**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

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Back cover image credit: Turtles at Gingham Waterhole

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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:
  + transfer of allocations between connected catchments
  + sale of allocations
  + 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

# Purpose and portfolio management for 2015–16

## 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).

Supply

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.

Purpose

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.

A figure depicting the range of potential water resource availability and environmental demands in the Gwydir catchment for 2015-16.
Resource availability is expected to be very low to moderate in 2015-16, or high if wet conditions eventuate. Considered together with environmental demands, which range from moderate to high, the overall purpose of environmental watering will be to protect environmental assets, while improving ecological health and resilience if conditions become wet.


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

## 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.

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

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| * **Watering action** | | * **2015–16 Basin annual environmental watering priority(s) [[1]](#footnote-1)** | **Resource availability scenarios action is likely to be pursued under** | | |
| **Low – very low** | **Moderate** | **High – very high** |
| Wetland watering actions | Gwydir Wetlands | * Basin-wide in-stream and riparian vegetation * Basin-wide waterbird habitat and future population recovery | Yes | Yes | Yes |
| Mallowa Creek Watercourse | * Basin-wide flow variability and longitudinal connectivity * Basin-wide in-stream and riparian vegetation * Basin-wide waterbird habitat and future population recovery * Basin-wide native fish habitat and movement * Northern Basin fish refuges | Yes | Yes | No |
| Aquatic Ecology & Local Fish Populations | Mehi River maintenance flow to support the habitat requirements of Native fish | * Basin-wide flow variability and longitudinal connectivity * Basin-wide native fish habitat and movement * Northern Basin fish refuges | Yes | Possible | No |
| Carole Creek maintenance flow to support the habitat requirements of Native fish | * Basin-wide flow variability and longitudinal connectivity * Basin-wide native fish habitat and movement * Northern Basin fish refuges | Yes | Possible | No |
| Support Upper Gwydir river baseflow during low and very low resource availability scenario | * Basin-wide native fish habitat and movement * Northern Basin fish refuges | Yes | No | No |
| Contingency watering | Low flow  Waterbird breeding | * Basin-wide in-stream and riparian vegetation * Basin-wide waterbird habitat and future population recovery | Yes  No | No  No | No  Yes |

**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 in-stream 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).

## 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.

## 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 [Commonwealth environmental water Trading Framework](http://www.environment.gov.au/water/cewo/publications/water-trading-framework), which includes operating rules, procedures, and [protocols](http://www.environment.gov.au/water/cewo/trade/trading-framework#protocols), for further information.

## 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: [ewater@environment.gov.au](mailto:ewater@environment.gov.au).

**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**

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Environmental assets** | | **Indicative demand (for all sources of water in the system)[[2]](#footnote-2)** | **Required frequency (maximum dry interval)** | **Watering history**  **(from all sources of water)** | | | **2015-16** | | | **Implications for future demands** | | |
| **Predominant urgency of environmental demand for water** | **Purpose under low to very low resource availability** | **Potential Commonwealth environmental water contribution?** | **Likely urgency of demand in 2016–17 if watering occurred as planned in 2015-16** | **2017–18**  **Range of likely demand** | Met in 2016–17 |
| **2012–13** | **2013–14** | **2014–15** |
| wet | moderate | drying | Not met in 2016–17 |
| Gwydir Wetlands | | - 45 GL during October to March  - 60 GL during October to March  - 80 GL during October and March, (\*constraints currently limiting ability to deliver to this demand with regulated flows) | 7/8 in 10 years (5 years)  6 in 10 years (5 years)  4 in 10 years (6 years) | Extensive watering | Drying period | 1st Return watering  (60 GL) | MODERATE  Watering has occurred for 4 of the last 5 water years  Dry sequence is within requirements  Respond to natural flow events (supplementary) | **Protect** | Environmental water could partially contribute to this demand.  Respond to natural flow triggers | Moderate | Moderate | |
| High | |
| Mallowa Creek Watercourse | | Baseflow to overbank  10 – 20 GL  All year (most likely spring to autumn) | 3 consecutive in 6 years | 1st Watering trial | 2nd Watering | 3rd Watering | LOW to MODERATE  3 years watering followed by a dry period.  Dry sequence is within requirements  Respond to natural flow events (supplementary) | **Protect** | Environmental water could partially contribute to this demand.  Drying phase -Respond to natural flow triggers  Diversion of supplementary entitlement if available into the Mallowa | Low | Low | |
| Moderate | |
| Aquatic in-stream ecology | Mehi River | - 15–20 GL, all year (most likely spring to autumn)  (stimulation flow)  - 5 GL demand for maintenance | 5 in 10 years  Second and thrid year following a stimulation / breeding flow | - | 1st fish flow trial | 2nd fish flow | MODERATE  2 years of delivery - stimulation of fish breeding  Lower section of the Mehi may dry down to refuge pools | **Protect** | A high potential for maintenance flow to enhance survival rates of new cohort fish – smaller volume required than fish breeding stimulation flow | Low | Very Low | |
| Low | |
| Carole Creek | 5-10 GL  All year (most likely spring to autumn) | 5 in 10 years | - | 1st fish flow trial | 2nd fish flow | MODERATE  2 years of delivery - stimulation of fish breeding  Lower section of the Carole may dry down to refuge pools | **Protect** | Environmental water could partially contribute to this demand.  Given limited volumes available potential contribution to this demand has a lower priority than contribution to the Mehi. | Low | Very Low | |
| Low | |
| 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 flow pattern not met. | Required volumes Met. Natural flow pattern not met. | Required volumes Met. Natural flow pattern not met. | MODERATE | **Protect** | Likely to be met by tributary flows and environmental water delivery to other assets | Moderate | Moderate | |
| Moderate | |
| Ballin Boora Creek | Baseflow  1 GL (most likely spring to autumn) | Subject to examination of requirement/ due diligence  Stock and domestic flows piping will result in loss of flows to the creek system. | Stock and domestic flows | Stock and domestic flows | Stock and domestic flows | MODERATE  Required in 3/5 years (zero flow during 2014/15. | **Protect** | Water required this year or next  Unlikely to have all requirements for delivery met during 2015-16 (defer use till 2016-17) | High | Moderate | |
| High | |
| Contingency watering reserve | | - 10 - 15 GL reserve to suppory to support threatened colonial waterbird breeding or  -Up to 8 GL in very dry inflow sequences for in-stream baseflow to protect critical aquatic refuge habitat | As required, All years | Not Required | Not Required | Not Required | MODERATE  Moderate demand (under low resource availability)  Protect critical habitat during extended drying sequence  Waterbird breeding trigger unlikely during low resource availability | **Avoid Damage** | A high potential for watering in 2015–16  Respond to natural conditions to protect / support threatened waterbird breeding (unlikely) or critical in-stream aquatic refuge habitat (more likely) | Moderate | Moderate | |
| Moderate | |
|  | | | | | | | | **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. | |
| **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 access to assist in meeting high demands. Sale of allocations unlikely considering a number of moderate and high demands expected. | Potential to trade will depend on environmental demands and resource availability. | |

**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 all sources of water in the system)[[3]](#footnote-3)** | **Required frequency (maximum dry interval)** | **Watering history**  **(from all sources of water)** | | | **2015-16** | | | | **Implications for future demands** | | | |
| **Predominant urgency of environmental demand for water** | **Purpose under moderate resource availability** | | **Potential Commonwealth environmental water contribution?** | **Likely urgency of demand in 2016–17 if watering occurred as planned in 2015-16** | | **2017–18**  **Range of likely demand** | Met in 2016–17 |
| **2012–13** | **2013–14** | **2014–15** |
| wet | moderate | drying | Not met in 2016–17 |
| Gwydir Wetlands | | - 45 GL during October to March  - 60 GL during October to March  - 80 GL during October and March, (\*constraints currently limiting ability to deliver to this demand with regulated flows) | 7/8 in 10 years (5 years)  6 in 10 years (5 years)  4 in 10 years (6 years) | Extensive watering | Drying period | 1st Return watering  (60 GL) | MODERATE  Vegetation condition and resilience in the Gwydir Wetlands | | **Maintain** | High Potential for contribution to 45 GL demands  Protect high value refuge sites by responding to natural cues with supplementary access / call held water to offset likely extraction from the natural events | Moderate | | Low | |
| Moderate | |
| Mallowa Creek Watercourse | | Baseflow to overbank  10 – 20 GL  All year (most likely spring to autumn) | 3 consecutive in 6 years | 1st Watering trial | 2nd Watering | 3rd Watering | LOW to MODERATE  Vegetation condition and resilience in the Mallowa Creek Watercourse | | **Maintain** | Environmental water could partially contribute to this demand.  Drying phase -Respond to natural flow triggers  Diversion of supplementary entitlement if available into the Mallowa | Low | | Low | |
| Moderate | |
| Aquatic in-stream ecology | Mehi River | - 15–20 GL, all year (most likely spring to autumn)  (stimulation flow)  - 5 GL demand for maintenance | 5 in 10 years  Second and thrid year following a stimulation / breeding flow | - | 1st fish flow trial | Aquatic in-stream ecology | MODERATE  2 years of delivery - stimulation of fish breeding | | **Maintain** | High Potential for maintenance flow under moderate resource scenario to enhance survival rates of new cohort fish – smaller volume required than fish breeding stimulation flow | Low | | Low | |
| Very Low | |
| Carole Creek | 5-10 GL  All year (most likely spring to autumn) | 5 in 10 years | - | 1st fish flow trial | 2nd fish flow | MODERATE  2 years of delivery - stimulation of fish breeding | | **Maintain** | High Potential for maintenance flow under moderate resource scenario.  Potential contribution to this demand has a lower priority than contribution to the Mehi. | Low | | Low | |
| Very Low | |
| 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 flow pattern not met. | Required volumes Met. Natural flow pattern not met. | Required volumes Met. Natural flow pattern not met. | MODERATE | | **Maintain** | Environmental water could partially contribute to this demand in conjunction with tributary flows and environmental water delivery to other assets | Moderate | | Moderate | |
| Moderate | |
| Ballin Boora Creek | Baseflow  1 GL (most likely spring to autumn) | Subject to examination of requirement/ due diligence  Stock and domestic flows piping will result in loss of flows to the creek system. | Stock and domestic flows | Stock and domestic flows | Stock and domestic flows | MODERATE  Required in 3/5 years (zero flow during 2014/15. | | **Protect** | Water required this year or next  Unlikely to have all requirements for delivery met during 2015-16 (defer use till 2016-17) | High | | Moderate | |
| High | |
| Contingency watering reserve | | - 10 - 15 GL reserve to suppory to support threatened colonial waterbird breeding or  -Up to 8 GL in very dry inflow sequences for in-stream baseflow to protect critical aquatic refuge habitat | As required, All years | Not Required | Not Required | Not Required | MODERATE  Waterbird breeding trigger may be met during Moderate resource availability | | **Protect** | Potential requirement to support a Waterbird Breeding event in the Gwydir Wetlands.  In-stream baseflow likely to be met by other system flows | Moderate | | Moderate | |
| Moderate | |
|  | | | | | | | | | **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. | | |
| **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 access to assist in meeting high demands. Sale of allocations unlikely considering a number of moderate and high demands expected. | Potential to trade will depend on environmental demands and resource availability. | | |

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

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Environmental assets** | | **Indicative demand (for all sources of water in the system)[[4]](#footnote-4)** | **Required frequency (maximum dry interval)** | **Watering history**  **(from all sources of water)** | | | **2015-16** | | | **Implications for future demands** | | |
| **Predominant urgency of environmental demand for water** | **Purpose under high resource availability** | **Potential Commonwealth environmental water contribution?** | **Likely urgency of demand in 2016–17 if watering occurred as planned in 2015-16** | **2017–18**  **Range of likely demand** | Met in 2016–17 |
| **2012–13** | **2013–14** | **2014–15** |
| wet | moderate | drying | Not met in 2016–17 |
| Gwydir Wetlands | | - 45 GL during October to March  - 60 GL during October to March  - 80 GL during October and March, (\*constraints currently limiting ability to deliver to this demand with regulated flows) | 7/8 in 10 years (5 years)  6 in 10 years (5 years)  4 in 10 years (6 years) | Extensive watering | Drying period | 1st Return watering  (60 GL) | MODERATE  Vegetation condition and resilience in the Gwydir Wetlands | **Improve** | High Potential for contribution to 45 GL demands  Protect high value refuge sites by responding to natural cues with supplementary access / call held water to offset likely extraction from the natural events | Moderate | Low | |
| Moderate | |
| Mallowa Creek Watercourse | | Baseflow to overbank  10 – 20 GL  All year (most likely spring to autumn) | 3 consecutive in 6 years | 1st Watering trial | 2nd Watering | 3rd Watering | LOW to MODERATE  Vegetation condition and resilience in the Mallowa Creek Watercourse | **Improve** | Environmental water could partially contribute to this demand.  Drying phase -Respond to natural flow triggers  Diversion of supplementary entitlement if available into the Mallowa | Low | Low | |
| Moderate | |
| Aquatic in-stream ecology | Mehi River | - 15–20 GL, all year (most likely spring to autumn)  (stimulation flow)  - 5 GL demand for maintenance | 5 in 10 years  Second and thrid year following a stimulation / breeding flow | - | 1st fish flow trial | Aquatic in-stream ecology | MODERATE  2 years of delivery - stimulation of fish breeding | **Improve** | High Potential for maintenance flow to enhance survival rates of new cohort fish  Some potential for a stimulation flow with connection to the Barwon-Darling. | Low | Low | |
| Very Low | |
| Carole Creek | 5-10 GL  All year (most likely spring to autumn) | 5 in 10 years | - | 1st fish flow trial | 2nd fish flow | MODERATE  2 years of delivery - stimulation of fish breeding | **Improve** | High Potential for maintenance flow under moderate resource scenario.  Some potential for a stimulation flow with connection to the Barwon-Darling. | Low | Low | |
| Very Low | |
| 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 flow pattern not met. | Required volumes Met. Natural flow pattern not met. | Required volumes Met. Natural flow pattern not met. | MODERATE | **Improve** | High potential to contribute to this demand in conjunction with tributary flows and environmental water delivery to other assets | Moderate | Moderate | |
| Moderate | |
| Ballin Boora Creek | Baseflow  1 GL (most likely spring to autumn) | Subject to examination of requirement/ due diligence  Stock and domestic piping will result in loss of flows to the creek system. | Stock and domestic flows | Stock and domestic flows | Stock and domestic flows | MODERATE  Required in 3/5 years (zero flow during 2014/15. | **Improve** | Water required this year or next  Unlikely to have all requirements for delivery met during 2015-16 (defer use till 2016-17) | High | Moderate | |
| High | |
| Contingency watering reserve | | - 10 - 15 GL reserve to suppory to support threatened colonial waterbird breeding or  -Up to 8 GL in very dry inflow sequences for in-stream baseflow to protect critical aquatic refuge habitat | As required, All years | Not Required | Not Required | Not Required | MODERATE  Waterbird breeding event more likely under a High resource scenario | **Improve** | Moderate to High potential to support a Waterbird Breeding event in the Gwydir Wetlands.  In-stream baseflow likely to be met by other system flows | Moderate | Moderate | |
| Moderate | |
|  | | | | | | | | **Carryover potential** | Moderate proportion of allocations carried into 2016–17. | 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. | |
| **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. | |

# Part II: Commonwealth environmental water portfolio management planning

# Background

## 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.

## 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](#_ENREF_12)). 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](#_ENREF_4))). Downstream re-regulating 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](#_ENREF_15)). 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](#_ENREF_10)). 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](#_ENREF_11)). 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 club-rush in New South Wales (NSW) ([NSW DECCW, 2011](#_ENREF_10), [Bowen and Simpson, 2010](#_ENREF_2)).

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](#_ENREF_14)).

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](#_ENREF_12)).

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](#_ENREF_5)). 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](#_ENREF_3)). 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](#_ENREF_13), [Baumgartner et al., 2013](#_ENREF_1)). 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](#_ENREF_15), [NSW DECCW, 2008](#_ENREF_9)).

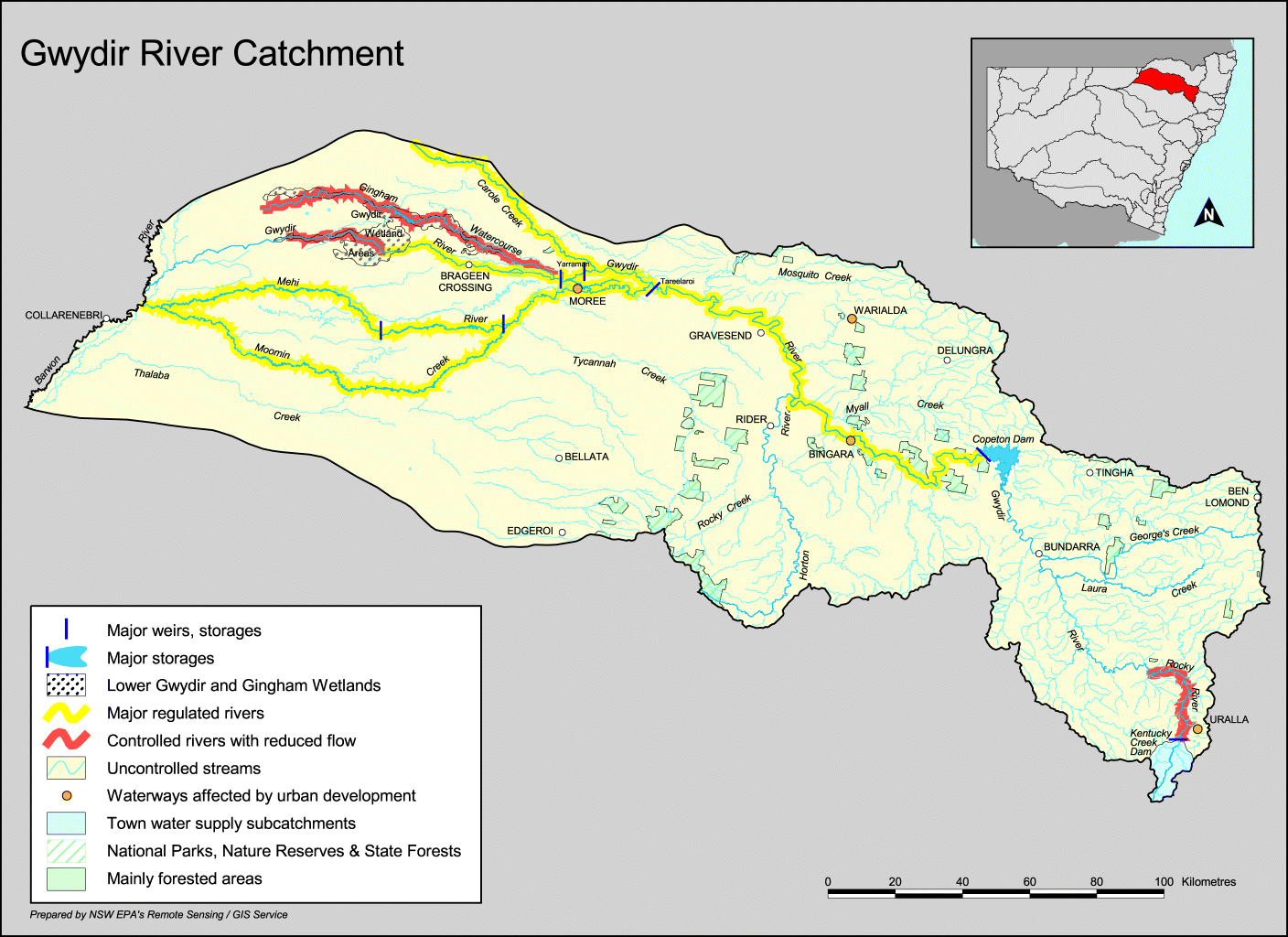


Figure 2: Map of the Gwydir River Valley (produced by the NSW Office of Environment and Heritage)

# Long-term environmental water demands in the Gwydir catchment

## 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 Attachment A.

**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

## 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.

## 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.

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

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| * **BASIN-WIDE OUTCOMES**   **(Outcomes in red link to the Basin-wide Environmental Watering Strategy)** | **EXPECTED OUTCOMES FOR GWYDIR ASSETS** | | | | | |
| **IN-CHANNEL ASSETS** | | | **OFF-CHANNEL ASSETS** | | |
| **Mehi River,** | **Carole Creek** | **Lower Gwydir river channel** | **Gingham Wetlands** | **Gwydir Wetlands** | **Mallowa Wetlands** |
| **OVERALL** | Contribute to flow variability, hydrological connectivity, in-stream habitat condition and diversity, water quality, primary productivity, native aquatic species condition and reproduction | | Under sustained low inflows provide hydrological connectivity to in-stream habitat, to ensure the persistence of pools as refuge; and to reduce the risk of degrading water quality conditions (particularly low dissolved oxygen levels) | | Promote recovery of wetland vegetation, provide habitat for threatened species as well as survival and reproduction opportunities for a range of waterbird and native aquatic species (e.g. fish, frogs, turtles, invertebrates) | |
| **VEGETATION** | Contributed to riparian native vegetation diversity, extent and condition. | | | **Gwydir Wetlands:** 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 Breeding:** Maintain waterbird habitat, including refuge sites, and food sources, to support waterbird populations across the Murray-Darling Basin.  Support waterbird breeding events (reproduction and fledging) to successful completion. | | | | | |
| **FISH** | **Native fish in the northern Basin:** Improve survival of native fish by enhancing and protecting refuge habitat in the northern Basin  Contribute to natural and/or regulated flows to support hydrological connectivity increasing fish habitat availability and supporting fish condition, breeding and dispersal. | | | | | |
| **MACROINVERTEBRATES** | Support recruitment and maintain macroinvertebrate diversity and habitat | | | | | |
| **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)

## 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.

A hydrograph figure showing the scope of demands that Commonwealth environmental water may contribute to in the Gwydir catchment.
Low flows are often met by other sources of water, such as consumptive water deliveries. Conversely, very high flows are the result of unregulated or natural flows. Commonwealth environmental water cannot contribute to these high flows, as doing so would create unacceptable third party impacts. The focus for Commonwealth environmental watering is therefore on support natural variable river flows, including flows through to the Gwydir and Mallowa Wetlands and the Barwon River.


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 [*Preliminary Overview of Constraints to Environmental Water Delivery in the Murray–Darling Basin*](http://www.mdba.gov.au/media-pubs/publications/constraints-overview)([MDBA, 2013b](#_ENREF_8))and [*Constraints Management Strategy 2013 to 2024*](http://www.mdba.gov.au/what-we-do/water-planning/managing-constraints) ([MDBA, 2013a](#_ENREF_7))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. |  | | | | |
| 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 all sources of water in the system)** |
| Wetland recovery | Gwydir Wetlands | Baseflows – small fresh and overbank contributing to:   * 45 GL during October to March * 60 GL during October to March * 80 GL during October and March, [\*constraints currently limiting ability to deliver to this demand with regulated flows (cropping, harvest access, channel capacity etc)] |
| Mallowa Creek Watercourse | Baseflow and Overbank   * 10 – 20 GL - All year (most likely spring to autumn) |
| Contingency watering reserve | | * 10 - 15 GL reserve to support to support threatened waterbird breeding or * Up to 8 GL in very dry inflow sequences for in-stream baseflow to protect critical aquatic refuge habitat |
| Aquatic in-stream ecology | Mehi River | * 15–20 GL stimulation flow, all year (most likely spring to autumn) * 5 GL demand for maintenance |
|
| Carole Creek | * 5-10 GL * All year (most likely spring to autumn) |
|
| Gwydir River Downstream of Copeton Dam | * Improve natural character of flows downstream of the dam |
|
| Ballin Boora Creek | * Baseflow - 1 GL (most likely spring to autumn) |
|

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

## 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. | | |  |
| **Mallowa Wetlands** | 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. | | | |  |
| **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 natural and/or regulated flows to support hydrological connectivity increasing fish habitat availability, supporting ecosystem processes, improving native fish condition and supporting opportunities for breeding. | |  |
| **3. Contingency watering reserve** | **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. | |  | | |
| **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.

## 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).

# Long-term water availability

## 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 [www.environment.gov.au/topics/water/commonwealth-environmental-water-office/about-commonwealth-environmental-water/how-much](http://www.environment.gov.au/topics/water/commonwealth-environmental-water-office/about-commonwealth-environmental-water/how-much) and is updated monthly.

## 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)

## 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.

# Next steps

## 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.

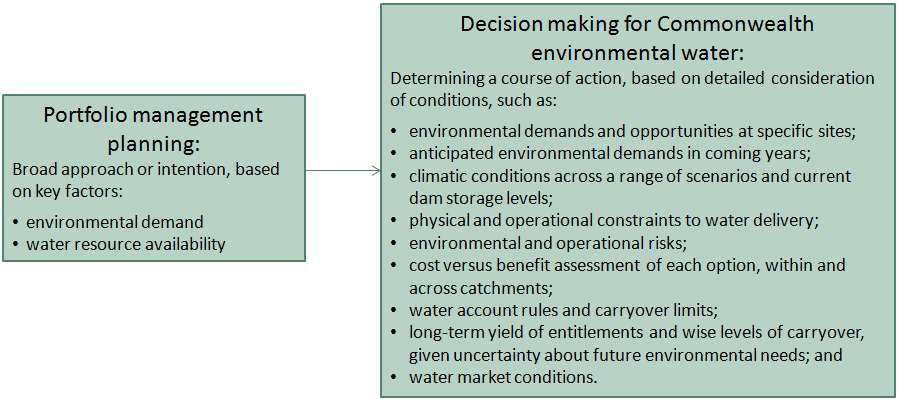


Figure 4: Planning and decision making for Commonwealth environmental water use

## Further information

For further information on how the Office plans for water use, carryover and trade, please visit our web site [www.environment.gov.au/topics/water/commonwealth-environmental-water-office](http://www.environment.gov.au/topics/water/commonwealth-environmental-water-office)

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

# 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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1. 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 [↑](#footnote-ref-1)
2. Used for most/all indicators: CEWO 2014, MDBA 2012, MDBA 2014(a) [↑](#footnote-ref-2)
3. Used for most/all indicators: CEWO 2014, MDBA 2012, MDBA 2014(a) [↑](#footnote-ref-3)
4. Used for most/all indicators: CEWO 2014, MDBA 2012, MDBA 2014(a) [↑](#footnote-ref-4)