



Australian Government

Commonwealth Environmental Water Office

Commonwealth Environmental Water

Portfolio Management Plan

Namoi–River Valley

2018–19



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Commonwealth environmental water portfolio management planning

Commonwealth Environmental Water Holder

The Commonwealth Environmental Water Holder is a statutory position established under the *Water Act 2007* and is responsible for managing the Commonwealth's environmental water holdings. This water must be managed to protect and restore the rivers, wetlands and floodplains (and the native animals and plants they support) of the Murray–Darling Basin. Ms Jody Swirepik is the current Commonwealth Environmental Water Holder. Ms Swirepik is supported by staff of the Commonwealth Environmental Water Office (CEWO). The CEWO employs six local engagement officers who live and work in regional centres across the Murray–Darling Basin.

Commonwealth environmental water

Commonwealth environmental water holdings are water entitlements that have been acquired by the Australian Government through investments in water-saving infrastructure and purchases on the water market. The holdings are a mix of entitlement types held across 19 catchments. The rules governing the entitlements vary across states and across catchments. Commonwealth environmental water entitlements are subject to the same fees, allocations, carryover and other rules as equivalent entitlements held by other water users.

There are broadly three options for managing Commonwealth environmental water:

- delivering water to a river or wetland to meet an identified environmental demand
- leaving water in storage and carrying it over for use in the next water year (referred to as 'carryover')
- trading water, that is, selling water and using the proceeds to buy water in another catchment or in a future year, or investing in complementary 'environmental activities'.

Purpose of the document

This document sets out the plans for managing the Commonwealth environmental water portfolio in the Namoi River Valley for 2018–19. Efficient and effective management of Commonwealth environmental water requires the utilisation of all portfolio management options. By taking a multi-year approach to planning, portfolio management tools such as use, carryover and trade can be managed for maximising environmental outcomes.

The portfolio management plans support transparent, coordinated and adaptive management of Commonwealth environmental water, consistent with the Basin-wide environmental watering strategy and having regard to the Basin annual environmental watering priorities.

To learn more about the planning approach see *Portfolio Management Planning: Approach to planning for the use, carryover and trade of Commonwealth environmental water, 2018–19* (available at: <http://www.environment.gov.au/water/cewo/publications> under 'Planning approach').

Delivery partners

Commonwealth environmental water is managed in conjunction with and delivered by a range of partners. Commonwealth environmental water planning and delivery in the Namoi River Valley is supported by advice from the New South Wales Office of Environment and Heritage (NSW OEH), Department of Industry (DOI) – Water, Department of Primary Industries (DPI) – Fisheries, WaterNSW and North West Local Land Services.

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 CEWO via: ewater@environment.gov.au.

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1. Environmental watering in the Namoi River Valley

1.1. The Namoi River Valley

The Namoi River Valley is located in north-eastern New South Wales, extending westwards of Nundle to Walgett. Rainfall in the upper catchment drives river flows and can be highly variable between years. Water for regulated delivery throughout the valley is stored in Split Rock and Keepit dams (Figure 1). There are also a number of smaller regulating weirs downstream of Keepit Dam.

The Namoi River is the primary riverine asset and is a major tributary of the Barwon River. Major tributaries of the Namoi include Cox's Creek and the Mooki, Manilla and the Peel rivers, which join the Namoi River upstream of Boggabri. Flows are confined in-channel until the floodplain begins to broaden at Gunnedah. The Pian (an anabranch of the Namoi River), Narrabri, Baradine and Bohena creeks contribute flows to the Namoi River downstream of Boggabri. The Namoi River connects with the Barwon-Darling near Walgett.

The Peel River contributes an average annual volume of approximately 280 000 megalitres (ML) into the Namoi system (Green et al. 2011). Flows are regulated out of Chaffey Dam and flow into the Namoi River slightly downstream of Keepit Dam. Major tributaries into the Peel River are Goonoo Goonoo Creek, the Cockburn River and Dungowan Creek.

The Peel and Namoi rivers support a number of threatened fish species including Murray cod, silver perch, freshwater catfish, olive perchlet, purple spotted gudgeon and the river snail. Riverine vegetation in the Namoi River Valley includes emergent aquatic plants and river oaks, rough-barked apple and river red gum.

The aquatic community of the Namoi River forms part of the *Lowland Darling River aquatic ecological community*, which is listed as endangered under the *NSW Fisheries Management Act 1994*. This community includes 21 native fish species and hundreds of native invertebrate species that are found within the Darling River and its associated streams, wetlands and anabranches within NSW.

Environmental watering in the Namoi River Valley is most likely to be delivered as baseflows or freshes, undertaken in conjunction with other flows in the system (e.g. a naturally occurring fresh flow, or consumptive water or block releases), or during prolonged low flow conditions.

Held environmental water in the Peel River can be made available from Chaffey Dam in combination with downstream unregulated tributary inflows, consumptive water or planned environmental water. For example, Commonwealth environmental water could be delivered in conjunction with the Peel environmental contingency allowance managed by the NSW Government.

In order to meet the Lower Namoi River in-channel fresh requirements regulated releases from Keepit Dam could be to be timed to coincide with unregulated inflows from the Peel and Mooki rivers and Cox's Creek. The environmental benefits from these flows may also extend downstream to the Barwon-Darling River. Where possible, environmental water will be managed to provide environmental benefits to multiple sites in order to maximise the efficiency and effectiveness of water delivery.

The Namoi River provides good hydrological connection with the Barwon-Darling at various times. The Barwon-Darling connects rivers, lakes and wetlands across the northern Basin, providing critical drought refuge and a movement corridor for fish and waterbirds, and habitat for other aquatic species including turtles, mussels, and shrimp. Flows that connect the Barwon-Darling and the northern tributaries may help to support healthy and diverse populations of native fish and other fauna, including in the Namoi and Peel rivers. More information about the Barwon-Darling is described in the *Commonwealth Environmental Water Portfolio Management Plan: Barwon-Darling 2018–19*.

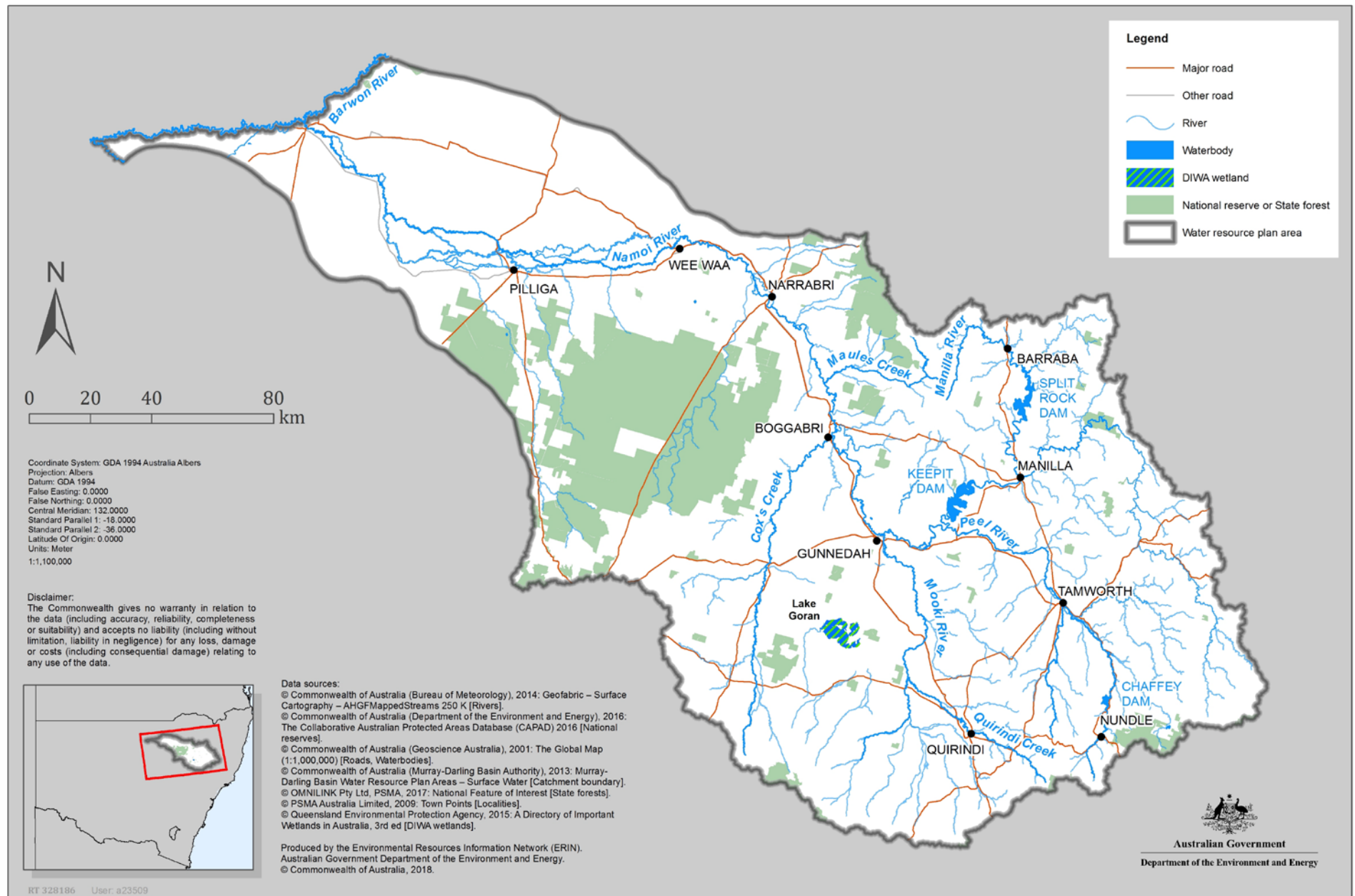


Figure 1: Map of the Namoi River Valley produced by the Department of Environment and Energy, June 2018.

1.2. Environmental objectives in the Namoi River Valley

The long-term environmental objectives for the Murray-Darling Basin are described in the Basin Plan's environmental watering plan and the Basin-wide environmental watering strategy, which includes 'quantified environmental expected outcomes' at both a Basin-scale and for each catchment. The expected outcomes relevant for the Namoi River Valley are described in [Attachment A](#).

Basin state governments are also developing long-term watering plans for each catchment. These plans will identify the priority environmental assets and ecosystem functions in the catchment, the objectives and targets for these assets and functions, and their watering requirements. Once developed, these plans will provide the key information on the long-term environmental water demands in the catchment. Prior to the development of long-term watering plans, the CEWO 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.

Based on these strategies and plans, and in response to best available knowledge drawing on the results of environmental watering monitoring programs, the objectives for environmental watering in the Namoi River Valley are summarised in Table 1 below. The objectives for water-dependent ecosystems will continue to be revised as part of the CEWO's commitment to adaptive management.

Table 1: Summary of objectives being targeted by environmental watering in the Namoi River Valley

BASIN-WIDE OUTCOMES (Outcomes in red link to the Basin-wide Environmental Watering Strategy)	ENVIRONMENTAL OBJECTIVES FOR NAMOI RIVER VALLEY ASSETS		
	IN-CHANNEL ASSETS		OFF-CHANNEL ASSETS
	Lower Namoi River channel	Peel River channel	Lower Namoi anabranch & floodplain wetland system
VEGETATION	Maintain riparian and in-channel vegetation condition, growth and survival (extent) by providing in-channel freshes		Provide freshes to maintain the condition, growth and survival (extent) of native vegetation of the anabranch communities and wetland vegetation
WATERBIRDS	Provide drought refuge for waterbirds and support waterbird habitat		
FISH	Provide freshes to support reproduction and recruitment opportunities for native fish including silver perch, Murray cod and freshwater catfish Provide baseflows and freshes to support connectivity and movement, and maintain in-channel refuge and aquatic habitat for native fish, including silver perch, Murray cod and freshwater catfish		
MACROINVERTEBRATES	Support recruitment and maintain macroinvertebrate diversity		
OTHER VERTEBRATES	Support opportunities for the reproduction and recruitment of other native aquatic species, including frogs and turtles		
CONNECTIVITY	Support longitudinal connectivity, including with the Lower Namoi floodplain and Barwon-Darling system by providing baseflows and freshes	Support longitudinal connectivity along the river channel by providing baseflows and freshes	Support connectivity, particularly lateral between the river and floodplain, by contributing to freshes and bankfull flows
PROCESSES	Support key ecosystem functions within channel and on the floodplain, including the cycling of nutrients and wetting banks and benches		
WATER QUALITY	Maintain water quality within channels and pools		
RESILIENCE	Provide drought refuge habitat (particularly for fish)		

Information sourced from: MDBA (2012), MDBA (2014), Barma Water Resources et al. (2012), Department of the Environment (2014).

1.3. Environmental flow requirements

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 2 shows the broad environmental demands that are in scope for Commonwealth environmental water. 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. Further information on delivery constraints are described in [Attachment B](#).

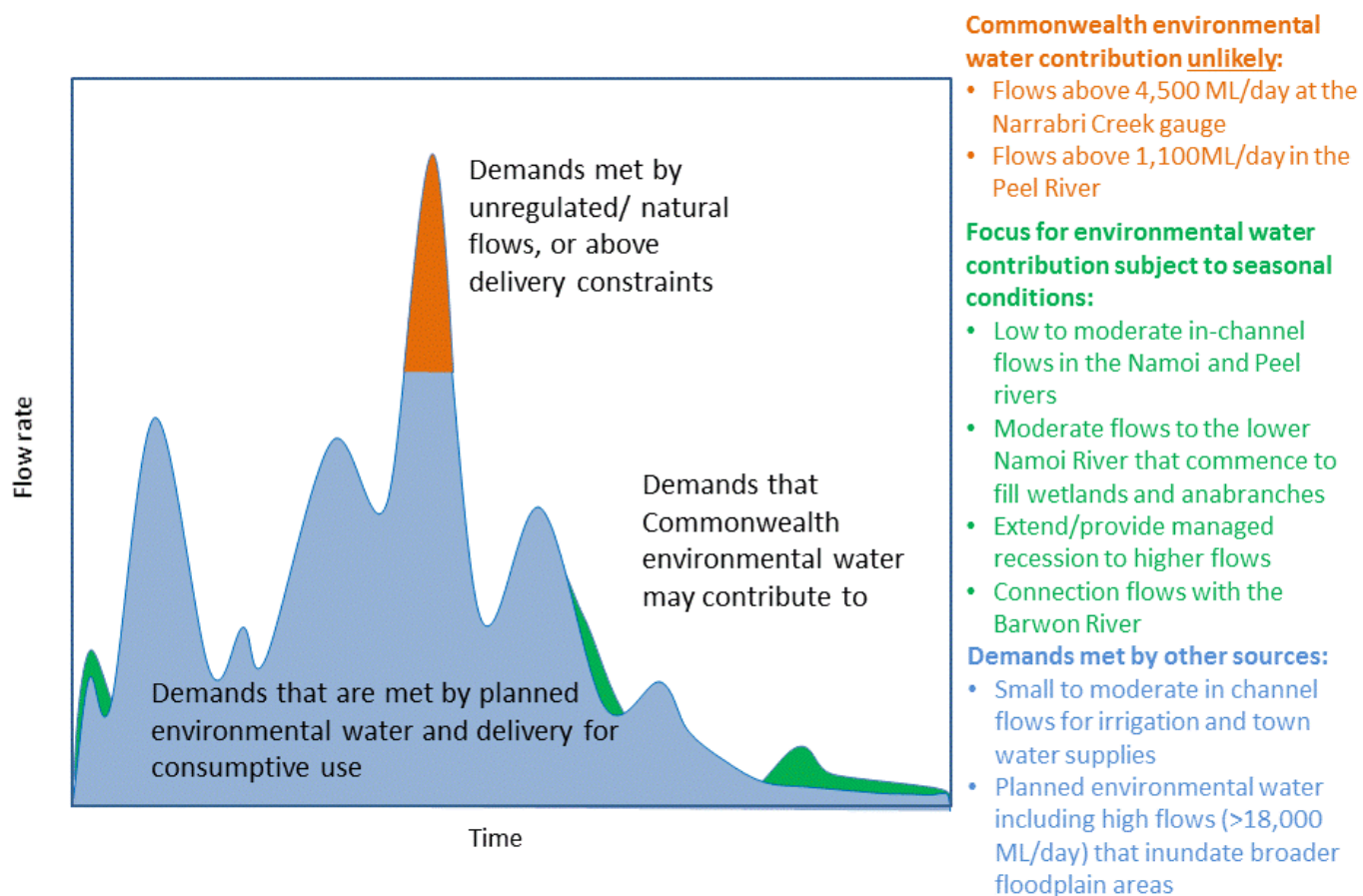


Figure 2: Scope of demands that Commonwealth environmental water may contribute to in the Namoi River Valley

Based on the above objectives and delivery constraints, specific watering requirements (flow magnitude, duration, timing and frequency) have been identified as being in scope for Commonwealth environmental water. These water requirements are described in Table 3. The priority for the use of Commonwealth environmental water is maintaining low flows in the catchment as these are required to maintain ecosystem health. As with the objectives, the environmental water requirements will continue to be reviewed and revised in response to new knowledge.

1.4. Monitoring and adaptive management

Operational monitoring is undertaken for Commonwealth environmental watering actions and involves collecting on-ground data with regard to environmental water delivery such as volumes delivered, impact on the river system's hydrograph, area of inundation and river levels. It can also include observations of environmental outcomes. Short-term intervention monitoring will be considered for Commonwealth environmental watering events in the Namoi River Valley in 2018–19. The outcomes from these monitoring activities are used to inform portfolio management planning and adaptive management decision-making as outlined in Section 2.

2. Portfolio management in 2018–19

In planning for the management of Commonwealth environmental water, the CEWO aims to maximise the outcomes achieved from the available water. This includes consideration of the urgency of demands (based on targeted objectives and watering requirements, watering history and asset condition) and the available supply under different resource scenarios. Plans for water delivery, trade and carryover are then made in a multi-year context, with an assessment also undertaken of need for water in future years.

This planning process is outlined in full in Table 3 below and summarised in the sections below.

2.1. Antecedent and current catchment conditions and the demand for environmental water in 2018–19

Dry conditions prevailed in the Namoi River Valley from 2013 to 2016 with below average rainfall and above average temperatures. The minimum flows required to maintain refuge pools did not occur for several years. This is likely to have contributed to the decline in condition of environmental assets (such as the native fish community) in the Namoi River Valley. Water availability improved in 2016 with increased rainfall, tributary, unregulated and consumptive flows starting the recovery of the environmental assets. Commonwealth environmental water releases in autumn 2017, along with flows from the Namoi River tributaries and the Peel River, supported further recovery of assets. These flows also contributed water to the Barwon River and may have provided opportunities for native fish to move between the Namoi and Barwon rivers. However, some environmental assets that experienced a greater decline in ecological condition during the dry years between 2013 and 2016 may take longer to recover.

Conditions began to dry again in 2017–18, with rainfall ranging from average to lowest on record, and maximum temperatures above average to very much above average between July 2017 and April 2018. With extremely dry conditions across the valley, well above average rainfall will be required to replenish soil moisture, create runoff and improve inflows. As conditions dry in the Namoi–Peel and volumes in storage fall, measures such as delivering water in block releases have been implemented to conserve water, and rules that provide for end-of-system flow requirements may not be implemented. This may increase periods of cease to flow and reduce the likelihood of environmental demands being met.

Commonwealth environmental water was delivered in autumn 2018 in the Namoi River following the delivery of irrigation flows to maintain baseflows to support native fish, particularly endangered silver perch. In the Peel, environmental water was delivered in autumn 2018 in conjunction with the Peel environmental contingency allowance, to improve instream productivity, and provide opportunities for native fish to move and access habitat.

Water dependent species will require further support in 2018–19 to ensure their survival, and the river system will need water to maintain and build resilience over the coming years, particularly should dry conditions continue.

Environmental water demands for environmental assets in the Namoi River Valley in 2018–19 are represented in Table 3 and summarised below:

Lower Namoi River channel: Moderate to high-critical demand, depending on the flow rate. The demand for small flows (minimum flows and baseflows) is high to critical because they are ideally required annually and were not met fully in 2017–18. Medium flows have a moderate demand for water, having last been met in 2016–17 and being required once every 2–3 years. The demand for large flows remains moderate after being met for the minimum duration in 2016–17.

Namoi and Barwon connection flows: The demand for small flows in the Namoi River to connect with the Barwon River has a moderate demand for water in 2018–19. These flows were last achieved in 2016–17 and are likely to be provided opportunistically.

Wetlands/anabranches: This demand remains moderate in 2018–19 (required approximately once in every 2–5 years) after wetter conditions provided the minimum duration requirements of flows for 7 days in 2016 (but not the ideal duration of 45 days).

Peel River channel: Low-moderate to high demand depending on the flow rate. There is a high demand for baseflows in the Peel River, because these flows are required annually. Pulsed baseflows (required annually) have either been partially met or not met in all years since 2012–13 excluding 2016–17 and 2017–18. The demand for freshes remains low to moderate, being required every 2–3 years and last being met in 2016–17.

Currently Commonwealth environmental water holdings in the Namoi River Valley are insufficient to meet all of the environmental water demands in the Valley.

Barwon-Darling

There is a growing awareness of the importance of connecting flows across the northern Basin, to support habitat, water quality, native fish and other aquatic species in the Barwon-Darling and its tributary systems, including the Namoi River. Depending on flow conditions in the Barwon and Namoi rivers and weir drown-outs, native fish can move between these catchments, supporting native fish populations. Subject to antecedent conditions, water availability, and urgency of environmental demands, opportunities to coordinate releases across multiple rivers in the northern Basin to meet broader environmental demands could be considered. The environmental demands in the Barwon-Darling are described in the *Commonwealth Environmental Water Portfolio Management Plan: Barwon-Darling 2018–19*.

Murray-Darling Basin Plan environmental watering priorities and the Murray-Darling Basin-wide environmental watering strategy

The Murray-Darling Basin Authority publish the *Basin annual environmental watering priorities* each year and in 2017–18 also published multi-year priorities. Commonwealth environmental water in the Namoi River Valley will contribute to the following multi-year environmental watering priorities and the 2018–19 Basin annual environmental watering priorities.

Rolling, multi-year priorities:

- Support lateral and longitudinal connectivity;
- Maintain and improve the condition and promote recruitment of forests and woodlands;
- Improve flow regimes and connectivity to maximise the ecological function of the Barwon-Darling river system for native fish;
- Support viable populations of threatened native fish, maximise opportunities for range expansion and establish new populations.

2018–19 Annual Priorities:

- Coordinate replenishment flows across multiple tributaries to maintain habitat condition and regulate water quality, carbon and nutrients in refuges along the Barwon-Darling watercourse;
- Improve flow regimes and connectivity to maximise the ecological function of the Barwon-Darling river system for native fish;
- Support viable populations of threatened native fish, maximise opportunities for range expansion and establish new populations.

In contributing to these demands, the Office will also be aiming to contribute to the expected outcomes in the Basin-wide environmental watering strategy (see [Attachment A](#)).

2.2. Water availability in 2018–19

Forecasts of Commonwealth water allocations

Allocations against Commonwealth water entitlements in the Namoi River Valley are determined by NSW and will vary depending on inflows. The following forecasts in Table 2 are based on the best available information including NSW forecasts and historical inflow scenarios.

Table 2: Forecasts of Commonwealth water allocations (including carryover) in 2018–19 in the Namoi River Valley as at 30 April 2018.

Entitlement type	Forecasts of Commonwealth water allocations (including carryover) in 2018–19 (GL)					
	Very dry ←————→ Very wet					
	95 percentile	90 percentile	75 percentile	50 percentile	25 percentile	10 percentile
Upper Namoi general security	0.1	0.1	0.1	0.1	0.1	0.1
Lower Namoi general security	6	6	7	9	13	18
Peel River general security	1.2	1.2	1.2	1.2	1.2	1.2
Total – Namoi	7.3	7.3	8.0	10.3	14.3	19.3

Notes:

1. Forecasts for regulated catchments are given to the nearest whole GL except where the entitlement held by the Commonwealth is below 1 GL.
2. Allocation rate scenarios are based on long term average allocation rates.
3. Figures include a carryover account balance of 6 GL

The volume of Commonwealth environmental water likely to be carried over in the Namoi River Valley for use in 2018–19 is estimated to be approximately 6 GL.

Information on allocations to Commonwealth environmental water holdings can be found at <http://www.environment.gov.au/water/cewo/portfolio-mgt/holdings-catchment> and is updated monthly.

Water resource availability scenarios

Commonwealth environmental water is managed with other water in the system and is not managed in isolation. When considering the available resources to meet environmental demands, it is necessary to also factor in the resources managed by other entities and available to contribute to environmental objectives. While there are currently no other sources of held environmental water in the Namoi River Valley, relevant water resources include planned environmental water (e.g. end of system flows and Peel environmental contingency allowance), unregulated flows, conveyance water and consumptive water. Further detail on the sources of water in the Namoi River Valley is provided in Attachment C.

By combining the forecasts of water held by the Commonwealth with streamflow forecasts, as well as taking into account operational considerations, water resource availability scenarios can be developed ranging from very low to very high. Based on available information, very low to moderate resource availability scenarios are in scope for 2018–19, with a high resource availability scenario being in scope if wetter conditions eventuate, noting that conditions can change suddenly.

2.3. Overall purpose of managing environmental water based on supply and demand

Environmental water needs (demand) and water availability (supply) both influence the overall purpose of Commonwealth environmental water management. Under different combinations, the management purpose can range from ‘avoiding damage’ to the environment to ‘improving’ ecological health. This in turn informs the mix of portfolio management options that are suitable for maximising outcomes.

Figure 3 shows how current demands and forecasted supply are considered together.

The overall ‘purpose’ for managing the Commonwealth’s water portfolio in the Namoi River Valley for 2018–19 is to avoid damage and where possible protect and maintain the health and resilience of aquatic ecosystems in the Lower Namoi River, wetlands and anabranches, and the Peel River, subject to water availability.

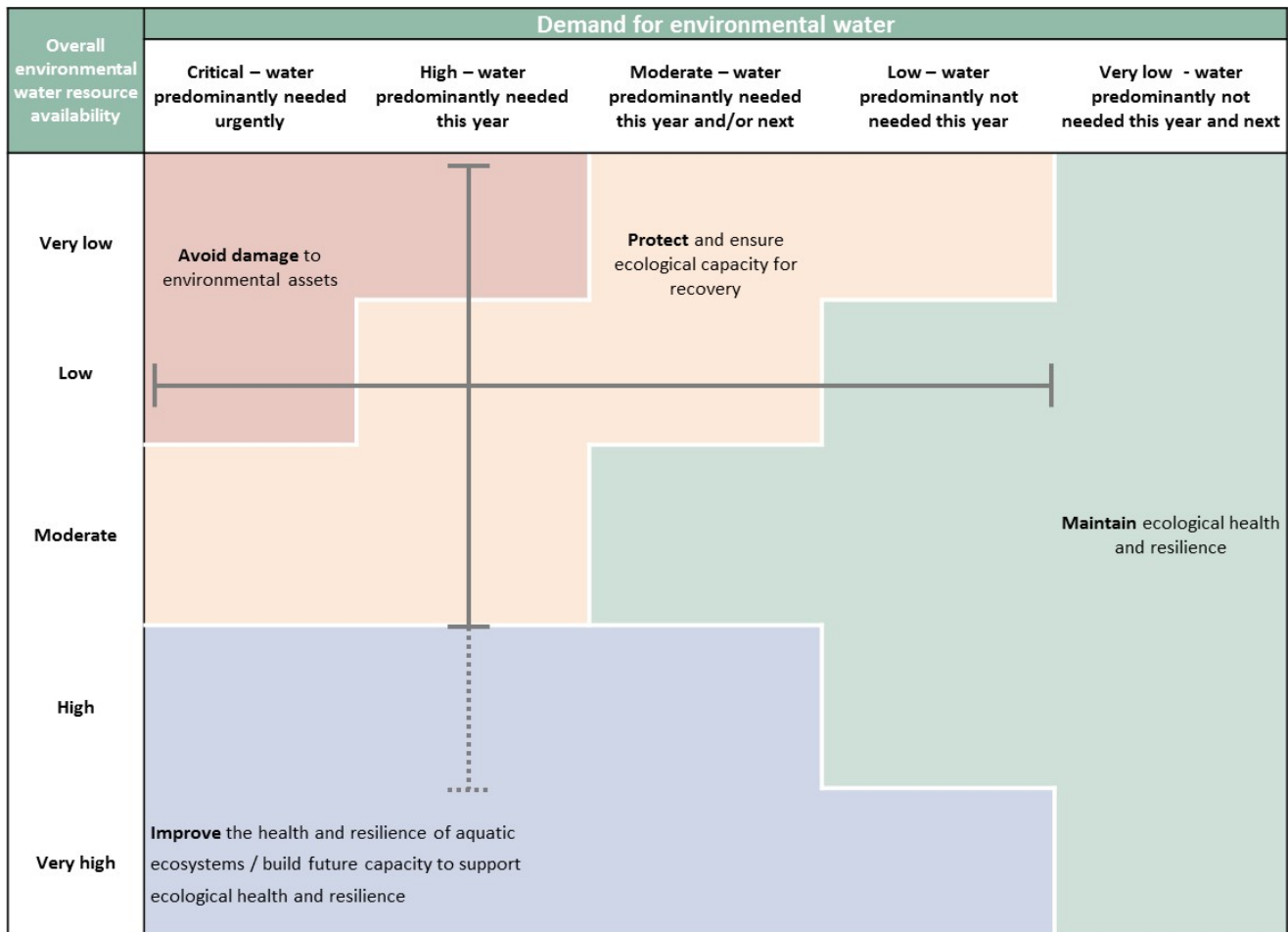


Figure 3: Determining a broad purpose for portfolio management in the Namoi River Valley for 2018–19. Note: grey lines represent potential range in demand and resource availability.

Further detail on how the overall purpose for portfolio management changes under different supply and demand scenarios is provided in *Portfolio Management Planning: Approach to planning for the use, carryover and trade of Commonwealth environmental water, 2018–19* (available at: <http://www.environment.gov.au/water/cewo/publications>).

2.4. Water Delivery in 2018–19

Consistent with the demands and purpose described above, the CEWO is considering supplying environmental water to the following watering actions for 2018–19 (see also Table 3 for supporting information regarding the basis for determining these watering intentions).

The priorities for the use of Commonwealth environmental water in the Namoi catchment are to improve connectivity, support aquatic ecology, maintain habitat and refresh pools in the lower Namoi.

Given the very low to moderate water resource availability scenarios in scope for 2018–19, options for the delivery of Commonwealth environmental water are:

- Lower Namoi River minimum flows and baseflows: In a very low to low resource availability scenario, supporting minimum flows would be a high priority, while providing baseflows outside the irrigation season would be a high priority under all scenarios. Providing minimum flows and baseflows would maintain refuge habitat, and increase connectivity between pools to support the survival of native fish including silver perch (Action 1 – Appendix 3).
- Lower Namoi River medium flows: Possible use under a moderate scenario depending on available environmental water and flows being delivered in conjunction with other water. Providing medium flows would provide longitudinal connectivity and access to habitat for native fish (Action 2 – Appendix 3).
- Namoi and Barwon connection flow: Possible use subject to a suitable trigger in the Barwon River and operational feasibility. Providing a small flow to connect the Namoi and Barwon rivers would provide

longitudinal connectivity, and opportunities for native fish dispersal, increased genetic diversity and recruitment (Action 5 – Appendix 3).

- Peel River baseflows: Under very low to moderate scenarios, delivering a range of baseflows in the Peel River would be a high priority. Providing minimum variable baseflows would provide refuges and habitat, maintain resilience and water quality, and provide connectivity. Providing baseflows for native fish would support native fish movement and dispersal, and pulsed baseflows would contribute to native fish condition, hydrological connectivity and in-stream productivity (Actions 7–9 – Appendix 3).

Stakeholder Feedback

Feedback on the environmental demands was sought from the NSW OEH and DPI – Fisheries. Feedback included suggested amendments to the environmental need for water for some assets, based on the watering history. There will be potential in the future to incorporate new information being developed by NSW DPI – Fisheries in relation to required flow rates, duration, timing and frequency of flows required for native fish. However, this was not available at the time of publication of this document. Stakeholder feedback on the 2017–18 environmental water delivery in the Peel provided information on stakeholder concerns and expectations. This feedback will inform future stakeholder consultation and environmental deliveries in the Namoi River Valley.

2.5. Trading water in 2018–19

No specific requirements for sale or purchase of water in the Namoi Valley have been identified, however, environmental water requirements will be reviewed periodically throughout the water year and this may identify a need to adjust the availability of water allocations through purchase. This will be subject to an assessment that a reasonable level of supply exists within the water market.

Planning on water trade considers supply and demand within the catchment and across the Basin. As part of the planning process, the CEWO undertakes a Basin-wide analysis to identify opportunities to use allocation trade to better match differing demands across catchments.

Further information will be provided to the market ahead of any trade of Commonwealth environmental water at: <http://www.environment.gov.au/water/cewo/trade/current-trading-actions>.

For more information on the rules and procedures governing the trade of Commonwealth environmental water, see the *Commonwealth environmental water Trading Framework* available at: <http://www.environment.gov.au/water/cewo/publications/water-trading-framework-nov2016>.

2.6. Carrying over water for use in 2019–20

Carryover provisions vary across the Namoi River Valley.

- In the Lower Namoi unused water may be carried over, but the account limit is set at 150 per cent of the entitlement volume.
- In the Upper Namoi up to 50 per cent of the entitlement volume can be carried over, but the account limit is 100 per cent of the entitlement volume.
- In the Peel Valley there is no provision for carryover.

The volume of water carried over for use in 2019–20 will depend upon resource availability and demand throughout the year. As the 2018–19 water year progresses, a carryover target will be determined for the Namoi catchment, sufficient to meet early season requirements. As documented in Table 3 below, potential demands in 2019–20 include:

- Lower Namoi River channel: Demand for water to provide baseflows, refresh pools and to maintain habitat, support native fish dispersal and resilience, and maintain connectivity within the river channel and with the Barwon River.
- Wetlands/anabranches: Demand for water to provide off channel habitat, and to support native fish and riparian vegetation in low commence to flow anabranches.
- Peel River channel: Demand for baseflows in the Peel River.

Carryover volumes will be adjusted throughout the year as the season unfolds in response to both current and future demands and the water available to meet these demands. These decisions will be based upon the best information available at the time.

More information on how the Commonwealth makes decisions on carryover is here:

<http://www.environment.gov.au/water/cewo/portfolio-mgt/carryover>

2.7. Identifying Investment Opportunities

Under the Water Act the Commonwealth Environmental Water Holder (CEWH) has the flexibility to use the proceeds from the sale of water allocations to fund environmental activities in the Basin. 'Environmental activities' should improve the capacity of the CEWH to meet the objectives of the Basin Plan environmental watering plan.

Environmental Activities must also be consistent with:

- the CEWH's obligation to exercise its functions to protect and restore environmental assets; and
- the requirement to use Special Account funds (including trade proceeds) to cover costs incurred in the performance of the CEWH's functions.

The CEWH is in the process of developing an Investment Framework to guide decisions on what types of environmental activities may be considered when investing the proceeds from the sale of environmental water allocations.

Table 3: Environmental demands, priority for watering in 2018–19 and outlook for coming year in the Namoi River Valley.

Environmental assets	Target values	Indicative demand (for <u>all sources of water</u> in the system)		Watering history	2018–19		Implications for future demands
		Flow/Volume	Required frequency (maximum dry interval)	(from all sources of water)	Environmental demands for water	Potential Commonwealth environmental water contribution?	Likely urgency of demand in 2019–20 if watering occurred as planned in 2018–19
Lower Namoi River channel ¹ <ul style="list-style-type: none"> Native fish habitat and spawning Instream aquatic ecosystems Riparian vegetation 	Drought refuge habitat Water quality Habitat maintenance Fish dispersal and resilience including conservation stocking of silver perch	Small flows (minimum flows and baseflows): <ul style="list-style-type: none"> 8 ML/day at Boggabri and 13 ML/day at Wee Waa 50–100 ML/day at Gunnedah to maintain minimum connectivity Gunnedah to Narrabri (Mar–May) 72 ML/day at Boggabri and 105 ML/day at Wee Waa (Dec–June) 215 ML/day at Boggabri and 260 ML/day at Wee Waa (July–Nov) 	1 in 1–2 years	Minimum flows were last met in 2016–17, but were not fully met in 2013–16 or in 2017–18. These flows are ideally required every year, so there is a need for water in 2018–19 to meet this demand in full and support recovery in the system. Therefore the demand has been assessed as high to critical.	High to Critical	A high priority for CEW to contribute to minimum flows, baseflows or break cease to flow conditions if required. Supporting minimum flows relevant under very low to low water availability scenarios, and baseflows under very low to very high scenarios.	High
	Longitudinal connectivity Low level bank and bar wetting Pool maintenance Fish movement, habitat access, spawning and recruitment	Medium flows: <ul style="list-style-type: none"> 500 ML/day at Bugilbone for 75 days (min. 25 consecutive days) preferably in late spring/summer and late winter 	1 in 2–3 years	Demand was last met in 2016–17, but was only partially met in 2012–13 and not met between 2013–14 and 2015–16, or in 2017–18. Given the required frequency and low number of recent years this demand has been met, water is required in the next year or next. Therefore the demand has been assessed as moderate.	Moderate	Possible use of CEW under moderate to high water resource availability scenarios, subject to water availability and being delivered in conjunction with other water.	Moderate to High
	Fish spawning, recruitment, dispersal and condition Increase ecosystem function Bench and bank wetting Access to habitat Nutrient cycling	Large flows: <ul style="list-style-type: none"> 1 800 ML/day at Bugilbone for 60 days (min. 6 consecutive days) preferably in late spring/summer and late winter 1 400–2 870 ML/day at Boggabri and 1 500–3 150 ML/day at Wee Waa in Sept–Dec for min. 7 days 	1 in 3–5 years	Demand was met in 2016–17, however, only the minimum duration requirements were met. Large flows were also met at Boggabri in December 2017 for 15 days (continuing into January), but targets were not met at Bugilbone or Wee Waa. As such, water is not required urgently in 2018–19, but may be required in the following year. Therefore the demand has been assessed as moderate.	Moderate	Possible use of CEW only if there is an increase in available water under high to very high water resource availability scenarios. May be delivered in conjunction with other flows if required.	Moderate
Namoi and Barwon rivers connection flow <ul style="list-style-type: none"> Native fish habitat and dispersal Connectivity between the Namoi and Barwon catchments Instream aquatic ecosystems 	Longitudinal connectivity Fish dispersal, genetic diversity and recruitment	Small flow of 100–150 ML/day at Wee Waa to provide connection between the Namoi and Barwon rivers. Ideally when Barwon River flows are over 4 000 ML/day at Dangar Bridge	Opportunistic watering (whenever flow trigger at Dangar Bridge is met)	Demand was last met in 2016–17. Although flows in the Namoi at Wee Waa exceeded the target flows on a number of occasions in 2017–18, there were insufficient flows in the Barwon River to meet the demand each time. Given the opportunistic nature of the demand, it has been assessed as needing water in 2018–19 and/or the following year. Therefore the demand has been assessed as moderate.	Moderate	Possible use of CEW under very low to very high water resource availability scenarios, subject to suitable conditions and operational feasibility.	Moderate
Wetlands / Anabranches ² <ul style="list-style-type: none"> Habitat and breeding ground for aquatic fauna Riparian vegetation Native fish movement and breeding 	Riparian vegetation in low commence to flow anabranche channels Fish movement and off-channel habitat Fish breeding and recruitment	Commence to fill wetlands preferably in late spring/summer and winter over 45 days (min. 7 consecutive days): <ul style="list-style-type: none"> 4 000–4 500 ML/day at Bugilbone Greater than 4 600 ML/day at Boggabri (for Barbers Lagoon) Greater than 3 300 ML/day at Duncan's Junction 	1 in 2–5 years (varies between native fish species)	Over the past six years, this demand was partially met in 2012–13, and met in 2016–17, but was not met in all other years during that timeframe. Only the minimum duration requirements were met in 2016–17, so this demand may require water in the next 1–2 years. Therefore the demand has been assessed as moderate.	Moderate	Possible use of CEW only if water availability increases under a high water resource availability scenario. Under a high/very high resource scenario natural flow conditions may meet this demand. If required, environmental water may be able to contribute to meeting this demand if delivered in conjunction with other flows	Moderate

Environmental assets	Target values	Indicative demand (for <u>all sources of water</u> in the system)		Watering history	2018–19		Implications for future demands
		Flow/Volume	Required frequency (maximum dry interval)	(from all sources of water)	Environmental demands for water	Potential Commonwealth environmental water contribution?	Likely urgency of demand in 2019–20 if watering occurred as planned in 2018–19
Peel River channel ³ <ul style="list-style-type: none"> Native fish habitat and spawning Instream aquatic ecosystems Riparian vegetation 	Maintain refuges Habitat Water quality Connectivity	Minimum variable baseflow greater than 3 ML/day) from Chaffey Dam	Annually	Minimum baseflows have been met since 2012–13, except in 2015–16. These flows are required annually, so the demand has been assessed as high for 2018–19.	High	High priority for CEW under very low to low scenarios. Would be met by other water in moderate to very high scenarios.	High
	Fish condition, movement and dispersal Connectivity	Baseflows up to 210 ML/day at Piallamore and 276 ML/day at Carroll Gap to provide depths 0.3–0.5 m for 10 days (for fish movement)	Annually	Baseflows for native fish movement have been met at Piallamore in each year since 2012–13. These flows are required annually, so the demand has been assessed as high for 2018–19.	High	High priority for CEW under very low to moderate scenarios. Would be met by other water in high/very high scenarios.	High
	Fish resilience, movement, spawning and recruitment Connectivity Wet low level-benches and point bars Flow variability	Pulsed baseflows up to 750 ML/day (min ~500 ML/day) for at least 2 days from Chaffey Dam	Annually	Pulsed baseflows were last met in 2016–17 and 2017–18, but were either only partially met or not met in all other years since 2012–13. These flows are required annually, so the demand has been assessed as high for 2018–19.	High	High priority for CEW in conjunction with other water under very low to moderate scenarios. Would be met by other water in high/very high scenarios.	High
	Connectivity Water quality Fish spawning, recruitment, movement and condition	Fresh flow (1 000–4 000 ML/day) to provide connectivity and wet medium-level benches, point bars and riparian zone	2–3 years average return interval	Demand last met in 2016–17. Requires water every 2–3 years, so doesn't require water urgently in 2018–19, but may require water in the following year. Therefore the demand has been assessed as low to moderate.	Low to Moderate	Commonwealth environmental water unlikely to contribute to this demand because of system constraints.	Low
Note: Contributions to meet Barwon-Darling environmental requirements may be considered subject to water availability, antecedent conditions, and environmental demands. Refer to <i>Commonwealth Environmental Water Portfolio Management Plan: Barwon-Darling 2018–19</i> . References <ol style="list-style-type: none"> Sourced from information provided by Green et al (2011), MDBA (2012), and previous environmental watering, with advice from NSW DPI Fisheries (Anthony Townsend, pers. comm.) Sourced from information provided by Green et al (2011), MDBA (2012) and Foster (1999), with advice from NSW DPI Fisheries (Anthony Townsend, pers. comm.) Sourced from Barma Water Resources et al. (2012), with advice from NSW DPI Fisheries (Anthony Townsend, pers. comm.) All watering history sourced from data from the following gauges (NSW Department of Industry, 2018): <ul style="list-style-type: none"> 419021: Namoi River at Bugilbone 419012: Namoi River at Boggabri 419059: Namoi River d/s Gunidgera Weir (Wee Waa) 419094: Namoi River d/s Duncan's Junction 419091: Upstream Walgett 422001: Dangar Bridge 419045: Peel River d/s Chaffey Dam 					Carryover potential	Available allocations to be carried into 2018–19 will be identified in the Namoi environmental water holdings at https://www.environment.gov.au/water/cewo/about/water-holdings There are no carryover provisions in the Peel.	A low proportion of available allocations in the Namoi expected to be carried into 2019–20, subject to Commonwealth Environmental Water Holdings at 30 June 2019, water resource availability and environmental watering actions undertaken in 2018-19. There are no carryover provisions in the Peel.
					Trade potential	There may be a need to adjust availability through a purchase of allocations. This will be subject to an assessment that a reasonable level of supply exists within the water market. Any decision to purchase is likely to take place once there is greater certainty of environmental water use during the spring period, from September 2018.	No expected urgency to augment available allocations. Potential to trade will depend on environmental demands and resource availability.

Key - potential watering in 2018–19

<div></div>	High priority for Commonwealth environmental watering (likely to receive water even under low water resource availability)
<div></div>	Secondary priority for Commonwealth environmental watering (watering to occur only if natural trigger is met, or under moderate – high water resource availability); or water demand likely to be met via other means
<div></div>	Low priority for Commonwealth environmental watering (under high – very high water resource availability)
<div></div>	Unable to provide Commonwealth water due to constraints

Key - environmental demands

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

3. Next steps

3.1. From planning to decision making

It is important to distinguish between planning and operational decision making. As shown in Figure 4, planning allows the CEWO 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, and constraints to water delivery and market conditions.

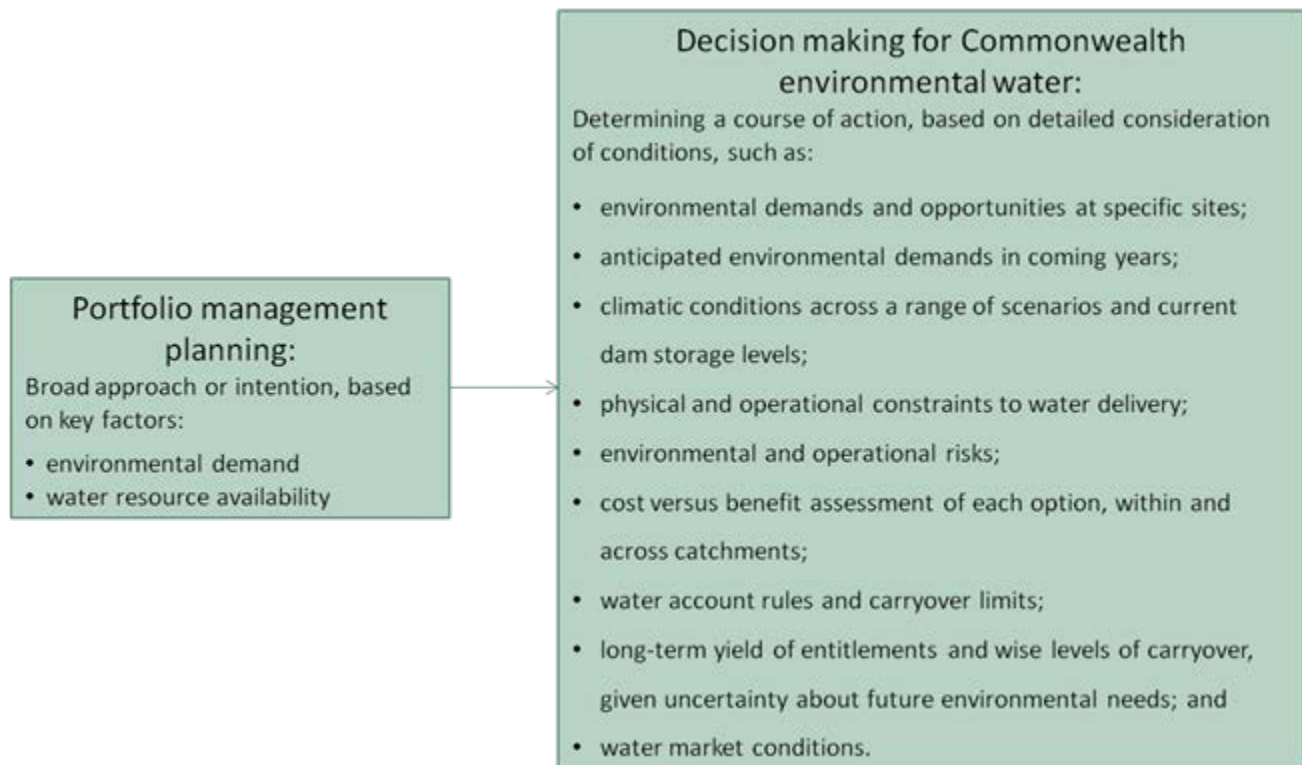


Figure 4: Planning and decision making for Commonwealth environmental water use

3.2. Further information

For further information on how the CEWO plans for water use, carryover and trade, please visit our web site: <http://www.environment.gov.au/water/cewo>

or the sites below:

- Water use: 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: <http://www.environment.gov.au/water/cewo/trade/trading-framework>

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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 Namoi River catchment 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 and bankfull flows.

VEGETATION

- Maintain the current extent of forest and woodland vegetation and non woody vegetation.
- No decline in the condition of black box, river red gum and coolibah.
- Improved recruitment of trees within black box and river red gum communities

Vegetation extent

Area of river red gum (ha)	Area of black box (ha)	Area of coolibah (ha)	Shrublands	Non-woody water dependent vegetation
6 100	800	4 200		Closely fringing or occurring within the Namoi River

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

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 fish species for the Namoi River Valley include:

Species	Specific outcomes	In-scope for C'th water in the Namoi River Valley?
Freshwater catfish (<i>Tandanus tandanus</i>)	Expand the core range of at least 3–5 existing populations (Candidate sites include Namoi and Peel River)	Yes
Golden perch (<i>Macquaria ambigua</i>)	A 10–15 per cent increase of mature fish (of legal take size) in key populations	Yes
Murray cod (<i>Maccullochella peelii</i>)	A 10–15 per cent increase of mature fish (of legal take size) in key populations	Yes
Olive perchlet (<i>Ambassis agassizii</i>)	Establish or improve the core range of 2–5 additional populations (Candidate sites include Namoi River)	Possibly (Once widespread. Current extent unknown in Namoi)
River blackfish (<i>Gadopsis marmoratus</i>)	Establish or improve the core range of 2–4 additional populations (candidate sites include Namoi River)	Yes
Silver perch (<i>Bidyanus bidyanus</i>)	Expand the core range of at least 2 existing populations (Candidate sites include Namoi River)	Yes (Current extent unknown in Namoi. Stocking of 50 000 fingerlings each year in 2016 and 2017 and around 3,000 in 2018. Anecdotal evidence of silver perch between Narrabri and Gunnedah, near Keepit Dam and in the Peel River)
Southern purple-spotted gudgeon (<i>Mogurnda adspersa</i>)	Establish or improve the core range of 2–5 additional populations – (priority catchments include Namoi)	Possibly (Once widespread. Current extent in Namoi unknown. Some stocking has occurred)

Important Basin environmental assets for native fish in the Namoi River Valley

Environmental asset	Key movement corridors	High Biodiversity	Site of other Significance	Key site of hydrodynamic diversity	Threatened species	Dry period / drought refuge	In-scope for C'th e-water
Lower Namoi River (Keepit Dam to Walgett)	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Peel River downstream of Chaffey Dam		Yes		Yes	Yes	Yes	Yes
Upper Namoi River upstream of Keepit Dam		Yes		Yes	Yes		Yes

Attachment B – Operational details for watering

Operational considerations in the Namoi River Valley

The delivery of environmental water in the Namoi River Valley is currently constrained by the release capacities from storages, channel capacities, and system constraints.

Watering actions will be developed in consideration of the following constraints:

- Keepit Dam storage capacity of 425 510 ML and outlet capacity of 4 000 ML/day (WaterNSW 2017)
- Chaffey Dam storage capacity of 102 868 ML and outlet capacity of 1 100 ML/day (WaterNSW 2016)
- Minor flood level of 39 900 ML/day at Narrabri
- Minor flood level of 13 400 ML/day at Bugilbone (downstream of Duncan's Junction)
- The need to notify the community if deliveries from Chaffey Dam will exceed 500 ML/day.
- The Lower Namoi entitlement has a maximum use in a single year of 125 per cent of entitlement (subject to the account balance) and 300 per cent of entitlement over three consecutive years.

In the Namoi River, Commonwealth environmental water could be coordinated with unregulated flow events to deliver freshes and appropriate flow recessions during wetter times.

During periods of low water availability in storage, river operators may implement drought management strategies such as delivering water in block releases. Rules and thresholds that provide some water to the environment by limiting supplementary access or providing end-of-system flows vary depending on volumes in storage or allocations in general security accounts. This may reduce water left instream and increase periods of cease to flow. In the instance of a low inflow scenario, Commonwealth environmental water may be used in conjunction with other flows to provide low flow variability and maintain water quality and drought refuge.

In the Peel River, Commonwealth environmental water deliveries could be coordinated with a NSW environmental contingency allowance flow or other flows to deliver a fresh flow. Under a low flow scenario, Commonwealth environmental water could provide low flow variability for baseflows delivered from Chaffey Dam or translucency flows in response to dam inflows. The Peel allocation cannot be carried over and unused water is forfeited.

Operational considerations such as delivery methods, opportunities, constraints and risks will differ depending on the inflow scenario and are summarised in Table 4 on the following page. 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.

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 ability to deliver environmental water. Table 4 identifies the range of potential watering actions in Namoi River Valley and the levels of water resource availability that relate to these actions.

Table 4: Summary of potential watering actions for the Namoi River Valley

Broad Asset	Indicative demand	Applicable level(s) of resource availability				
		Very Low	Low	Moderate	High	Very High
Lower Namoi River channel	Small flows (minimum flows and baseflows):	1. <i>Minimum flows</i> : contribute to minimum flows during dry periods to provide refuge habitat and maintain resilience.				
	<ul style="list-style-type: none"> 8 ML/day at Boggabri and 13 ML/day at Wee Waa 50–100 ML/day at Gunnedah (Mar–May) 72 ML/day at Boggabri and 105 ML/day at Wee Waa (Dec–June) 215 ML/day at Boggabri and 260 ML/day at Wee Waa (July–Nov) 					
	Medium flows:			2. <i>High and low season baseflows</i> : contribute to baseflows to refresh pools, manage water quality, and provide hydrological connectivity, allowing fish movement and building population resilience.		
	<ul style="list-style-type: none"> 500 ML/day at Bugilbone for 75 days (min. 25 consecutive days) preferably in late spring/summer and late winter 			3. <i>Providing hydrological connectivity</i> : contribute flows (freshes) to supplement river flows to inundate low level structures and provide longitudinal connectivity and access to habitat for native fish, which would also achieve movement, spawning and possible recruitment in some species.		

Broad Asset	Indicative demand	Applicable level(s) of resource availability				
		Very Low	Low	Moderate	High	Very High
	Large flows: <ul style="list-style-type: none">1 800 ML/day at Bugilbone for 60 days (min. 6 consecutive days) preferably in late spring/summer and late winter1 400–2 870 ML/day at Boggabri and 1 500–3 150 ML/day at Wee Waa in Sept–Dec for min. 7 days				4. <i>Managed flow recessions</i> : contribute flows (freshes) to extend the duration and recession of unregulated flows to provide instream habitat, support native fish (movement, spawning, recruitment and condition), and maintain ecosystem function and longitudinal connectivity.	
	Small flow of 100–150 ML/day at Wee Waa to provide connection between the Namoi and Barwon rivers. Ideally when Barwon River flows are over 4 000 ML/day at Dangar Bridge	5. <i>Connection between the Namoi and Barwon rivers</i> : provide a small flow at Wee Waa which will flow down the Namoi River to Walgett and connect the Namoi and Barwon rivers. This will provide longitudinal connectivity, fish dispersal, genetic diversity and recruitment.				
Wetlands / Anabranes	Commence to fill wetlands preferably in late spring/summer and late winter over 45 days (min. 7 consecutive days): <ul style="list-style-type: none">4 000–4 500 ML/day at BugilboneGreater than 4 600 ML/day at Boggabri (for Barbers Lagoon)				6. <i>Connectivity with anabranes</i> : contribute flows to supplement other flows to connect the river with low commence to flow anabranes. There is also a possibility to pump water into anabranes. This action is to provide off channel habitat, support riparian vegetation, and support fish movement, spawning, recruitment and condition.	

Broad Asset	Indicative demand	Applicable level(s) of resource availability				
		Very Low	Low	Moderate	High	Very High
	<ul style="list-style-type: none">Greater than 3 300 ML/day at Duncan's gauge					
Peel River channel	Minimum variable low baseflow (greater than 3 ML/day) from Chaffey Dam	7. <i>Minimum variable baseflows</i> : Contribute to a minimum variable baseflow, likely during or after a period of low flows, to provide refuges and habitat, maintain resilience, provide hydrological connectivity, and maintain water quality.				
	Baseflow up to 210 ML/day at Piallamore and 276 ML/day at Carroll Gap	8. <i>Baseflows for fish movement</i> : Contribute to a small baseflow to provide suitable water depths for 10 days to support native fish movement.				
	Pulsed baseflow (up to 750 ML/day) from Chaffey Dam	9. <i>Pulsed baseflows</i> : Contribute to a pulsed baseflow to contribute to native fish resilience, connectivity, and in-stream productivity.				
	Fresh flow (1 000–4 000 ML/day)				10. <i>In-channel freshes</i> : Contribute to freshes in conjunction with other flows to provide habitat, support ecological processes, maintain riparian vegetation, and support fish movement, spawning, recruitment and condition	

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

Potential watering actions – standard operating arrangements

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 ability to deliver environmental water. Table 4 identifies the range of potential watering actions in Namoi River Valley and the levels of water resource availability that relate to these actions.

Table 4 identifies the range of potential watering actions in the Namoi River Valley in the Murray-Darling Basin that give effect to the long-term demands and flow regime identified as being in scope for the contribution of Commonwealth environmental water in any given year. The standard considerations associated with these actions are set out below.

Watering Action 1: Lower Namoi River minimum flows

Watering action: Contribute to minimum flows (including low flow variability) in the Lower Namoi River during dry periods to provide refuge habitat and maintain resilience. This action would contribute to maintaining flows and preventing a no flow situation.

Standard operational considerations:

- Environmental water could be delivered from Keepit Dam, or Gunidgera weir, as in-channel flows, and managed within standard water delivery arrangements.
- The flow limit for this action is 4 500 ML/day at Narrabri Creek (noting that the minor flood level at Bugilbone is 13 400 ML/day).
- The delivery rate will depend on antecedent conditions and available water, and may be delivered by supplementing other water sources.
- Water orders will be developed in conjunction with WaterNSW to ensure operational feasibility and the achievement of environmental objectives.

Typical extent: This action could contribute flows to the Lower Namoi River downstream of Keepit Dam to Walgett. The actual extent achieved will depend on antecedent conditions and available water. Consideration could also be given to delivering low baseflows in the Manilla River downstream of Split Rock Dam to maintain critical refuge during extreme dry conditions (using General Security entitlements held in the Upper Namoi River).

Approvals: Consult with NSW agencies (WaterNSW, NSW OEH and DPI – Fisheries) before implementing this action. Approval would need to be sought to link Commonwealth entitlements to a Works Approval for Split Rock Dam if delivery of water to the Manilla River was to proceed.

Watering Action 2: Lower Namoi River baseflows

Watering action: Contribute to baseflows in the Lower Namoi River to refresh pools, manage water quality, provide hydrological connectivity, allowing fish movement and building population resilience.

Standard operational considerations:

- Environmental water could be delivered from Keepit Dam, or Gunidgera weir, as in-channel flows, or sourced from tributary flows as appropriate, and managed within standard water delivery arrangements.
- The flow limit for this action is generally 4 500 ML/day at Narrabri Creek (noting that the minor flood level at Bugilbone is 13 400 ML/day).

- The delivery rate will depend on antecedent conditions and available water, and may be delivered by supplementing other water sources.
- Water orders will be developed in conjunction with WaterNSW to ensure operational feasibility and the achievement of environmental objectives.

Typical extent: This action could contribute flows to the Lower Namoi River downstream of Keepit Dam to Walgett. The actual extent achieved will depend on antecedent conditions and water availability.

Approvals: Consult with NSW agencies (WaterNSW, NSW OEH and DPI – Fisheries) before implementing this action.

Watering Action 3: Providing hydrological connectivity

Watering action: Contribute flows (freshes) to supplement river flows to inundate low level river structures and provide longitudinal connectivity and access to habitat for native fish, which would also achieve movement, spawning and possible recruitment in some species.

The timing and duration of this action is important for achieving outcomes for target native fish species.

Standard operational considerations:

- Environmental water could be delivered from Keepit Dam, or Gunidgera weir, as in-channel flows, or sourced from tributary flows as appropriate, and managed within standard water delivery arrangements.
- The flow limit for this action is generally 4 500 ML/day at Narrabri Creek (noting that the minor flood level at Bugilbone is 13 400 ML/day).
- This action could be delivered by supplementing other river flows, with preference given to supplementing natural flows rather than regulated releases.
- Water orders will be developed in conjunction with WaterNSW to ensure operational feasibility and the achievement of environmental objectives.

Typical extent: This action could contribute flows to the Lower Namoi River downstream of Keepit Dam to Walgett, with the potential to increase connection with the Barwon River.

Approvals: Consult with NSW agencies (WaterNSW, NSW OEH, DOI – Water and DPI – Fisheries) before implementing this action.

Watering Action 4: Managed flow recessions in the Lower Namoi River

Watering action: Contribute flows (freshes) to extend the duration and recession of unregulated flows or water deliveries to provide instream habitat, support native fish (movement, spawning, recruitment and condition), and maintain ecosystem function and longitudinal connectivity.

The timing and duration of this action is important for achieving outcomes for target native fish species.

Standard operational considerations:

- Environmental water could be delivered from Keepit Dam, or Gunidgera weir, as in-channel flows, or sourced from tributary flows as appropriate, and managed within standard water delivery arrangements.
- The flow limit for this action is generally 4 500 ML/day at Narrabri Creek (noting that the minor flood level at Bugilbone is 13 400 ML/day).

- This action would be delivered by supplementing other river flows, with preference given to supplementing natural flows rather than regulated releases. Consideration may be given to augmenting regulated releases to increase peak flows, or to provide a secondary flow peak, and to provide a more natural recession.
- Water orders will be developed in conjunction with WaterNSW to ensure operational feasibility and the achievement of environmental objectives.

Typical extent: This action could contribute flows to the Lower Namoi River downstream of Keepit Dam possibly all the way to Walgett depending on volume of flows.

Approvals: Consult with NSW agencies (WaterNSW, NSW OEH and DPI – Fisheries) before implementing this action.

Watering Action 5: Connection between the Namoi and Barwon rivers

Watering action: Contribute flows to connect the Namoi River with the Barwon River. This would provide longitudinal connectivity, fish dispersal, genetic diversity and recruitment.

Standard operational considerations:

- Environmental water could be delivered from Keepit Dam, or Gunidgera weir, as in-channel flows or sourced from tributary flows as appropriate.
- This action is to provide a small flow of 100–150 ML/day at Wee Waa which will flow down the Namoi River to Walgett and connect the Namoi and Barwon rivers. This action is dependent on the Barwon River flowing high enough to back up from Walgett weir (11A) and drownout the Walgett town weir on the Namoi River.
- Flow pulses in the Barwon River predicted to be greater than 4 000 ML/day at Dangar Bridge and flows in the Namoi predicted to be below 200 ML/day at Wee Waa.
- Catchment conditions and water availability.
- Operational feasibility including the lag time from the release of the environmental water to when the water reaches the Barwon River will need to be accounted for so the water arrives in sufficient time to connect with the Barwon River flows.
- Water orders will be developed in conjunction with WaterNSW to ensure operational feasibility and the achievement of environmental objectives.

Typical extent: This watering action would contribute flows to connect the Namoi and Barwon rivers. Providing connection flow is important for native fish outcomes.

Approvals: Consult with NSW agencies (WaterNSW, NSW OEH and DPI – Fisheries) before implementing this action.

Watering Action 6: Connectivity with wetlands/anabranches in the Lower Namoi

Watering action: Contribute flows to supplement natural unregulated freshes or other water to connect the Namoi River with low commence to flow anabranches, provide off channel habitat, support riparian vegetation, and support fish movement, spawning, recruitment and condition.

Standard operational considerations:

- Environmental water could be delivered from Keepit Dam, or Gunidgera weir, as in-channel flows or sourced from tributary flows as appropriate. There is a possibility of providing water via pumps or instream as part of standard water delivery arrangements.

- This action will be delivered in conjunction with a natural unregulated flow event (likely in the order of 2 000–4 000 ML/day).
- Environmental water may be used to slow and extend the flow recession following an unregulated flow event of an appropriate size to maintain inundation in anabranch habitats.
- Environmental water delivery may also be considered to add to an unregulated event to deliver a secondary flow peak that allows reconnection of anabranch habitat for native fish outcomes.
- Water orders will be developed in conjunction with WaterNSW to ensure operational feasibility and the achievement of environmental objectives.

Typical extent: This watering action would contribute flows to low commence to flow anabranch channels in the Lower Namoi River system. Providing a reconnection flow is important for native fish outcomes.

Approvals: Consult with NSW agencies (WaterNSW, NSW OEH and DPI – Fisheries), Local Land Services, and relevant landholders before implementing this action.

Watering Action 7: Minimum variable baseflows in the Peel River

Watering action: Contribute to a minimum variable baseflow in the Peel River, likely during or after a period of low flows. This will provide habitat, maintain resilience, provide hydrological connectivity, and maintain water quality.

Standard operational considerations:

- Water could be delivered to the Peel River from Chaffey Dam as in-channel flows, and managed within standard water delivery arrangements.
- Water orders will be developed in conjunction with WaterNSW to ensure operational feasibility and the achievement of environmental objectives.
- The actual flow rate will be determined based on antecedent conditions and flows through the season.

Typical extent: This action will contribute flows to the Peel River between Chaffey Dam and the Namoi River.

Approvals: Consult with NSW agencies (WaterNSW, NSW OEH and DPI – Fisheries) before implementing this action.

Watering Action 8: Baseflows for fish movement in the Peel River

Watering action: Contribute to a small baseflow to provide suitable water depths for 10 days to support native fish movement.

Standard operational considerations:

- Water could be delivered to the Peel River from Chaffey Dam as in-channel flows, and managed within standard water delivery arrangements.
- Water could be delivered in conjunction with other water, including the environmental contingency allowance.
- Water orders will be developed in conjunction with WaterNSW to ensure operational feasibility and the achievement of environmental objectives.
- Flows will be delivered to achieve a depth of 0.3–0.5 m (ideal minimum of 10 days).

- The actual flow rate will be determined based on antecedent conditions and flows through the season.

Typical extent: This action will contribute flows to the Peel River between Chaffey Dam and the Namoi River.

Approvals: Consult with NSW agencies (WaterNSW, NSW OEH and DPI – Fisheries) before implementing this action.

Watering Action 9: Pulsed baseflows in the Peel River

Watering action: Contribute to a pulsed baseflow to contribute to native fish resilience, connectivity and in-stream productivity.

Standard operational considerations:

- Water could be delivered to the Peel River from Chaffey Dam as in-channel flows, and managed within standard water delivery arrangements.
- Water could be delivered in conjunction with other water, including the environmental contingency allowance.
- Water orders will be developed in conjunction with WaterNSW to ensure operational feasibility and the achievement of environmental objectives.
- Flows of 500–1 000 ML/day may be targeted, with a minimum flow of 500 ML/day being preferable. However, the actual flow rate will be determined based on antecedent conditions and flows through the season.

Typical extent: This action will contribute flows to the Peel River between Chaffey Dam and the Namoi River.

Approvals: Consult with NSW agencies (WaterNSW, NSW OEH and DPI – Fisheries), Local Land Services, peak irrigation bodies and landholders before implementing this action. WaterNSW to provide notification for flows over 500 ML/day.

Watering Action 10: In-channel freshes in the Peel River

Watering action: Contribute to freshes in the Peel River, in conjunction with other flows to provide habitat, support ecological processes, maintain riparian vegetation, and support fish movement, spawning, recruitment and condition.

Standard operational considerations:

- Chaffey Dam outlet capacity (1 100 ML/day) and potential inundation impacts constrain ability to achieve target flow rates over 1 000 ML/day.
- Water could be delivered in conjunction with other in-stream freshes or water sources, such as tributary flows or the environmental contingency allowance.
- Water orders will be developed in conjunction with WaterNSW to ensure operational feasibility and the achievement of environmental objectives.
- The actual flow rate will be determined based on antecedent conditions and flows through the season.

Typical extent: This action will contribute flows to the Peel River between Chaffey Dam and the Namoi River.

Approvals: Consult with NSW agencies (WaterNSW, NSW OEH and DPI – Fisheries), Local Land Services, peak irrigation bodies and landholders before implementing this action. WaterNSW to provide notification for flows over 500 ML/day.

Attachment C – Long-term water availability

Commonwealth environmental water holdings

The Commonwealth holds the following entitlements in the Namoi River Valley:

- General Security – Upper Namoi
- General Security – Lower Namoi
- General Security – Peel

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 and is updated monthly.

Other sources of environmental water

There are currently no other sources of held environmental water in the Namoi River Valley.

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 plans (referred to as ‘planned environmental water’).

The Water Sharing Plan for the Upper Namoi and Lower Namoi Regulated Water Sources (NSW Government 2016) provides for planned environmental water and stock and domestic (replenishment flows) releases. Water deliveries to meet irrigation orders may provide baseflows in some sections of the Namoi River. Planned environmental water includes limiting the long-term average extraction levels to a percentage of average flow, limiting supplementary access to a percentage of flow at certain times of the year and providing minimum end of system flows. Thresholds in the Water Sharing Plan that provide for supplementary access change depending on volume water allocations in General Security accounts. When storages fall below certain levels, rules that provide for end-of-system flow requirements do not need to be implemented. This may result in less planned environmental water during dry times. Supplementing other water releases with Commonwealth environmental water may increase the potential for environmental objectives to be achieved and assist with delivery efficiency.

The Peel Water Sharing Plan (Water Sharing Plan for the Peel Valley Regulated, Unregulated, Alluvium and Fractured Rock Water Sources, NSW Government 2010) includes a 5 000 ML environmental contingency allowance. The CEWO has been working with the NSW Government to coordinate environmental water releases in the Peel River.



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