

Australian Government

**Commonwealth Environmental Water Office** 

Integrated planning for the use, carryover and trade of Commonwealth environmental water

# Gwydir River Valley

2015-16







Front cover image credit: Aerial view of the Gwydir Wetland System © Department of the Environment

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#### Acknowledgement of the traditional owners of the Murray-Darling Basin

The Commonwealth Environmental Water Office respectfully acknowledges the traditional owners, their Elders past and present, their Nations of the Murray-Darling Basin, and their cultural, social, environmental, spiritual and economic connection to their lands and waters.

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# Commonwealth environmental water portfolio management planning

## Purpose of the document

This document consists of two parts. Part I sets out the Commonwealth Environmental Water Office's (the Office) portfolio management planning for the 2015–16 water year and for the following two years. While focussed on the Gwydir, the identified use, carryover and trading intentions have been considered together with those for other catchments in a Murray-Darling Basin-wide analysis.

Part II of this document establishes the context for how the Office integrates its management of the Commonwealth environmental water portfolio in the Gwydir and across the Murray-Darling Basin more broadly. It sets out the environmental demands that Commonwealth environmental water may contribute to in the Gwydir, as well as the long-term supply profile for Commonwealth environmental water. Part II also explains how these two factors are considered together to inform an overall purpose for portfolio management, as well as the most appropriate mix of portfolio management options to maximise the benefits that can be achieved with the water portfolio across multiple years.

# Purpose of portfolio management planning

Efficient and effective management of the Commonwealth environmental water holdings requires the utilisation of all portfolio management options (use, carryover and trade). To support improved outcomes from water use over time, carryover provides the opportunity to optimise water use across water years and to improve water availability early in a water year, while trade provides further capacity to optimise use over the long-term as well as across catchments.

Through multi-year integrated planning, portfolio management tools such as use, carryover and trade can be strategically managed for maximising environmental outcomes. Integrated portfolio management planning will also support the Office in:

- meeting Basin Plan obligations and contributing to the long-term objectives of the environmental watering plan, the expected outcomes in the Basin-wide environmental watering strategy and Basin annual environmental watering priorities
- managing the Commonwealth environmental water portfolio in response to the demands identified by Basin States in long-term environmental watering plans, once available
- applying adaptive management (including the setting of objectives, evaluating outcomes and informing future decision making)
- providing increased transparency in relation to the Commonwealth Environmental Water Holder's portfolio management (use, trade and carryover) behaviour
- coordinating water use with delivery partners, including developing long-term delivery arrangements

## Scope of integrated portfolio management planning

The following portfolio management options have been determined to be in scope for integrated planning by the Office:

- use
- carryover
- trade of allocations including:
  - o transfer of allocations between connected catchments
  - o sale of allocations
  - o purchase of allocations

The Office's portfolio management planning seeks to consider long-term demands (i.e. flow regimes) and supply, covering at least the preceding three years and out to three years.

# Part I: Portfolio management planning in the Gwydir

# 1. Purpose and portfolio management for 2015–16

## 1.1. Overall purpose

#### Demand for environmental water

Between 2002 and 2010 the Gwydir River Valley experienced an extended period of drought, which, coupled with river regulation, had a significant impact on the environmental condition of the valley. Watering through 2010–13 was targeted at restoring and maintaining wetland vegetation in good condition, particularly key plant species such as water couch-spike rush and lignum shrubland, and to improve and increase habitat for a range of fauna species, such as waterbirds. In 2012–13 environmental flows contributed to maintaining conditions for growth in the eastern sections of the lower Gwydir River and Gingham Watercourse. Two unregulated flow events then replenished these areas in late February–March.

Following three successive years of extended inundation, monitoring showed that the wetland vegetation extent and condition of communities, such as the marsh club-rush sedgeland (listed as critically endangered under the NSW *Threatened Species Conservation Act 1995*), recovered well. Improved inflows also supported recruitment of native fish and frog species in the Gwydir system. Large numbers of colonial nesting waterbirds (predominantly ibis and egrets) also bred in the wetlands in response to the widespread flooding across the lower Gwydir floodplain in 2011–12.

In March 2014 an intense fire burnt through 1 600 hectares of the lower Gwydir wetlands, causing significant damage to the wetland vegetation. Local rainfall and a small unregulated flow days after the fire was beneficial in stimulating the initial recovery of the wetland vegetation. Environmental water was used in 2014–15 (~60 GL) to consolidate the recovery of wetland vegetation in the Lower Gwydir River and Gingham Watercourse.

Following on from the 2013-14 drying sequence and the 2014-15 inundation of wetland vegetation the Environmental Contingency Allowance Operational Advisory Committee (ECAOAC) agreed that the strategy for managing the Gwydir Wetlands in 2015–16 was to follow natural cues.

The Mallowa Wetlands received water from small unregulated flows in 2011–12 after a long dry period and the vegetation responded well. This was followed up with environmental watering from Commonwealth and NSW environmental water in 2012–13. In 2013–14, Commonwealth environmental water was delivered to maintain the current extent of wetland vegetation in a healthy, dynamic and resilient condition providing important refuge habitat for a range of native species. This watering initiated a very good vegetation response and also resulted in a frog breeding event. The Mallowa Wetlands was the only large wetland site north of the Macquarie Marshes to be watered during the summer of 2013–14, and provided important drought refuge for foraging waterbirds. Monitoring and reports from landholders noted that a large diversity of waterbirds were observed in the area. In 2014-15, good inundation coverage of the Mallowa wetlands was achieved despite restricted delivery windows as a result of the block releases of water and works on the stock and domestic pipelines.

In addition to the wetland recovery in the Gwydir Valley, the Commonwealth is working towards building a healthier in-stream ecological environment by contributing environmental water to in-stream freshes in the mainstream and effluent watercourses of the Gwydir. These flows are provided in a way that mimics the natural flow rise and recession to stimulate fish breeding activity. Monitoring of the first fish flow trial showed that Commonwealth environmental water was successful at stimulating breeding in populations of bony bream, and spangled perch. If drying conditions persist into 2015-16, the ECAOAC has recommended that delivery for in stream aquatic ecology follow natural flow cues.

In-stream environmental watering actions in the Mehi River and Carole Creak in 2013–14 and 2014–15 also achieved good connectivity with the Barwon-Darling River contributing to environmental outcomes for native fish during low flow conditions, including connectivity between refuge pools and water quality (salinity).

#### <u>Supply</u>

Water resource availability (supply) in the context of meeting environmental demands is made up of allocations against entitlements held for the environment by the Commonwealth Environmental Water Holder and New South Wales Office of Environment and Heritage, as well as natural and unregulated flows, and planned environmental water provisions. Further detail is provided in Part II, Section 4.

Considering carryover of Commonwealth environmental allocations from 2014–15 to 2015–16 and the range of potential opening allocations for 2015–16, along with the full range of potential streamflows, all resource availability scenarios are in scope for 2015–16. However, the condition of the Murray–Darling Basin is likely to be dry for the 2015–16 water year (MDBA 2015). Dry conditions suggest **low to moderate resource availability** is most likely, while high resource availability is only possible if conditions become wet.

#### <u>Purpose</u>

Figure 1 shows how these two factors are considered together. The overall 'purpose' for managing the Commonwealth's water portfolio in the Gwydir for 2015–16 is to protect wetland vegetation of the Gwydir wetlands and ensuring their ecological capacity for recovery, while maintaining the ecological health and resilience of other important sites in the catchment, including in stream aquatic ecology.

		Demand for envi	ironmental water (201	5-16)	
Overall environmental water resource availability	Very High – water predominantly needed urgently	High – water predominantly needed this year	Moderate – water predominantly needed this year and/or next	Low – water predominantly not needed this year	Very low - water predominantly not needed this year and next
Verylow		Т			
Low					
Moderate			1		
High					
Veryhigh					

Avoid damage: Avoid damage to environmental assets

- Protect: Ensure ecological capacity for recovery
- Maintain: Maintain ecological health and resilience

Improve: Improve the health and resilience of aquatic ecosystems / Build future capacity to support ecological health and resilience

#### Figure 1: Determining a broad purpose for portfolio management in the Gwydir for 2015–16

Note: grey lines represent potential range in demand and resource availability

## 1.2. Water Use

Consistent with the demands and purpose described above, the Office is considering supplying environmental water to the following watering actions for 2015–16. Table 1 summarises which of these actions are relevant to which resource availability scenarios in 2015–16, with further detail and rationale established in Table 2, including implications for future years based on assumed use behavior for 2015–16. Table 1 also identifies the 2015–16 Basin annual environmental watering priorities (published by the Murray-Darling Basin Authority) that the various watering actions may contribute to meeting.

Watering act	ion	2015–16 Basin annual environmental watering	Resource av likely	ailability scenc to be pursued	arios action is under
		priority(s) <sup>1</sup>	Low – very low	Moderate	High – very high
	Gwydir Wetlands	<ul> <li>Basin-wide in-stream and riparian vegetation</li> <li>Basin-wide waterbird habitat and future population recovery</li> </ul>	Yes	Yes	Yes
Wetland watering actions	Mallowa Creek Watercourse	<ul> <li>Basin-wide flow variability and longitudinal connectivity</li> <li>Basin-wide in-stream and riparian vegetation</li> <li>Basin-wide waterbird habitat and future population recovery</li> <li>Basin-wide native fish habitat and movement</li> <li>Northern Basin fish refuges</li> </ul>	Yes	Yes	No
	Mehi River maintenance flow to support the habitat requirements of Native fish	<ul> <li>Basin-wide flow variability and longitudinal connectivity</li> <li>Basin-wide native fish habitat and movement</li> <li>Northern Basin fish refuges</li> </ul>	Yes	Possible	No
Aquatic Ecology & Local Fish Populations	Carole Creek maintenance flow to support the habitat requirements of Native fish	<ul> <li>Basin-wide flow variability and longitudinal connectivity</li> <li>Basin-wide native fish habitat and movement</li> <li>Northern Basin fish refuges</li> </ul>	Yes	Possible	No
	Support Upper Gwydir river baseflow during low and very low resource availability scenario	<ul> <li>Basin-wide native fish habitat and movement</li> <li>Northern Basin fish refuges</li> </ul>	Yes	No	No
Contingency watering	Low flow	<ul> <li>Basin-wide in-stream and riparian vegetation</li> <li>Basin-wide waterbird habitat</li> </ul>	Yes	No	No
	waterbira preeaing	and future population recovery	INO	INO	res

 Table 1: Potential Commonwealth watering actions and applicable resource availability scenarios for the Gwydir in 2015–16

<sup>&</sup>lt;sup>1</sup> For full details on the Basin annual environmental watering priorities refer to the MDBA website at http://www.mdba.gov.au/what-we-do/environmental-water/environmental-watering-priorities

#### Contributing to wetland vegetation maintenance following natural cycles of wetting and drying

Summary: Contributing to wetland vegetation maintenance by reactive watering - activating access to supplementary water and offsetting a component of the consumptive extraction up to an approved volume with held environmental water called from storage.

Timing: Pursue this option during the optimal vegetation growth period (late winter to early summer)

Operational considerations and feasibility:

- Constraints within the watercourses including low level crossings, riparian cropping and in channel capacity sharing constraints.
- Watering option will follow natural cues, if no supplementary access occurs during the optimal timing, proactive watering with held environmental water will not occur. If supplementary access occurs outside of optimal watering period, no additional held environmental will be called to offset the extractive component.

#### Contributing to in-stream aquatic ecology maintenance

Summary: Contributing to flows to maintain in-stream aquatic ecology to protect the habitat for aquatic wetlands vegetation maintenance by reactive watering - activating access to supplementary water and offsetting a component of the consumptive extraction up to an approved volume with held environmental water called from storage.

Timing: Pursue this option during the optimal primary production period in early summer.

Operational considerations and feasibility:

- Constraints in river operations, operating within possible scheduled block releases from storage.
- Watering option will be proactive. In the absence of natural cues, provide a maintenance flow to protect in steam aquatic ecology.

**Stakeholder feedback:** The Gwydir Valley Environmental Contingency Allowance Operations Advisory Committee (ECAOAC) met in late March 2015 to consider the priorities and targets for environmental watering in the Gwydir catchment over the next 3 seasons. With limited resources available in carryover and low likelihood of additional allocations being made at the start of 2015-16, the ECAOAC focused on how to best managed existing carryover over several seasons to ensure sufficient volumes would be available in 2016-17 and 2017-18 should dry conditions persist over several seasons. A consensus plan for management was informed by discussions between the ECAOAC members and observers which includes Gwydir valley landholders, water users, scientists, independent environmental advisors and Aboriginal representatives.

The ECAOAC feedback has recommended that the maintenance of wetland vegetation (following natural flow cues) and the protection of in stream aquatic ecology be a priority for 2014–15 to promote the recovery wetlands and in stream communities after extended drought of 2001–10. A strong focus on responding to natural cues has been adopted with the majority of the watering strategies proposed reactive to natural flows. With improving conditions in water availability, follow natural cues to protect instream aquatic ecology, particularly for native fish, which may have benefited from previous years' environmental watering.

The strategy and advice received from ECAOAC has been considered and reflected in the approach taken in this document. Feedback will be sought on an ongoing basis as planning transitions to implementation phase (see Section 1.5).

## 1.3. Carryover

A moderate proportion of allocations available in 2014–15 were carried over to 2015–16 (~23 GL or 30% of available allocations). Given the relatively high environmental demands in the Gwydir for 2015–16, if water resource availability remains low, a small proportion of Commonwealth's available allocations for 2015–16 are expected to be carried over to support environmental demands in 2016–17 (see Table 2). The level of available allocations to be carried over to 2016–17 will depend upon resource availability and demand.

## 1.4. Trade

At this time there is no plan to buy or sell allocations in the Gwydir River Valley in 2015–16. Currently, there is only limited market opportunity for allocation purchase to be pursued. The moderate to high demands for environmental water that may extend to 2016–17 mean that the sale of allocations will be considered based on ongoing assessments of environmental demands within the Gwydir catchment and across the Murray-Darling Basin over the next two years (Table 2). The types of scenarios where the need to adjust the availability of Commonwealth allocations is most likely to arise in coming years include:

- If environmental demands have been met and it is determined that there is sufficient forecast
  allocation to meet future demands in the Gwydir catchment, the market will be assessed to determine
  if there are opportunities to sell surplus water and secure proceeds to improve the Commonwealth
  Environmental Water Holder's capacity to meet current or future environmental demands across the
  Murray-Darling Basin
- If a Basin-scale analysis identifies urgent environmental demands within a particular catchment and allocation purchase provides an opportunity to meet those demands using proceeds from the sale of water in a catchment with less urgent demands
- If conditions were to become wet while environmental demands remain high, market conditions might provide a favourable opportunity to purchase allocations to assist in meeting demands and augmenting natural flows

Refer to the <u>Commonwealth environmental water Trading Framework</u>, which includes operating rules, procedures, and <u>protocols</u>, for further information.

## 1.5. Your input

The management of Commonwealth environmental water relies on considerable advice and assistance from local organisations, state governments and others. Individuals and groups within the Murray-Darling Basin community are encouraged to submit suggestions for the management of Commonwealth environmental water. Please contact the Office via: <a href="mailto:ewater@environment.gov.au">ewater@environment.gov.au</a>.

Table 2a: Environmental demands, potential watering in 2015–16 and outlook for coming years in the Gwydir – VERY LOW to LOW WATER RESOURCE AVAILABILITY IN 2015–16

Environmente	al assets	Indicative demand (for <u>all</u>	Required frequency	N N	atering histo	ry		2015-16		Implications	for future dem	ands
		sources of water in the system) <sup>2</sup>	(maximum dry interval)	(from o	all sources of	water)	Predominant urgency of environmental demand for	Predominant urgency of environmental demand for waterPurpose under low to very lowPotential Common environmental work		Likely urgency of demand in 2016–17 if	2017–18 Range of	Met in 2016–17
				2012-13 wet	2013-14 moderate	2014–15 drying	water	<u>very low</u> resource availability	contribution?	watering occurred as planned in 2015-16	likely demand	Not met in 2016–17
Gwydir Wetld	ands	<ul> <li>- 45 GL during October to March</li> <li>- 60 GL during October to March</li> <li>- 80 GL during October</li> </ul>	7/8 in 10 years (5 years) 6 in 10 years (5 years) 4 in 10 years (6	Extensive	Drying	1 <sup>st</sup> Return watering	MODERATE Watering has occurred for 4 of the last 5 water years Dry sequence is within	Protect	Environmental water could partially contribute to this demand.	Moderate	м	oderate
		and March, (*constraints currently limiting ability to deliver to this demand with regulated flows)	years)	Waloung	poliod	(60 GL)	requirements Respond to natural flow events (supplementary)	flow triggers			High	
Mallowa Cre	ek	Baseflow to overbank 10 – 20 GL All year (most likely spring	3 consecutive in 6 years	] st	2nd	3rd	LOW to MODERATE 3 years watering followed by a dry period.		Environmental water could partially contribute to this demand.			Low
Watercourse				Watering trial	Watering	Watering	Dry sequence is within requirements Respond to natural flow events (supplementary)	Protect	Diversion of supplementary entitlement if available into the Mallowa	Low	м	oderate
	Mehi River	- 15–20 GL, all year (most likely spring to autumn) (stimulation flow) - 5 GL demand for	5 in 10 years	_	1 <sup>st</sup> fish	2 <sup>nd</sup> fish	MODERATE 2 years of delivery - stimulation of fish breeding	Protect	A high potential for maintenance flow to enhance survival rates of	Low	V	ery Low
		maintenance	year following a stimulation / breeding flow		flow frial	flow	Lower section of the Mehi may dry down to refuge pools		new cohort fish – smaller volume required than fish breeding stimulation flow			Low
	Carole Creek	5-10 GL All year (most likely spring to autumn)	5 in 10 years				MODERATE 2 years of delivery -		Environmental water could partially contribute to this demand.		V	ery Low
Aquatic in- stream				-	1st fish flow trial	2 <sup>nd</sup> fish flow	stimulation of fish breeding Lower section of the Carole may dry down to refuge pools	Protect	available potential contribution to this demand has a lower priority than contribution to the Mehi.	Low		Low
ecology	Gwydir River Downstream of Copeton Dam	Improve natural character of flows d/s of the dam	All years (Spring to Autumn)	Required volumes Met. Natural	Required volumes Met. Natural	Required volumes Met. Natural	MODERATE	Protect	Likely to be met by tributary flows and	Moderate	м	oderate
				flow pattern not met.	flow pattern not met.	flow pattern not met.			environmental water delivery to other assets		м	oderate
	Ballin Boora Creek	Baseflow 1 GL (most likely spring to autumn)	Subject to examination of requirement/ due diligence	Stock and	Stock and	Stock and	MODERATE		Water required this year or next		М	oderate
			Stock and domestic flows piping will result in loss of flows to the creek system.	domestic flows	domestic flows	domestic flows	Required in 3/5 years (zero flow during 2014/15.	Protect	requirements for delivery met during 2015-16 (defer use till 2016-17)	High		High

<sup>&</sup>lt;sup>2</sup> Used for most/all indicators: CEWO 2014, MDBA 2012, MDBA 2014(a)

Contingency watering	- 10 - 15 GL reserve to suppory to support threatened colonial waterbird breeding or -Up to 8 GL in very dry inflow sequences for in-	As required, All years	Not	Not	Not	MODERATE Moderate demand (under low resource availability) Protect critical habitat	Avoid	A high potential for watering in 2015–16 Respond to natural conditions to protect /	Mederate	Moderate
reserve	stream baseflow to protect critical aquatic refuge habitat		Required	Required	Required	during extended drying sequence Waterbird breeding trigger unlikely during low resource availability	Damage	support threatened waterbird breeding (unlikely) or critical in- stream aquatic refuge habitat (more likely)	Moderdie	Moderate
Key - events in previous yea	<b>ars</b> was met, by Commonwealth	n environmental water o	Carryover potential	Moderate proportion of allocations carried into 2016–17.	Small proportion of allocations may be carried over to 2017–18, but will depend upon resource availability and demands.	Level of carryover will depend on environmental demands and resource availability.				
means demand was partially met, by Commonwealth environmental water or any other source         means water did not contribute to meeting demands.         Note that not all demands require water every year, drying phases are important for floodplains and temporary wetlands or streams         Key - potential watering in 2015-16         means a high potential for Commonwealth environmental watering (subject to seasonal and operational considerations)         means a moderate potential for Commonwealth environmental watering, or a partial contribution may be made         means a low potential for Commonwealth environmental watering								Low need to augment available allocations. Sale of allocations unlikely considering moderate and high demands and low availability of water to meet them.	Moderate expected need to augment available allocations, therefore should market conditions improve there is likely to be a desire to purchase allocation or supplementary flow access to assist in meeting high demands. Sale of allocations unlikely considering a number of moderate	Potential to trade will depend on environmental demands and resource availability.
Key - urgency of environme	ental demands Iemand i e urgent need for w	vater in that particular v	earto mana	ne risk of irret	rievable loss	or damage			and high demands expected.	

means high demand for water i.e. needed in that particular year

means moderate demand for water i.e. water needed that particular year and/or next

means low demand for water i.e. water generally not needed that particular year

means very low demand for water i.e. water generally not needed that particular year or the following year

Note that demand is considered at a generalised scale; there may be specifc requirements that are more or less urgent within the flow regime

Table 2b: Environmental demands, potential watering in 2015–16 and outlook for coming years in the Gwydir - MODERATE WATER RESOURCE AVAILABILITY IN 2015–16

Environmental assets Indicative demand (for <u>all</u>		Indicative demand (for <u>all</u>	Required frequency	v	Vatering histo	ry		2015-16		Implications	for future demo	ands
		<u>sources of water</u> in the system) <sup>3</sup>	(maximum dry interval)	(from	all sources of	water)	Predominant urgency of	Purpose	Potential Commonwealth	Likely urgency of	2017–18	Met in 2016–17
				2012–13	2013–14	2014–15	water	moderate	contribution?	watering occurred as	Range of likely	
				wet	moderate	drying		availability			demand	Not met in 2016–17
Gwydir Wetle	ands	<ul> <li>45 GL during October to March</li> <li>60 GL during October to March</li> <li>80 GL during October</li> <li>and March (*constraints)</li> </ul>	<ul><li>7/8 in 10 years (5 years)</li><li>6 in 10 years (5 years)</li><li>4 in 10 years (6 years)</li></ul>	Extensive watering	Drying period	1 <sup>st</sup> Return watering	MODERATE Vegetation condition and resilience in the Gwydir	Maintain	High Potential for contribution to 45 GL demands Protect high value refuge sites by responding to natural cues with	Moderate	L	.ow
		currently limiting ability to deliver to this demand with regulated flows)				(00 02)	Wetlands		supplementary access / call held water to offset likely extraction from the natural events		Мос	derate
Mallowa Cra	ock	Baseflow to overbank 10 – 20 GL All year (most likely spring to gutumn)	3 consecutive in 6 years	1 <sup>st</sup>	2 <sup>nd</sup>	3rd	LOW to MODERATE		Environmental water could partially contribute to this demand. Drying phase -Respond to		l	.ow
Watercourse				trial	Watering	Watering	resilience in the Mallowa Creek Watercourse	Maintain	natural flow triggers Diversion of supplementary entitlement if available into the Mallowa	Low	Мос	derate
	Mehi River	<ul> <li>15–20 GL, all year (most likely spring to autumn)</li> <li>(stimulation flow)</li> <li>5 GL demand for</li> </ul>	5 in 10 years Second and thrid	-	1 <sup>st</sup> fish flow	Aquatic in-stream	MODERATE 2 years of delivery -	Maintain	High Potential for maintenance flow under moderate resource scenario to enhance	Low	L	.ow
		maintenance	year following a stimulation / breeding flow		Indi	ecology	stimulation of fish breeding		cohort fish – smaller volume required than fish breeding stimulation flow		Ver	ry Low
	Carole Creek	5-10 GL All year (most likely spring to autumn)	5 in 10 years	_	1 <sup>st</sup> fish flow	2 <sup>nd</sup> fish	MODERATE	Maintain	High Potential for maintenance flow under moderate resource scenario.	low	L	.ow
Aquatic in- stream					trial	flow	stimulation of fish breeding		Potential contribution to this demand has a lower priority than contribution to the Mehi.		Ver	'y Low
ecology	Gwydir River Downstream of Copeton	Improve natural character of flows d/s of the dam	All years (Spring to Autumn)	Required volumes Met.	Required volumes Met.	Required volumes Met.	MODERATE	Maintain	Environmental water could partially contribute to this demand in	Moderate	Мос	derate
	Dum			flow pattern not met.	flow pattern not met.	flow pattern not met.	MODEKAIL	Mainain	flows and environmental water delivery to other assets	Moderdie	Мос	derate
	Ballin Boora Creek	Baseflow 1 GL (most likely spring to autumn)	Subject to examination of requirement/ due diligence	Stock and	Stock and	Stock and	MODERATE		Water required this year or next		Мос	derate
			Stock and domestic flows piping will result in loss of flows to the creek system.	domestic flows	domestic flows	domestic flows	Required in 3/5 years (zero flow during 2014/15.	Protect	Unlikely to have all requirements for delivery met during 2015-16 (defer use till 2016-17)	High	H	ligh

<sup>&</sup>lt;sup>3</sup> Used for most/all indicators: CEWO 2014, MDBA 2012, MDBA 2014(a)

Contingency watering	- 10 - 15 GL reserve to suppory to support threatened colonial waterbird breeding or	As required, All years	Not	Not	Not	MODERATE Waterbird breeding trigger	Protoct	Potential requirement to support a Waterbird Breeding event in the Gwydir Wetlands	Madarata	Moderate
reserve	-Up to 8 GL in Very dry inflow sequences for in- stream baseflow to protect critical aquatic refuge habitat		Required	Required	equired Required	May be mer during Moderate resource availability	FIDIECI	In-stream baseflow likely to be met by other system flows	Moderdie	Moderate
Key - events in previous y means deman means deman means water o Note that not all demand	ears d was met, by Commonwealth d was partially met, by Commo did not contribute to meeting o ds require water every year, dry	environmental water or onwealth environmental demands. ring phases are importar	r any other so water or any nt for floodplo	nds or streams	Carryover potential	Moderate proportion of allocations carried into 2016–17.	Small proportion of allocations may be carried over to 2017– 18, but will depend upon resource availability and demands.	Level of carryover will depend on environmental demands and resource availability.		
Key - potential watering ir means a high p means a mode means a low p	<b>2015-16</b> potential for Commonwealth e erate potential for Commonwe otential for Commonwealth er	environmental watering ealth environmental wat nvironmental watering	considerations) made	Trade potential	Low need to augment available allocations. Sale of allocations unlikely considering moderate and high demands and low availability of water to meet them.	Moderate expected need to augment available allocations, therefore should market conditions improve there is likely to be a desire to purchase allocation or supplementary flow	Potential to trade will depend on environmental demands and resource availability.			
Key - urgency of environr	nental demands								demands. Sale of	

means very low demand for water i.e. water generally not needed that particular year or the following year

Note that demand is considered at a generalised scale; there may be specific requirements that are more or less urgent within the flow regime

Table 2C: Environmental demands, potential watering in 2015–16 and outlook for coming years in the Gwydir - HIGH WATER RESOURCE AVAILABILITY IN 2015–16

Environmento	al assets	Indicative demand (for <u>all</u>	Required frequency	v	Vatering histo	ry		2015-16		Implication	for future demands	
		<u>sources of water</u> in the system) <sup>4</sup>	(maximum dry interval)	(from	all sources of	water)	Predominant urgency of	Purpose	Potential Commonwealth	Likely urgency of	<b>2017–18</b>	in 2016–17
				2012-13	2013–14	2014–15	water	resource	contribution?	nental water demand in 2016-17 if vatering occurred as planned in 2015-16		
				wet	moderate	drying		availability		plannea in 2015-16	demand Not m 2016-	net in -17
Gwydir Wetld	ands	<ul> <li>45 GL during October to March</li> <li>60 GL during October to March</li> <li>80 GL during October</li> </ul>	7/8 in 10 years (5 years) 6 in 10 years (5 years) 4 in 10 years (6 years)	Extensive	Drying	1 <sup>st</sup> Return watering	MODERATE Vegetation condition and	Improve	High Potential for contribution to 45 GL demands Protect high value refuge sites by responding to	Moderate	Low	
		and March, (*constraints currently limiting ability to deliver to this demand with regulated flows)			polica	(60 GL)	Wetlands		supplementary access / call held water to offset likely extraction from the natural events		Moderate	
Mallowa Cre	ek	Baseflow to overbank 10 – 20 GL All year (most likely spring to autumn)	3 consecutive in 6 years	] st	2nd	3rd	LOW to MODERATE		Environmental water could partially contribute to this demand. Drying phase -Respond to		Low	
Watercourse				Watering trial	Watering	Watering	resilience in the Mallowa Creek Watercourse	Improve	natural flow friggers Diversion of supplementary entitlement if available into the Mallowa	Low	Moderate	
	Mehi River	<ul> <li>15–20 GL, all year (most likely spring to autumn)</li> <li>(stimulation flow)</li> <li>5 GL demand for maintenance</li> </ul>	5 in 10 years Second and thrid	-	1 <sup>st</sup> fish flow trial	Aquatic in-stream	MODERATE 2 years of delivery -	Improve	High Potential for maintenance flow to enhance survival rates of new cohort fish Some potential for a	Low	Low	
		maintenance	year following a stimulation / breeding flow			ecology	stimulation of fish breeding		stimulation flow with connection to the Barwon-Darling.		Very Low	
	Carole Creek	5-10 GL All year (most likely spring to autumn)	5 in 10 years	-	1 <sup>st</sup> fish flow	2 <sup>nd</sup> fish	MODERATE 2 years of delivery -	Improve	High Potential for maintenance flow under moderate resource scenario.	Low	Low	
Aquatic in- stream					Triai	TIOW	stimulation of fish breeding		Some potential for a stimulation flow with connection to the Barwon-Darling.		Very Low	
ecology	Gwydir River Downstream of Copeton Dam	Improve natural character of flows d/s of the dam	All years (Spring to Autumn)	Required volumes Met. Natural	Required volumes Met. Natural	Required volumes Met. Natural	MODERATE	Improve	High potential to contribute to this demand in conjunction with	Moderate	Moderate	
				flow pattern not met.	flow pattern not met.	flow pattern not met.			tributary flows and environmental water delivery to other assets		Moderate	
	Ballin Boora Creek	Baseflow 1 GL (most likely spring to autumn)	Subject to examination of requirement/ due diligence	Stock and	Stock and	Stock and	MODERATE		Water required this year or next		Moderate	
			Stock and domestic piping will result in loss of flows to the creek system.	domestic flows	domestic flows	domestic flows	Required in 3/5 years (zero flow during 2014/15.	Improve	requirements for delivery met during 2015-16 (defer use till 2016-17)	High	High	

<sup>&</sup>lt;sup>4</sup> Used for most/all indicators: CEWO 2014, MDBA 2012, MDBA 2014(a)

Contingency watering	- 10 - 15 GL reserve to suppory to support threatened colonial waterbird breeding or -Up to 8 GL in very dry inflow sequences for in-	Not	Not	Not	MODERATE Waterbird breeding event		Moderate to High potential to support a Waterbird Breeding event	Moderato	Moderate
reserve	stream baseflow to protect critical aquatic refuge habitat	Required	Required	Required	more likely under a High resource scenario	Improve	In-stream baseflow likely to be met by other system flows	Moderale	Moderate
Key - events in previous ye means demand means demand means water di	Key - events in previous years         means demand was met, by Commonwealth environmental water or any other source         means demand was partially met, by Commonwealth environmental water or any other source         means water did not contribute to meeting demands.							Moderate proportion of allocations may be carried over to 2017– 18, but will depend upon resource availability and demands.	Level of carryover will depend on environmental demands and resource availability.
Note that not all demands Key - potential watering in means a high p	s require water every year, drying phases are importan 2015-16 otential for Commonwealth environmental watering (	Trade potential	Low need to augment available allocations. Sale of allocations unlikely considering moderate and high demands.	Low need to augment available allocations. Sale of allocations unlikely considering moderate and high demands	Potential to trade will depend on environmental demands and resource availability.				

means a moderate potential for Commonwealth environmental watering, or a partial contribution may be made

means a low potential for Commonwealth environmental watering

#### Key - urgency of environmental demands

means critical demand i.e. urgent need for water in that particular year to manage risk of irretrievable loss or damage means high demand for water i.e. needed in that particular year means moderate demand for water i.e. water needed that particular year and/or next means low demand for water i.e. water generally not needed that particular year means very low demand for water i.e. water generally not needed that particular year or the following year

Note that demand is considered at a generalised scale; there may be specific requirements that are more or less urgent within the flow regime

# Part II: Commonwealth environmental water portfolio management planning

# 2. Background

# 2.1. Commonwealth environmental water

The Commonwealth Environmental Water Holder is an independent statutory position established by the Water Act 2007 (the Water Act) to manage the Commonwealth environmental water holdings. The Commonwealth Environmental Water Holder leads and is supported by the Commonwealth Environmental Water Office (the Office), a division of the Australian Government Department of the Environment.

Under the Water Act, Commonwealth environmental water must be managed to protect or restore environmental assets, so as to give effect to relevant international agreements. The Water Act also requires that the Commonwealth Environmental Water Holder perform its functions and exercise its powers consistently with and in a manner that gives effect to the Basin Plan and that Commonwealth environmental water is managed in accordance with the Basin Plan's environmental watering plan.

# 2.2. The Gwydir catchment

Flows in the Gwydir River Valley are driven by rainfall in the upper catchment. Almost the entire runoff for the catchment is generated above Pallamallawa, with the western floodplains contributing minimal runoff due to low slopes, absorbent soils and high evaporation rates (Pietsch, 2006). Copeton Dam is the major regulated water storage in the Gwydir River Valley. Copeton Dam has a storage capacity of 1 364 GL and regulates about 55 percent of Gwydir system inflows (active storage in Copeton Dam is 1 345 GL (CSIRO, 2007)). Downstream reregulating structures at Tareelaroi, Boolooroo and Tyreel divert flows from the Gwydir River into the Mehi River, Carole Creek and Lower Gwydir River/Gingham Watercourse, respectively (Wilson et al., 2009). A number of unregulated tributaries flow into the Gwydir River below the dam; the Horton River is the primary source of unregulated flows.

The principal wetland areas of the Gwydir River Valley targeted by environmental water are the lower Gwydir, Gingham Watercourse and Mallowa Wetlands (NSW DECCW, 2011). The Gwydir Wetlands is a key asset in the Gwydir River Valley which forms an inland terminal wetland in the downstream reaches of the Gwydir River and Gingham Watercourse, below Moree. Four sites in the lower Gwydir and Gingham are internationally recognised under the Ramsar Convention and other international agreements for migratory species for their special habitat value for waterbirds. These are 'Windella', 'Crinolyn' and 'Goddard's Lease' on the Gingham Watercourse and 'Old Dromana' on the Lower Gwydir Watercourse (NSW OEH, 2012). When flooded, the wetland sustains up to hundreds of thousands of breeding colonial waterbirds. The primary ecological features of the wetlands are large expanses of vegetation, including large areas of coolibah woodland, water couch and the largest stand of marsh clubrush in New South Wales (NSW) (NSW DECCW, 2011, Bowen and Simpson, 2010).

The Mallowa Creek breaks off the Mehi River approximately 50 km downstream of Moree. Prior to the construction of the Mallowa Regulator in 1983, many fresh flows would have passed through Mallowa Creek and sections of the floodplain. These fresh flows are now diverted down the Mehi River. While not as extensive as the Gwydir Wetlands, the Mallowa Wetlands supports a diverse wetland and floodplain vegetation assemblage that is representative of native vegetation of the Gwydir River Valley. Importantly, it also has less of a Lippia presence. The native vegetation of the Mallowa Creek provides valuable habitat for waterbirds, woodland birds and other fauna (Torrible et al., 2009).

The Gwydir and Mallowa Wetlands play a substantial part in the biological and ecological functioning of the Murray-Darling Basin, as the major wetlands in the Basin are not inundated simultaneously and therefore habitat availability varies across the Basin spatially and temporally. Since flooding in the Gwydir Wetlands are not always synchronous with flooding of other Murray-Darling Basin wetlands, such as the Macquarie Marshes or Narran Lake, the Gwydir Wetlands play an important role on a regional scale.

The Mehi River and Carole Creek are major distributaries of the Gwydir River. Moomin Creek branches off the Mehi River downstream of Moree and rejoins the River just before its confluence with the Barwon River at Collarenebri. Carole Creek connects to the Barwon River through the Gil Gil Creek in the Border Rivers catchment. The Mehi River and Carole-Gil Gil Creek transport about 6 per cent of the average flow at Pallamallawa to the Barwon River (Pietsch, 2006).

The Sustainable Rivers Audit found that the lowland zone of the Gwydir Valley was rated as poor for both fish and macroinvertebrates (Davies et al., 2012). Native fish populations in the Gwydir and across the Murray-Darling Basin have been impacted by changes in the natural flow regime, reduction in habitat quality and availability, and barriers to migration (Copeland et al., 2003). Changes in the frequency, size, duration and timing of flow events have negatively impacted on the availability of food, habitat and breeding opportunities for native fish (Rolls et al., 2013, Baumgartner et al., 2013). The majority of native fish species in the lower Gwydir spawn during the spring and summer season with rises in water temperature and/or water levels. Up to 20 native fish species occur in the Gwydir catchment with most species still occurring in the middle Gwydir catchment (Wilson et al., 2009, NSW DECCW, 2008).



Figure 2: Map of the Gwydir River Valley (produced by the NSW Office of Environment and Heritage)

# 3. Long-term environmental water demands in the Gwydir catchment

## 3.1. Basin-wide environmental watering strategy

The Murray-Darling Basin Authority has published the first Basin-wide environmental watering strategy (the Strategy, MDBA 2014). Building on Basin Plan's environmental objectives, the Strategy sets out the Authority's best assessment of the expected environmental outcomes over the next decade as a result of implementing the Basin Plan and associated water reforms. The Strategy focusses on four components: river flows and connectivity; vegetation; waterbirds; and native fish. The expected outcomes for each component are summarised below, with more specific quantified outcomes provided in <u>Attachment A</u>.

**River flows and connectivity:** Improve connections along rivers and between rivers and their floodplains

Vegetation: Maintain extent and improve the condition

Waterbirds: Maintain current species diversity, improve breeding success and numbers

**Native Fish:** Maintain current species diversity, extend distributions, improve breeding success and numbers

## 3.2. Long-term watering plans

State governments are developing long-term watering plans for each catchment in the Basin. These plans will identify:

- the priority environmental assets and ecosystem functions in the catchment
- the objectives and targets for these assets and functions
- their watering requirements

In developing these plans, state governments will be consulting with environmental water holders and local communities.

Once developed, these plans will provide the key information on the long-term environmental water demands in the catchment and the Office's planning for the Gwydir catchment will be reviewed so that this information can be incorporated.

Prior to the development of long-term watering plans, the Office will continue to draw on existing documentation on environmental water demands developed by state governments, local natural resource management agencies and the Murray-Darling Basin Authority.

Key documentation includes:

- The Gwydir Monitoring and Evaluation Plan, developed under the Office's Long-Term Intervention Monitoring Project (EcoLogical Australia and UNE, 2015)
- The assessment of environmental water requirements for the proposed Basin Plan (MDBA 2012 a-c)
- Murray-Darling Basin Authority (2012). Assessment of environmental water requirements for the proposed Basin Plan: Gwydir Wetlands. Murray-Darling Basin Authority, Canberra.
- A range of scientific literature, monitoring outcomes and on-ground knowledge (e.g. Baumgartner et al 2013).

• Murray-Darling Basin Authority (2012). Assessment of environmental water requirements for the proposed Basin Plan: Gwydir Wetlands. Murray-Darling Basin Authority, Canberra.

The below section represents the Office's summary of the long-term environmental water demands, based on these documents. The objectives and expected outcomes for water-dependent ecosystems will continue to be revised and refined in response to best available knowledge, including drawing on the results of environmental watering monitoring programmes.

## 3.3. Expected outcomes in the Gwydir catchment

The expected outcomes from environmental watering in the Gwydir catchment are described below in Table 3 and how these contribute to Basin-wide outcomes. These outcomes will be refined and/or revised once the long-term watering plan for the catchment has been developed.

BASIN-WIDE OUTCOMES	EXPECTED	ECTED OUTCOMES FOR GWYDIR ASSETS									
(Outcomes in red link	IN-CHAN	NEL ASSETS		OFF-CHAN	NEL ASSETS						
Environmental Watering Strategy)	Mehi River,	Carole Creek	Lower Gwydir river channel	Gingham Wetlands	Gwydir Wetlands	Mallowa Wetlands					
OVERALL	Contribut variability hydrolog connecti stream he condition diversity, quality, p productiv native ac species c and repre	ontribute to flow priability, vdrological onnectivity, in- ream habitat ondition and versity, water vality, primary roductivity, ative aquatic becies condition and reproduction		Promote re wetland ve provide ho threatened as well as s and reprod opportunit range of w and native species (e. frogs, turtle invertebrat	ecovery of egetation, abitat for d species survival duction ies for a vaterbird e aquatic g. fish, es, tes)						
VEGETATION	Contribu vegetatio conditior	ted to ripari on diversity, 1.	an native extent and	<b>Gwydir Wetlands:</b> Improve the condition and maintain the extent of wetland vegetation communities (including Ramsar sites) by restoring hydrological connectivity and a flow regime that meets ecological requirements.							
WATERBIRDS	Waterbird sites, and Murray-D Support v	d Breeding: I food source arling Basin waterbird b	Maintain water ces, to support w reeding events	intain waterbird habitat, including refuge to support waterbird populations across the ding events (reproduction and fledging) to							
FISH       Native fish in the northern enhancing and protecting Contribute to natural and connectivity increasing fis condition, breeding and or		thern Basin: Imp ecting refuge h al and/or regulation ing fish habitation and dispersal.	n. hern Basin: Improve survival of native fish by ecting refuge habitat in the northern Basin I and/or regulated flows to support hydrological ng fish habitat availability and supporting fish and dispersal.								
MACROINVERTEBRATES	Support r habitat	ecruitment	and maintain m	nacroinverte	ebrate diver	sity and					

Table 3: Summary of expected outcomes from environmental watering in the Gwydir

PROCESSES	Hydrological connectivity, including end of system flows Mobilisation and dispersal of biotic and abiotic materials Primary production, decomposition, nutrient and carbon cycling	Primary production, decomposition, nutrient and carbon cycling				
WATER QUALITY	Maintain water quality within channels and pools					
RESILIENCE	Provide drought refuge habitat (particularly for fish and other aquatic fauna)					

Information sourced from: CEWO 2014, MDBA 2012, MDBA 2014 (a and b)

## 3.4. Flows in scope for Commonwealth environmental watering

Not all environmental demands can and will be met through the use of held environmental water. Some demands are met by regulated water deliveries for consumptive purposes, while others are met by large unregulated/natural flows events or are beyond what can be delivered within operational constraints. Figure 3 shows the broad environmental demands that are in scope for the Office to focus on contributing to in the Gwydir. Importantly, these are broad, indicative demands and individual watering events may contribute to particular opportunities, such as using infrastructure to deliver water to individual wetlands that would otherwise not be possible due to constraints. Also, there may be opportunities for Basin State governments to remove or modify constraints, which will improve the efficiency and/or effectiveness of environmental watering.



Figure 3: Scope of demands that environmental water may contribute to in the Gwydir

The delivery of environmental water in the Gwydir River Valley is complex as flow capacities are greatly reduced in the downstream direction, with the Gwydir River having the greatest contraction in capacity. A small increase in flows at Pallamallawa can cause over bank flow downstream. Delivery of water to the distributaries, such as the Mehi River, Carole Creek and Moomin Creek, has been enhanced over the past 100 years to improve water delivery efficiency for irrigation and stock and domestic users.

The delivery of environmental water in the Gwydir is currently constrained by the release capacities from storages, channel capacity, proximity of cropping to watercourses, control structures and various operating practices and system constraints.

Watering options have been developed in consideration of the release capacities outlined in the Water Sharing Plan for the Gwydir Regulated River Water Source. The Murray-Darling Basin Authority has recently published <u>Preliminary Overview of Constraints to Environmental Water</u> <u>Delivery in the Murray-Darling Basin</u> (MDBA, 2013b) and <u>Constraints Management Strategy 2013</u> to 2024 (MDBA, 2013a) which also provide further information about constraints to environmental water delivery in the Gwydir Catchment.

The distribution of regulated flow in the low lying wetlands depends on the amount of extraction between the control structures and the wetlands. Where possible, environmental deliveries will be planned to mimic patterns of natural inundation and ensure core wetland areas receive water during the warmer summer months for a sufficient period of time. However, spring and early summer deliveries of environmental water to the wetlands are constrained by risks to crops within wetland areas during the harvest period.

During periods of peak demand channel capacity is a significant constraint in meeting both consumptive and environmental demand. Where channel capacity is likely to be exceeded river operators may rationalise available capacity between water users. This can be compounded by cropping and harvest cycles pushing environmental water deliveries later in the season reducing the available time window for delivery to core wetland areas. Under these circumstances the ecological objectives of environmental water may be at risk due to compromised delivery of environmental water.

In-stream watering actions, particularly in the Mehi River and Carole Creek, may be timed to occur prior to the main period for the delivery of irrigation water. Delivery of irrigation water following an in stream action may contribute to environmental outcomes. While environmental objectives for such actions target the length of the system the environmental water delivery must be accounted for at a single point in the system. Extractions downstream of the accounting point may reduce the environmental outcomes in the lower reaches of the system. In-stream deliveries to the Mehi River and Carole Creek have the potential to contribute to environmental outcomes in the Barwon-Darling system.

Operational considerations such as delivery methods, opportunities, constraints and risks will differ depending on the inflow scenario. These considerations will be assessed throughout the year as decisions to make water available for use are made and implemented. This includes refining the ecological objectives, assessing operational feasibility and potential risks and the ongoing monitoring of the seasonal outlook and river conditions.

Environmental water may be made available for some watering options from the NSW Office of Environment and Heritage (NSW OEH) either as adaptive environmental water or discretionary planned environmental water to deliver common and complementary environmental outcomes.

Table 4: Current constraints on environmental watering for the Gwydir

Inflow scenario	Very low	Low	Moderate	High	Very high
Opportunities					
Manage the recession of naturally occurring high flows to provide for a more natural flow pattern.					
Use environmental water in conjunction with, or to maximise the environmental benefit of, naturally occurring river flows.					
Augment a peak flow and/or managed recession.					

Inflow scenario	Very low	Low	Moderate	High	Very high
Use environmental water to support bird reproduction events and aquatic species reproduction requirements					
Augment regulated flows to improve environmental outcomes.					
End of system flows contribute to additional environmental outcomes in the Barwon-Darling system.					
Constraints					
High unregulated flows limit delivery options due to reduced channel capacity, limiting the operation of river infrastructure and inhibiting additional releases from storages.			-	-	
Cropping and harvest practices reduce available time window for delivery of environmental water limiting inundation for core wetlands.					
Consumptive orders may dominate available channel capacity, limiting the opportunity to contribute regulated Commonwealth environmental water.		-			
Risks*					
The provision of Commonwealth environmental water must consider potential inundation impacts to property and infrastructure.					

Constraints as they relate to specific watering actions are described in the standard operating considerations listed in section 3.5 below.

Based on the above outcomes sought and delivery constraints, Table 5 identifies flows that are in scope for Commonwealth environmental watering. Some specific watering requirements (flow magnitude, duration, timing and frequency) have also been listed, drawn from existing resources. The watering requirements for the Gwydir will be developed in full by the state government as part of their long-term watering plan and will be reflected in future planning documents by the Commonwealth Environmental Water Office.

**Table 5:** Long-term indicative elements of a flow regime in scope for Commonwealth

 environmental watering in the Gwydir

Environmental assets		Indicative demand (for <u>all sources of water</u> in the system)
Wetland recovery	Gwydir Wetlands	<ul> <li>Baseflows – small fresh and overbank contributing to:</li> <li>45 GL during October to March</li> <li>60 GL during October to March</li> <li>80 GL during October and March, [*constraints currently limiting ability to deliver to this demand with regulated flows (cropping, harvest access, channel capacity etc)]</li> </ul>
	Mallowa Creek Watercourse	<ul> <li>Baseflow and Overbank</li> <li>10 – 20 GL - All year (most likely spring to autumn)</li> </ul>

Contingency watering reserve		<ul> <li>10 - 15 GL reserve to support to support threatened waterbird breeding or</li> <li>Up to 8 GL in very dry inflow sequences for in-stream baseflow to protect critical aquatic refuge habitat</li> </ul>			
	Mehi River	<ul> <li>15–20 GL stimulation flow, all year (most likely spring to autumn)</li> <li>5 GL demand for maintenance</li> </ul>			
Aquatic in- stream ecology Gv Da Ca Ba	Carole Creek	<ul><li>5-10 GL</li><li>All year (most likely spring to autumn)</li></ul>			
	Gwydir River Downstream of Copeton Dam	<ul> <li>Improve natural character of flows downstream of the dam</li> </ul>			
	Ballin Boora Creek	• Baseflow - 1 GL (most likely spring to autumn)			

Information sourced from CEWO 2014, MDBA 2012, MDBA 2014(a)

# 3.5. Potential watering actions under different levels of water resource availability

Under certain levels of water resource availability, watering actions may not be pursued for a variety of reasons, including that environmental demand may be met by unregulated flows and that constraints and/or risks may limit the availability to deliver environmental water. Table 6 identifies the range of potential watering actions in Gwydir and the levels of water resource availability that relate to these actions.

Table 6: Summary of potential watering actions for the Gwydir

Applicable level(	s) of resource availability	Very Low	Low	Moderate	High	Very High
1. Wetland watering	Gwydir Wetlands	Provide base flows to protect vegetation and maintain drought refuge habitat for waterbirds. Contribute to base flows and freshes to provide connectivity between wetlands, maintain vegetation extent and condition, and support opportunities for reproduction for a range of waterbird and other native aquatic species.			ovide connectivity ion extent and eproduction for a quatic species.	
	Mallowa Wetlands	Contribute to base f maintain vegetation ex for a rang				
2. In stream aquatic ecology	Lower Gwydir River, Mehi River, Carole Creek and Ballin Boora Creek	Contribute to base flows to refresh drought refuges and reduce the risk of degrading water quality.		Contribute to natura flows to support connectivity increa availability, suppo processes, impro condition and suppo for bree	l and/or regulated hydrological asing fish habitat rting ecosystem ving native fish orting opportunities oding.	
3. Contingency watering	In-stream low flow base flow (downstream of Copeton Dam to lower Mehi River)	Contribute to base flows to refresh drought refuges and reduce the risk of degrading water quality.				
reserve	Waterbird reproduction and fledging contingency			If required, augment natural flows to support key species to complete life cycles in low lying wetlands for example water bird reproduction and fledging.		

Note: Under certain resource availabilities, options may not be pursued for a variety of reasons including that environmental demand may be met by unregulated flows, and that constraints and/or risks may limit the ability to deliver environmental water.

### 3.6. Potential watering actions – standard operational considerations

Table 6 above identifies the range of potential watering actions in Gwydir that give effect to the long-term demands and flow regime identified as being in scope for the Office to contribute environmental water to in any given year. The standard considerations associated with these actions are set out below.

#### 1. Contributing to wetland vegetation maintenance following natural cycles of wetting and drying

Watering action: Contribute to wetland watering of Gwydir, Gingham and Mallowa watercourses following natural cycles of drying and wetting.

Standard operational considerations:

- Contributing to wetlands vegetation maintenance by reactive watering activating access to supplementary water and offsetting a component of the consumptive extraction up to an approved volume with held environmental water called from storage.
- When supplementary water access is made available, take a proportion of the Commonwealth supplementary licence for each watercourse (up to 14 100 ML in the Gingham/ Gwydir and up to 5 000 ML in the Mehi / Mallowa).
- To compliment the supplementary flows, and to offset a component of the natural flow that may be extracted from event, order a small volume of General Security water to be provided on the tail of the flows.

*Typical extent:* This watering action could contribute flows required to inundate small areas of wetland vegetation in the Gwydir, Gingham and Mallowa wetland systems.

Approvals: This option will be coordinated with NSW OEH to ensure complementary delivery. NSW OEH manages held and planned environmental water for NSW (the Environmental Contingency Allowance). Achieving the target flows outlined above will require an initial announcement of supplementary water access and proportional split between watercourses. Approval to order General Security water will also be required, with coordination between NSW OEH and the Commonwealth to apportion any shared volumes of held in environmental water proposed for use.

#### 2. Contributing to in-stream aquatic ecology maintenance

Watering action: Contributing to in-stream flows to maintain in-stream aquatic ecology to protect the habitat for aquatic species (fish, frogs, crustaceans and macroinvertebrates) and aquatic and riparian vegetation maintenance by reactive watering - activating access to supplementary water and offsetting a component of the consumptive extraction up to an approved volume with held environmental water called from storage.

Standard operational considerations:

- Contributing to in-stream and riparian vegetation maintenance by reactive watering activating access to supplementary water and offsetting a component of the consumptive extraction up to an approved volume with held environmental water called from storage.
- When supplementary water access is made available, take a proportion of the Commonwealth supplementary licence for each watercourse (up to 14 100 ML in the Gingham/ Gwydir and up to 5 000 ML in the Mehi / Mallowa).
- To compliment the supplementary flows, and to offset a component of the natural flow that may be extracted from event, order a small volume of General Security water to be provided on the tail of the flows.

*Typical extent:* This watering action could contribute flows within channel in the lower Gwydir River, Mehi River and Carole Creeks. In moderate to high water resource scenarios flows in the Mehi River and Carole Creek may provide connectivity with the Barwon-Darling River.

Approvals: This option will be coordinated with NSW OEH to ensure complementary delivery. NSW OEH manages held and planned environmental water for NSW (the Environmental Contingency Allowance). Achieving the target flows outlined above will require an initial announcement of supplementary water access and proportional split between watercourses. Approval to order General Security water will also be required, with coordination between NSW OEH and the Commonwealth to apportion any shared volumes of held in environmental water proposed for use.

#### 3. Contingency watering reserve

Watering action: Provide environmental water from storage to:

- contribute to base flows to refresh drought refuges and reduce the risk of degrading water quality to assist survival of aquatic species during dry periods; or
- augment natural flows to support key waterbird species to complete life cycles in low lying wetlands, for example to support a natural waterbird breeding event through to completion.

#### Standard operational considerations:

- Very dry to Dry scenario: Contribute to in-stream baseflows in the Gwydir River for drought refuge release from storage during periods of extreme low flows. Releases would be small and within release capacities, even at low storage levels. Where practicable releases would be coordinated with small tributary inflows to maximise environmental benefit.
- Moderate to Very high scenario: Augment flows to the Gwydir Wetlands to support the completion of a waterbird breeding event where there is a risk of changing water levels compromising breeding outcomes (e.g. risk of nest abandonment).

*Typical extent:* This watering action could contribute flows within the Gwydir River (for in-stream baseflow contingency) or the lower Gwydir and Gingham watercourses (for waterbird breeding contingency).

Approvals: These options will be coordinated with NSW OEH to ensure complementary delivery. NSW OEH manages held and planned environmental water for NSW (the Environmental Contingency Allowance).

# 4. Long-term water availability

# 4.1. Commonwealth environmental water holdings

The Commonwealth holds the following entitlements in the Gwydir:

- Gwydir (high security)
- Gwydir (general security)
- Gwydir (supplementary)

The full list of Commonwealth environmental water holdings can be found at <a href="https://www.environment.gov.au/topics/water/commonwealth-environmental-water-office/about-commonwealth-environmental-water/how-much">www.environment.gov.au/topics/water/commonwealth-environmental-water-office/about-commonwealth-environmental-water/how-much</a> and is updated monthly.

#### 4.2. Other sources of environmental water

Other potential sources of held environmental water that may be used to complement Commonwealth environmental water delivery in the Gwydir include:

- Environmental Water Allowance (New South Wales Office of Environment and Heritage)
- NSW RiverBank Environmental Water Licences (New South Wales Office of Environment and Heritage)

#### 4.3. Planned environmental water

In addition to water entitlements held by environmental water holders, environmental demands may also be met via natural or unregulated flows and water provided for the environment under rules in state water resource plans (referred to as 'planned environmental water').

The Water Sharing Plan for the Gwydir Regulated River Water Source provides for planned environmental water and stock and domestic releases (replenishment flows).

The water sharing plan sets water aside in an 'environmental contingency allowance' (ECA) of 45 000 ML, multiplied by the available water determination for general security access licences (e.g. if the general security allocation is 20 per cent 9 000 ML will be set aside [45 000 ML x 0.2 = 9 000 ML]). The maximum ECA account balance, at any time, is limited to 90 000 ML. Releases may be made for a wide range of purposes related to wetland or river health or for the direct benefit of birds, fish or other fauna. The ECA account is managed by the NSW Office of Environment and Heritage with advice provided by the Environmental Contingency Allowance Operations Advisory Committee (ECAOAC).

The Gwydir Wetlands often benefit from unregulated tributary flows (downstream of Copeton Dam) protected under the water sharing plan. The water sharing plan protects up to 500 ML/day of inflows from tributaries downstream of Copeton Dam for the Gwydir Wetlands (referred to as 3T Water). In addition 50 per cent of high unregulated flows are protected for the environment with the remaining flow shared across supplementary licences.

Regulated stock and domestic replenishment flows are provided for in the Water Sharing Plan for use in several systems within the valley. Many of these are no longer required due to the construction of Stock and Domestic pipelines. The Plan allows for flows to the following watercourses if required:

- up to 6 GL per year to the Gingham Watercourse (no longer required replaced with a stock and domestic pipeline). No planned delivery in 2015-16 as requirements are to be met by stock and domestic pipeline.
- up to 4 GL per water year to the lower Gwydir River. No planned delivery in 2015-16 as requirements are to be met by stock and domestic pipeline.

- up to 6 GL per water year to Mallowa Creek. No planned delivery in 2015-16 as requirements are to be met by stock and domestic pipeline.
- up to 4 GL per water year to Thalaba Creek.
- up to 1GL per water year to Ballinboora Creek. No planned delivery in 2015-16 as requirements are to be met by stock and domestic pipeline.

These regulated and unregulated flows offer opportunities to piggy back Commonwealth environmental water and increase the potential for environmental objectives to be achieved.

# 5. Next steps

# 5.1. From planning to decision making

It is important to distinguish between planning and operational decision making. As shown in Figure 7, planning allows the Office to manage the environmental water portfolio in a holistic manner and is an exercise in developing a broad approach or intention, based on the key drivers (demand and supply).

Decision making throughout each year builds on the intention by considering in more detail the specific prevailing factors and additional factors such as costs, risks, constraints to water delivery and market conditions.



Figure 4: Planning and decision making for Commonwealth environmental water use

## 5.2. Further information

For further information on how the Office plans for water use, carryover and trade, please visit our web site <u>www.environment.gov.au/topics/water/commonwealth-environmental-water-office</u>

- Water use: <u>www.environment.gov.au/topics/water/commonwealth-environmental-water-office/assessment-framework</u>
- Carryover: <u>http://www.environment.gov.au/topics/water/commonwealth-environmental-</u> water-office/portfolio-management/carryover
- Trade: Discussion Paper Trade of Commonwealth Environmental Water and Commonwealth Environmental Water Trading Framework: <u>http://www.environment.gov.au/water/cewo/trade/trading-framework</u>

# Attachment A – Expected outcomes from the Basin-wide environmental watering strategy

Expected outcomes from the Basin-wide Environmental Watering Strategy (MDBA 2014) that are relevant to the Gwydir are described below.

#### **RIVER FLOWS AND CONNECTIVITY**

Baseflows are at least 60 per cent of the natural level.

Contributing to a 10 per cent overall increase in flows in the Barwon–Darling.

A 10-20 per cent increase in the frequency of freshes, bankfull and lowland floodplain flows.

#### VEGETATION

Maintain the current extent of water-dependent vegetation near river channels and on low-lying areas of the floodplain.

No decline in the condition of river red gum, black box and coolibah.

Improve condition of lignum shrublands in the Lower Gwydir.

Improved recruitment of trees within black box, river red gum and coolibah communities.

Increased periods of growth for non-woody vegetation communities that closely fringe or occur within the river and creek channels, and for marsh club-rush and water couch in the Gwydir Wetlands.

#### Vegetation extent

Area of river red gum (ha)	Area of black box (ha)	Area of coolibah (ha)	Shrublands	Non–woody water dependent vegetation
4 500	600	6 500	Lignum in the Lower Gwydir	Closely fringing or occurring within the Gwydir River and marsh club-rush and water couch in the Gwydir Wetlands

#### WATERBIRDS

Maintain current species diversity.

Increase Basin-wide abundance of waterbirds by 20–25 per cent by 2024.

A 30–40 per cent increase in nests and broods (Basin-wide) for other waterbirds.

Up to 50 per cent more breeding events (Basin-wide) for colonial nesting waterbird species.

#### Important Basin environmental assets for waterbirds in the Gwydir

Environmental asset	Total abundance and diversity	Drought refuge	Colonial waterbird breeding	Shorebird abundance	In scope for C'th watering?
Gwydir wetlands	Yes		Yes		Yes

#### FISH

No loss of native species.

Improved population structure of key species through regular recruitment, including:

- Short-lived species with distribution and abundance at pre-2007 levels and breeding success every 1–2 years.
- Moderate to long-lived with a spread of age classes and annual recruitment in at least 80 per cent of years.

Increased movements of key species.

Expanded distribution of key species and populations.

#### Key species for the Gwydir include:

Species	Specific outcomes	In-scope for C'th watering?
Freshwater catfish (Tandanus tandanus)	Expand the core range of existing populations in the Gwydir	Yes
Golden Perch (Macquaria ambigua)	A 10–15 per cent increase of mature fish (of legal take size) in key populations	Yes
Murray cod (Maccullochella peelii peelii)	A 10–15 per cent increase of mature fish (of legal take size) in key populations	Yes
Olive perchlet (Ambassis agassizii)	-	Yes
River blackfish (Gadopsis marmoratus)	Expand the range of current populations in the upland systems of the Gwydir	No
Southern purple-spotted gudgeon (Mogurnda adspersa)	Expand the range (or core range) of populations in the Gwydir. Establish additional populations	Yes

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For more information about Commonwealth environmental water, Please contact us at:

🖀 1800 218 478

@: ewater@environment.gov.au

~ つwww.environment.gov.au/water/cewo

🄰 @theCEWH

www.flickr.com/photos/envirogov/sets

🖂 GPO Box 787, Canberra, ACT, 2601