - Greatly reduce the amount of water that may be used for floodplain harvesting
 - prohibit any new floodplain harvesting involving expansion or new locations and restrict trading of FPH entitlements to maintaining some existing operations, at least until the full effects of the new FPH arrangements are widely understood.
- More comprehensive wetland protection is needed:
 - Schedules 4 and 5 should include many more significant wetlands. They should include additional upland wetlands on the Gwydir side of the Great Dividing Range, Bells Swamp, Carex sedgelands and sod tussock wetland, and a very large number of additional wetlands in the floodplains. Some of these wetlands have not been mapped (e.g. Carex sedgelands and sod tussock wetland in the Brushgrove-Kingstown area where only those in the Namoi catchment were mapped).
 - Ensure that wetlands do not miss out on protection from water supply works just because mapping is incomplete: Clause 47 (2) should be extended by adding after “Schedule 4 or 5” the words “or any other lagoon, waterhole, wetland or swamp” and parallel changes should be made to clause 60
 - Reduce existing extraction from wetlands by either deleting clause 47 (3) and (4) or exempting from clause 47 (2) only replacement surface water supply works that reduce the amount of water that may be taken by those works and limit the times at which the replacement works may be used to ensure that the replacement works will not be used in a way that adversely affects the ecological values or cultural significance of the lagoon, waterhole, wetland or swamp
 - Add requirements that new or replacement water supply works are not approved upstream of any lagoon, waterhole, wetland or swamp, and that dams are not approved upstream or downstream of any lagoon, waterhole, wetland or swamp, if approved use of the work or construction of the dam could adversely affect any of the ecological or cultural values of the lagoon, waterhole, wetland or swamp by reducing the volume of water it receives or changing the timing or extent of its wetting or drying regime.

Reduce the risks to groundwater dependent ecosystems from declining recharge of alluvial aquifers on which they depend by not approving floodplain harvesting works or replacement works upstream of any of the High Priority Groundwater-Dependent

Ecosystems shown on the map referred to in Appendix 2 of Water Sharing Plan for the Gwydir Alluvial Groundwater Sources 2020.

Conclusion

IRN looks forward to recommendations from the NRC that will inform the making of new WSPs for the Unregulated Gwydir water sources. Improved water sharing rules will help ecosystem function and health to improve in this stressed and poor condition catchment.

For more information regarding this submission please contact

Bev Smiles

inlanddriversnetwork@gmail.com

0428817282