Gwydir Long Term Water Plan
Part B: Gwydir planning units
Draft for exhibition

Cover photo: Glossy ibis in the Gwydir Wetlands, Daryl Albertson

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Acknowledgement of Traditional Owners

The Office of Environment and Heritage pays its respect to the Traditional Owners and their Nations of the Murray-Darling Basin. The contributions of earlier generations, including the Elders, who have fought for their rights in natural resource management are valued and respected.

In relation to the Gwydir catchment, the Office of Environment and Heritage pays its respects to the Traditional Owners – the Gomeroi Nation – past, present and future. We look forward to building upon existing relationships to improve the health of our rivers and wetlands including in recognition of their traditional and ongoing cultural and spiritual significance.

Abbreviations

AHIMS	Aboriginal Heritage Information Management System
ASL	Above Sea Level
Basin Plan	Murray-Darling Basin Plan 2012
BCT	Biodiversity Conservation Trust
BF	Baseflow
BK	Bankfull
BWS	Basin-wide environmental watering strategy
CAG	Customer Advisory Group
CAMBA	China-Australia Migratory Bird Agreement
CEWO	Commonwealth Environmental Water Office
CF	Cease-to-flow
DBH	Diameter at breast height
DO	Dissolved oxygen
DOC	Dissolved organic carbon
DOI–W	NSW Department of Industry – Lands and Water
DPIF	NSW Department of Primary Industries Fisheries
EEC	Endangered ecological community
EWA	Environmental water allowance
EWAG	Environmental Water Advisory Group
EWR	Environmental water requirement
FFDI	Forest Fire Danger Index
GCM	Global Climate Model
GDE	Groundwater dependent ecosystem
GL/yr	gigalitres per year
ha	hectares
HEW	Held environmental water
JAMBA	Japan-Australia Migratory Bird Agreement
LF	Large fresh
LLS	Local Land Services (NSW)
LTWP	Long Term Water Plan
m/s	metres per second
MDBA	Murray-Darling Basin Authority
MER	Monitoring, evaluation and reporting
mg/L	milligrams per litre
ML	megalitre
NPWS	NSW National Parks and Wildlife Services
NRAR	Natural Resources Access Regulator

NSW	New South Wales
OB	Overbank
OEH	Office of Environment and Heritage
PCT	Plant community type
PEW	Planned environmental water
PU	Planning unit
RAS	Resource availability scenario
RCM	Regional Climate Model
ROKAMBA	Republic of Korea-Australia Migratory Bird Agreement
RRG	River red gum
SDL	Sustainable diversion limit
SF	Small fresh
VF	Very low flow
WL	Wetland inundating flow
WQA	Water quality allowance
WQMP	Water quality management plan
WRP	Water resource plan
WRPA	Water resource plan area
WSP	Water sharing plan

Glossary

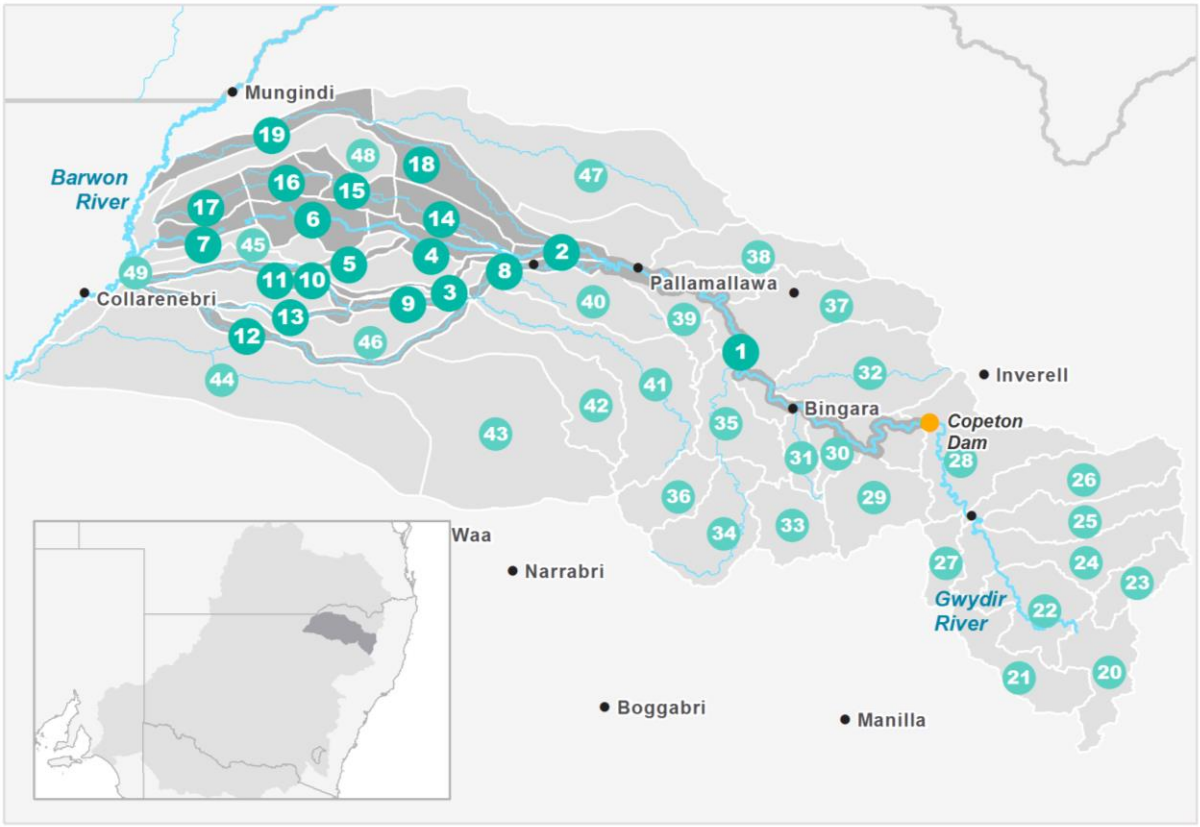
Actively managed wetland / floodplain	The area of floodplains and wetlands that can be inundated by managed environmental water deliveries alone or in combination with other flows from regulated river systems (see 'Regulated river').
Adaptive management	A procedure for implementing management while learning about which management actions are most effective at achieving specified objectives.
Allocation	The volume of water made available to water access licence or environmental water accounts in a given year by DOI–W, which is determined within the context of demand, inflows, rainfall forecasts and stored water.
Allochthonous	Organic material (leaf litter, understory plants, trees) derived from outside rivers, including riparian zones, floodplains and wetlands.
Alluvial	Comprised of material deposited by water.
Autochthonous	Organic material derived from photosynthetic organisms (algal and macrophyte growth) within rivers.
Bankfull flow (BK)	River flows at maximum channel capacity with little overflow to adjacent floodplains. These flows engage the riparian zone, anabranches, flood runners and wetlands located within the meander train. They inundate all in-channel habitats including benches, snags and backwaters.
Baseflow (BF)	Reliable background flow levels within a river channel that are generally maintained by seepage from groundwater storage, but also by surface inflows. They typically inundate geomorphic units such as pools and riffle areas.
Basin Plan	The Basin Plan as developed by the Murray-Darling Basin Authority under the *Water Act 2007*.
Biota	The organisms that occupy a geographic region.
Blackwater	Occurs when water moves across the floodplain and releases organic carbon from the soil and leaf litter. The water takes on a tea colour as tannins and other carbon compounds are released from the decaying leaf litter. The movement of blackwater plays an important role in transferring essential nutrients from wetlands into rivers and vice versa. Blackwater carries carbon which is the basic building block of the aquatic food web and an essential part of a healthy river system.
Carryover	Water allocated to water licences or environmental water accounts that remains un-used in storage at the end of the water year which, under some circumstances, may be held over and used in the following water year.
Catch per unit effort (CPUE)	An indirect measure of the abundance of a target species.
Cease-to-flow (CF)	The absence of flowing water in a river channel that leads to partial or total drying of the river channel. Streams contract to a series of isolated pools.

Cease-to-pump (access rule in WSP)	Pumping is not permitted: • from in-channel pools when the water level is lower than its full capacity • from natural off-river pools when the water level is lower than its full capacity • from pump sites when there is no visible flow. These rules apply unless there is a commence to pump access rule that specifies a higher flow rate that licence holders can begin pumping.
Cold water pollution	The artificial lowering of water temperature that occurs downstream of dams, particularly during warmer months when stratification is more likely to occur. The impact of cold water pollution can extend for hundreds of kilometres along the river from the point of release.
Constraints	The physical or operational constraints that affect the delivery of water from storages to extraction or diversion points. Constraints may include structures such as bridges that can be affected by higher flows, the volume of water that can be carried through the river channel, or scheduling of downstream water deliveries from storage.
Consumptive water	Water that is removed from available supplies without return to a water resource system (such as water removed from a river for agriculture).
Cultural water dependent asset	A place that has social, spiritual and cultural value based on its cultural significance to Aboriginal people. Related to the water resource.
Cultural water dependent value	An object, plant, animal, spiritual connection or use that is dependent on water and has value based on its cultural significance to Aboriginal people.
Discharge	The amount of water moving through a river system, most commonly expressed in megalitres per day (ML/d).
Dissolved Organic Carbon (DOC)	A measurement of the amount of carbon from organic matter that is soluble in water. DOC is transported by water from floodplains to river systems and is a basic building block available to bacteria and algae that are food for microscopic animals that are in turn consumed by fish larvae, small bodied fish species, yabbies and shrimp. DOC is essential for building the primary food webs in rivers and ultimately generates a food source for large bodied fish like Murray cod and golden perch and predators such as waterbirds.
Environmental asset	The physical features that make up an ecosystem and meet one or more of the assessment indicators for any of the five criteria specified in Schedule 8 of the Basin Plan.
Ecosystem function	The resources and services that sustain human, plant and animal communities and are provided by the processes and interactions occurring within and between ecosystems. Identified ecosystem functions must also meet one or more of the assessment indicators for any of the four criteria specified in Schedule 9 of the Basin Plan.
Ecological objective	Objective for the protection and/or restoration of an environmental asset or ecosystem function. Objectives are set for all priority environmental assets and priority ecosystem functions, and have regard to the outcomes described in the Basin-wide environmental watering strategy.
Ecological target	Level of measured performance that must be met to achieve the defined objective. The targets in this Long Term Water Plan are SMART (Specific/Measurable/Achievable/Realistic/Time-bound) and can demonstrate progress towards the objectives and the outcomes described in the Basin-wide environmental watering strategy.

Ecological value	An object, plant or animal which has value based on its ecological significance.
Ecosystem	A biological community of interacting organisms and their physical environment. It includes all the living things in that community, interacting with their non-living environment (weather, earth, sun, soil, climate and atmosphere) and with each other.
Environmental Contingency Allowance (ECA)	Held water entitlements, in addition to planned environmental water, up to 45,000 ML held in Copeton Dam to be used for environmental purposes.
Environmental water	Water for the environment. It serves a multitude of benefits to not only the environment, but communities, industry and society. It includes water held in reservoirs (held environmental water) or protected from extraction from waterways (planned environmental water) for the purpose of meeting the water requirements of water dependent ecosystems.
Environmental water requirement (EWR)	The water required to support the completion of all elements of a lifecycle of an organism or group of organisms (taxonomic or spatial), consistent with the objective/target, measured at the most appropriate gauge. It includes all water in the system including natural inflows, held environmental water and planned environmental water.
Flow component	The type of flow in a river defined by its magnitude (e.g. bankfull).
Flow regime	The pattern of flows in a waterway over time that will influence the response and persistence of plants, animals and their ecosystems.
Freshes	Temporary in-channel increased flow in response to rainfall or release from water storages.
Groundwater	Water that is located below the earth's surface in soil pore spaces and in the fractures of rock formations. Groundwater is recharged from, and eventually flows to, the surface naturally.
Held environmental water	Water available under a water access right, a water delivery right, or an irrigation right for the purposes of achieving environmental outcomes (including water that is specified in a water access right to be for environmental use).
Hydrograph	A graph showing the rate of flow and/or water level over time past a specific point in a river. The rate of flow is typically expressed in megalitres per day (ML/d).
Hydrological connectivity	The link of natural aquatic environments.
Hydrology	The occurrence, distribution and movement of water.
Hypoxic Blackwater	Occurs when dissolved oxygen (DO) levels fall below the level needed to sustain native fish and other water dependent species. Bacteria that feed on dissolved organic carbon use oxygen in the water. When they multiply rapidly their rate of oxygen consumption can exceed the rate at which oxygen can be dissolved in the water. As a result, oxygen levels fall and a hypoxic (low oxygen) condition occurs. Dissolved oxygen is measured in milligrams per litre (mg/L). Generally native fish begin to stress when DO levels fall below 4 mg/L. Fish mortality occurs when DO levels are less than 2 mg/L.
Large fresh (LF)	High-magnitude flow pulse that remains in-channel. These flows may engage flood runners with the main channel and inundate low-lying wetlands. They connect most in-channel habitats and provide partial longitudinal connectivity, as some low-level weirs and other in-channel barriers may be drowned out.

Lateral connectivity	The flow linking rivers channels and the floodplain.
Longitudinal connectivity	The consistent downstream flow along the length of a river.
Long Term Water Plan (LTWP)	A component of the Murray–Darling Basin Plan. Long Term Water Plans give effect to the Basin-wide environmental watering strategy (MDBA 2014) relevant for each river system and will guide the management of water over the longer term. These plans will identify the environmental assets that are dependent on water for their persistence, and match that need to the water available to be managed for or delivered to them. The plan will set objectives, targets and watering requirements for key plants, waterbirds, fish and ecosystem functions. OEH is responsible for the development of nine plans for river catchments across NSW, with objectives for five, 10 and 20-year timeframes.
Montane	Relating to mountainous country.
Overbank flow (OB)	Flows that spill over the riverbank or extend to floodplain surface flows.
Planned environmental water	Water that is committed by the Basin Plan, a water resource plan or a plan made under state water management law to achieving environmental outcomes.
Planning Unit	A division of a water resource plan area based on water requirements (in catchment areas in which water is actively managed), or a sub-catchment boundary (all other areas).
Population structure	A healthy population structure has individuals in a range of age and size classes. These populations demonstrate regular recruitment and good numbers of sexually mature individuals.
Priority environmental asset	A place of particular ecological significance that is water dependent, meets one or more of the assessment indicators for any of the 5 criteria specified in Schedule 8 in the Basin Plan, and can be managed with environmental water. This includes planned and held environmental water.
Priority ecosystem function	Ecosystem functions that meets one or more of the assessment indicators for any of the four criteria specified in Schedule 9 of the Basin Plan and can be managed with environmental water.
Ramsar Convention	An international treaty to maintain the ecological character of key wetlands.
Recruitment	Successful development and growth of offspring; such that they can contribute to the next generation.
Refugium	An area in which a population of plants or animals can survive through a period of decreased water availability.
Registered cultural asset	A cultural water-dependent asset that is registered in the Aboriginal Heritage Information Management System (AHIMS).
Regulated river	A river that is gazetted under the *NSW Water Management Act 2000.* Flow is largely controlled by major dams, water storages and weirs. River regulation brings more reliability to water supplies but has interrupted the natural flow characteristics and regimes required by native fish and other plant and animal to breed, feed and grow.
Riffle	A rocky or shallow part of a river where river flow is rapid and broken.
Riparian	The part of the landscape adjoining rivers and streams that has a direct influence on the water and aquatic ecosystems within them.
Risk management strategy	A plan of management to overcome risks to achieving environmental outcomes.

Small fresh (SF)	Low-magnitude in-channel flow pulse. Unlikely to drown out any significant barriers but can provide limited connectivity and a biological trigger for animal movement.
Stochastic	Relating to or characterised by random chance.
Substrate	A habitat surface such as a stream bed.
Supplementary access	A category of water entitlement where water is made available to licence holder accounts during periods of high river flows that cannot otherwise be controlled by river operations. Water can be taken and debited from licence accounts during a declared period of high flow.
Surface water	Water that exists above the ground in rivers, streams creeks, lakes and reservoirs. Although separate from groundwater, they are interrelated and over extraction of either will impact on the other.
Sustainable diversion limit (SDL)	The grossed-up amount of water that can be extracted from Murray-Darling Basin rivers for human uses while leaving enough water in the system to achieve environmental outcomes.
Unregulated river	A waterway where flow is mostly uncontrolled by dams, weirs or other structures.
Very low flow (VF)	Small flow in the very-low flow class that joins river pools, thus providing partial or complete connectivity in a reach. These flows can improve DO saturation and reduce stratification in pools.
Water quality management plan (WQMP)	A document prepared by state authorities and accredited by the Commonwealth under the Basin Plan. It forms part of a water resource plan and aims to provide a framework to protect, enhance and restore water quality in each water resource plan area.
Water resource plan (WRP)	A document prepared by state authorities and accredited by the Commonwealth under the Basin Plan. The document describes how water will be managed and shared between users in an area.
Water resource plan area (WRPA)	Catchment-based divisions of the Murray–Darling Basin defined by a water resource plan.
Water sharing plan (WSP)	A plan made under the NSW *Water Management Act 2000* that sets out specific rules for sharing and trading water between the various water users and the environment in a specified water management area. It forms part of a water resource plan.
Water dependent system	An ecosystem or species that depends on periodic or sustained inundation, waterlogging or significant inputs of water for natural functioning and survival.
Wetland inundation flow (WL)	Flows that fill wetlands below bankfull or via regulating structures over weeks or sometimes months (i.e. longer than a typical fresh/pulse), or flows that are required to inundate wetlands in areas where there are very shallow channels or no discernible channels exist (e.g. terminal wetlands).



Legend

Zone A Planning Units

Zone B Planning Units

N

0 35 70

Kilometers

Planning Units

1. Gwydir downstream of Copeton
2. Main Gwydir River
3. Tarren Creek
4. Lower Gwydir
5. Goonal Creek
6. Central Lower Gwydir
7. Western Gwydir Floodplain
8. Upper Mehi
9. Central Mehi
10. Lower Mehi
11. Ballin Boora
12. Moomin Creek
13. Mallowa Creek
14. Upper Gingham
15. Central Gingham
16. Lower Gingham
17. Western Gingham Floodplain
18. Carole Creek
19. Gil Gil Creek
20. Rocky River
21. Roumalla Creek
22. Upper Gwydir River
23. Boorolong Creek
24. Laura Creek
25. Georges Creek
26. Moredun Creek
27. Bakers Creek
28. Copeton Darm
29. Keera Creek
30. Mackenzies Flat
31. Halls Creek
32. Myall Creek
33. Cobbodah Creek
34. Upper Horton
35. Lower Horton
36. Rocky Creek
37. Warialda Creek
38. Mosquito Creek
39. Slaughterhouse Creek
40. Moree
41. Tycannah Creek
42. Gurley Creek
43. Millie Creek
44. Thalabah Creek
45. Gwydir water source
46. Mehi water source
47. Gil Gil water source
48. Gingham water source
49. Barwon water source

Figure 1 The Gwydir catchment showing the division of planning units into Zone A and Zone B in the Long Term Water Plan

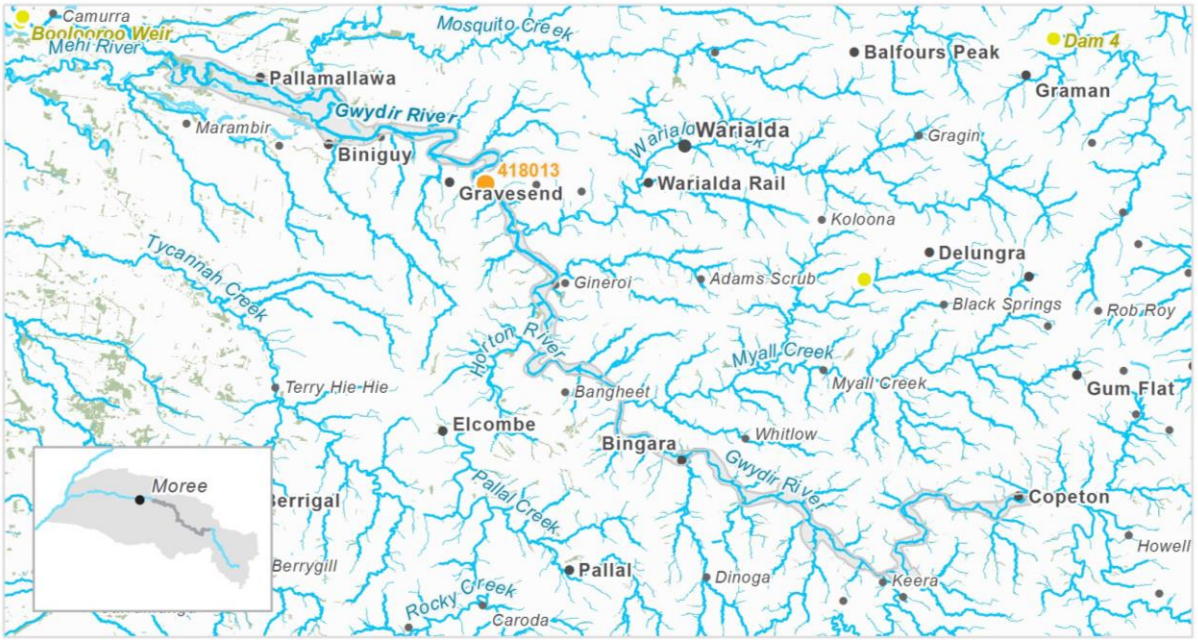
Zone A planning units

Zone A planning units are located downstream of Copeton Dam on either the Gwydir River or its distributary channels. Held environmental water released from Copeton Dam can be delivered to priority environmental assets in these planning units, together with planned environmental water and water delivered for consumptive use. Although river regulation has typically had a greater influence on the hydrology of Zone A planning units compared to those in Zone B, the associated storage and diversion infrastructure in Zone A has increased the potential for river flows to be targeted and manipulated to meet the needs of the environment.

Planning units in Zone A have been delineated in this LTWP based on how water is managed in each unit. This is primarily determined by the layout of the main watercourses, the lateral extent of the managed floodplain and groups of priority assets with similar water requirements.

The information in this section will help guide water management decision-making in the short-term and contribute to long-term objectives at targets at the regional, catchment and basin scale.

1.1 Gwydir River downstream of Copeton Dam



Legend

- Significant gauges
- High-impact fish barriers
- Rivers & creeks
- Gwydir downstream of Copeton
- Water-dependent sites
- Water-dependent vegetation

N

0 8 16

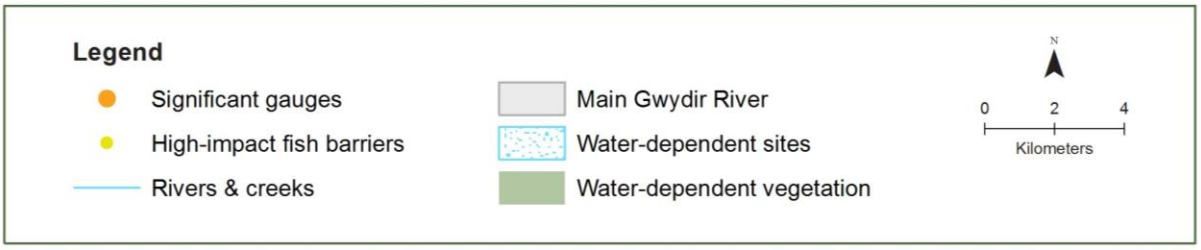
Kilometers

Priority environmental assets			
Patches of high biodiversity Gwydir River and associated inchannel habitat and fringing vegetation communities		Lowland Darling River endangered ecological community Barbers Lagoon	
Native fish	• unspecked hardyhead • carp–gudgeon • freshwater catfish • silver perch	• spangled perch • olive perchlet • golden perch • Murray cod	• Australian smelt • bony herring • Murray–Darling rainbowfish
Birds	61 water-dependent bird species recorded, including eastern great egret and Latham's snipe		
Native vegetation	16 water-dependent PCTs, including river red gum woodlands and coolibah woodlands		
Registered cultural assets	• Modified trees		

Flow component		Gauge	Flow rate / volume (event window)	Maximum inter-event period	Timing	Duration	Frequency	Additional water requirement descriptions and current management limitations
Cease-to-flow	CF1	Gwydir @ Gravesend (418013)	0 ML/d	N/A	In line with historical low flow season, typically April to June	10-20 days maximum (hot conditions) or 20-30 days maximum (cooler conditions)	Should occur in no more than 6% of years	When restarting flows, avoid harmful water-quality impacts, such as de-oxygenated refuge pools. Flows should ideally be >0.03–0.05 m/s to prevent stratification of pools.
Very-low flow	VF1	Gwydir @ Gravesend (418013)	>30 ML/d	1 year	Any time	200 days minimum (or 50 days minimum in very dry years)	No less than modelled natural	
Baseflow	BF1	Gwydir @ Gravesend (418013)	>440 ML/d	1 year	Any time	160 days minimum (or 20 days minimum in very dry years)	No less than modelled natural	
	BF2	Gwydir @ Gravesend (418013)	>440 ML/d	2 years	September to March	100 days minimum (10 days minimum in very dry years)	5–10 years in 10	
Small fresh	SF1	Gwydir @ Gravesend (418013)	>990 ML/d	1 year	October to April (but can occur any time)	10 days minimum	Annual	These EWRs may not be able to be met by HEW alone with the current volumes that are available and under current constraints. Maximum release rates from Copeton Dam are constrained to 6,500 ML/d. Flows above this threshold are dependent on natural events. HEW may be used to contribute to these flows if delivered in addition to irrigation deliveries in higher irrigation delivery years, or natural events.
	SF2	Gwydir @ Gravesend (418013)	990-8,600 ML/d	2 years	September to April	14 days minimum	5–10 years in 10	

Flow component		Gauge	Flow rate / volume (event window)	Maximum inter-event period	Timing	Duration	Frequency	Additional water requirement descriptions and current management limitations
Large fresh	LF1	Gwydir @ Gravesend (418013)	>8,600 ML/d	2 years	July to September (but can occur any time)	5 days minimum	5–10 years in 10	These EWRs cannot be met by HEW with the current volumes that are available and under current constraints. Maximum release rates from Copeton Dam are constrained to 6,500 ML/d. Flows above this threshold are dependent on natural events. Remaining natural flows must be protected to meet these EWRs. LF3 and LF4 and large overbank events will result in overbank events in downstream planning units. Flows >100,000 ML/d start to break out of bank at Gravesend gauge.
	LF2	Gwydir @ Gravesend (418013)	>8,600 ML/d	4 years	October to April	5 days minimum	3–5 years in 10	
	LF3	Gwydir @ Gravesend (418013)	>26,500 ML/d	4 years	August to February (but can occur any time)	6 days minimum (or 2 days minimum in very dry years)	3–5 years in 10	
	LF4	Gwydir @ Gravesend (418013)	>70,600 ML/d	5 years	September to May (but can occur any time)	4 days minimum (or 1 day minimum in very dry years)	2–3 years in 10	
Bankfull	BK1	Gwydir @ Gravesend (418013)	>90,000-100,000 ML/d	N/A	August to February (but can occur any time)	4 days minimum (or 1 day minimum in very dry years)	2 years in 10	
Large overbank	OB5	Gwydir @ Gravesend (418013)	>100,000 ML/d	10–15 years	Any time	1 day minimum 1–6 months of habitat inundation	1 year in 10	

1.2 Main Gwydir River



Priority environmental assets			
Yarraman Lagoon Lowland Darling River endangered ecological community		Gwydir River and associated inchannel habitat and fringing vegetation communities	
Native fish	• Australian smelt • olive perchlet • freshwater catfish • carp–gudgeon	• Murray–Darling rainbowfish • silver perch • spangled perch • golden perch	• Murray cod • bony herring • unspecked hardyhead
Birds	47 water-dependent bird species recorded including common sandpiper, eastern great egret, Latham's snipe		
Native vegetation	11 water-dependent PCTs, including river red gum woodlands, coolibah woodlands and wetland woodlands, and lignum shrubland wetlands		
Registered cultural assets	• Modified trees		

Flow component		Gauge	Flow rate / volume (event window)	Maximum inter-event period	Timing	Duration	Frequency	Additional water requirement descriptions and current management limitations
Cease-to-flow	CF1	Gwydir @ Yarraman (418004)	0 ML/d	N/A	In line with historical low flow season, typically April to June	30-40 days maximum (hot conditions) or 50-60 days maximum (cooler conditions)	Should occur in no more than 50% of years	When restarting flows, avoid harmful water-quality impacts, such as de-oxygenated refuge pools. Flows should ideally be >0.03–0.05 m/s to de-stratify pools.
Very-low flow	VF1	Gwydir @ Yarraman (418004)	>100 ML/d	1 year	Any time	280 days minimum (or 70 days minimum in very dry years)	Annual	
Baseflow	BF1	Gwydir @ Yarraman (418004)	>240 ML/d	1 year	Any time	200 days minimum (or 40 days minimum in very dry years)	Annual	
	BF2	Gwydir @ Yarraman (418004)	>240 ML/d	2 years	September to March	130 days minimum (or 30 days minimum in very dry years)	5–10 years in 10	
Small fresh	SF1	Gwydir @ Yarraman (418004)	>540 ML/d	1 year	October to April (but can occur any time)	10 days minimum	Annual	These EWRs may not be able to be met with HEW alone with the current volumes that are available and under current constraints. Flows >2000 ML/d are dependent on the remaining natural events. HEW may be used to contribute to these flows if delivered in addition to irrigation deliveries in higher irrigation delivery years, or natural events.
	SF2	Gwydir @ Yarraman (418004)	540-4,860 ML/d	2 years	September to April	14 days minimum	5–10 years in 10	
Large fresh	LF1	Gwydir @ Yarraman (418004)	>4,860 ML/d	2 years	July to September (but can occur any time)	5 days minimum	5–10 years in 10	

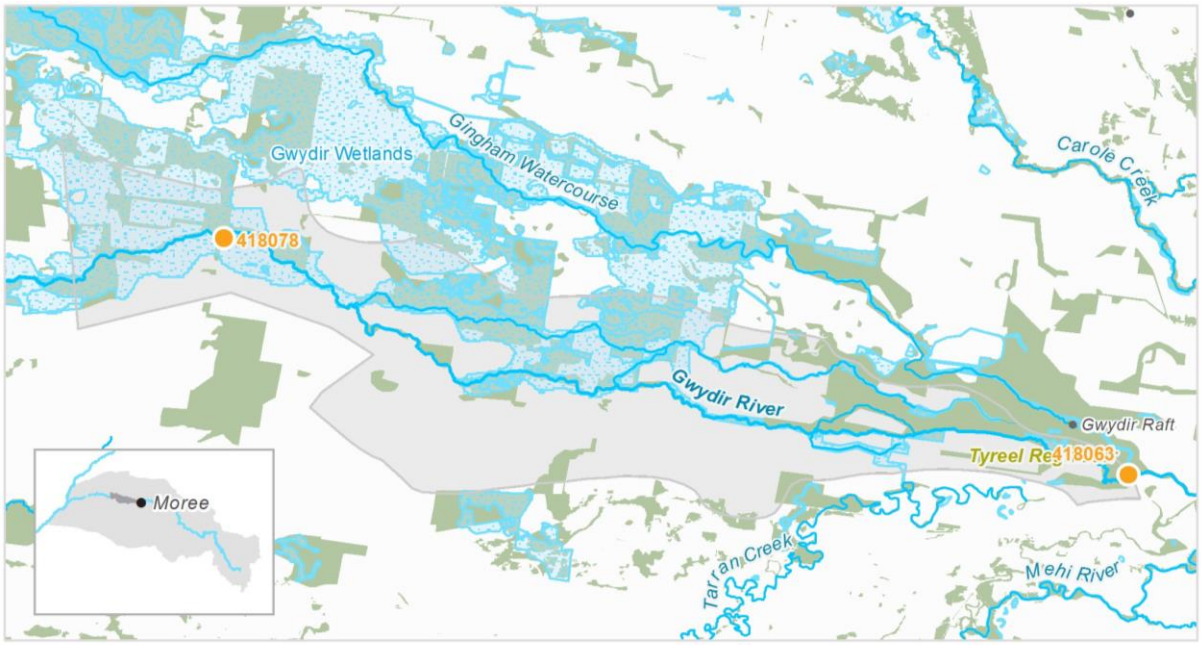
Flow component		Gauge	Flow rate / volume (event window)	Maximum inter-event period	Timing	Duration	Frequency	Additional water requirement descriptions and current management limitations
	LF2	Gwydir @ Yarraman (418004)	>4,860 ML/d	4 years	October to April	5 days minimum	3–5 years in 10	
	LF3	Gwydir @ Yarraman (418004)	>11,000 ML/d	4 years	August to February (but can occur any time)	2 days minimum (or 1 day minimum in very dry years)	3–5 years in 10	These EWRs cannot be met by HEW with the current volumes that are available and under current constraints. Flows >2000 ML/d are dependent on the remaining natural events. Remaining natural flows must be protected to meet these flows. LF3 and LF4 and large overbank flows will result in large overbank events in downstream planning units. Flows >60,000 ML/d start to break out of bank at Yarraman gauge.
	LF4	Gwydir @ Yarraman (418004)	>40,000 ML/d	5 years	September to May (but can occur any time)	2 days minimum (or 1 day minimum in very dry years)	2–3 years in 10	
Bankfull	BK1	Gwydir @ Yarraman (418004)	>50,000–60,000 ML/d	N/A	August to February (but can occur any time)	2 days minimum (or 1 day minimum in very dry years)	2–3 years in 10	
Large overbank	OB4	Gwydir @ Yarraman (418004)	>250,000 ML event (1–2 months)	5 years	September to May (but can occur any time)	3–8 months of habitat inundation	2–3 years in 10	
	OB5	Gwydir @ Yarraman (418004)	>500,000 ML event (1-3 months)	10 years	Any time	1–6 months of habitat inundation	1 year in 10	

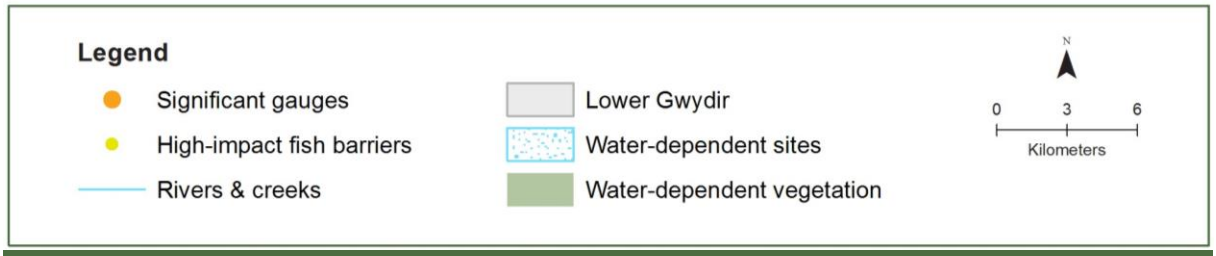
1.3 Tarren Creek

Priority environmental assets	
Tarren Creek, associated inchannel habitat, and fringing and floodplain wetland vegetation communities	
Native fish	• Purple-spotted gudgeon
Birds	31 water-dependent bird species recorded, including magpie goose, eastern great egret, Latham's snipe
Native vegetation	Seven water-dependent PCTs, including coolibah woodlands and coolibah wetland woodlands
Registered cultural assets	None registered

Flow component		Gauge	Flow rate / volume (event window)	Maximum inter-event period	Timing	Duration	Frequency	Additional description of flow requirements and management limitations
Large overbank	OB4	Gwydir @ Yarraman (418004)	>250,000 ML event (1–2 months)	5 years	September to May (but can occur any time)	3–8 months of habitat inundation	2–3 years in 10	These EWRs cannot be met by HEW with the current volumes that are available and under current constraints. Flows >2000 ML/d at Gwydir @ Yarraman gauge are dependent on the remaining natural events. Remaining natural flows must be protected to meet these flows.
	OB5	Gwydir @ Yarraman (418004)	>500,000 ML event (1–3 months)	10–15 years	Any time	1–6 months of habitat inundation	1 year in 10	

1.4 Lower Gwydir



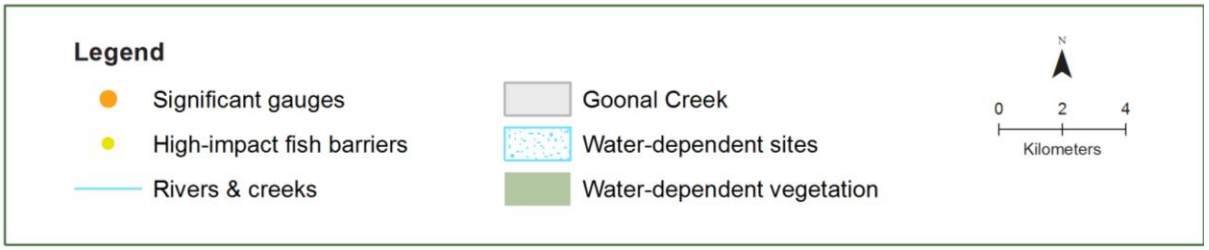


Priority environmental assets			
Gwydir River and associated inchannel habitat and fringing vegetation communities Gwydir Watercourse and associated floodplain and wetland vegetation communities			A portion of the Gwydir Wetlands Wirrit Waterhole North Arm and Big Leather flow paths
Native fish	• unspecked hardyhead • carp–gudgeon • freshwater catfish • silver perch	• olive perchlet • golden perch • Murray cod • Australian smelt	• spangled perch • bony herring • Murray–Darling rainbowfish
Birds	40 water-dependent bird species recorded, including eastern great egret		
Native vegetation	Six water-dependent PCTs, including river red gum woodlands, coolibah woodlands and wetland woodlands, river coobah wetlands		
Registered cultural assets	• Modified trees	• Burial sites	• Ceremonial grounds/ring

Flow component		Gauge	Flow rate / volume (event window)	Maximum inter-event period	Timing	Duration	Frequency	Additional water requirement descriptions and current management limitations
Cease-to-flow	CF1	Gwydir DS Tyreel (418063)	0 ML/d	N/A	In line with historical low flow season, typically April to June	40–60 days maximum (hot conditions) or 60–80 days maximum (cooler conditions)	No greater than natural	When restarting flows, avoid harmful water-quality impacts, such as de-oxygenated refuge pools. Flows should ideally be >0.03–0.05 m/s to prevent stratification of pools.
Very-low flow	VF1	Gwydir DS Tyreel (418063)	> 50 ML/d	1 year	Any time	230 days minimum (or 40 days minimum in very dry years)	Annual	
Baseflow	BF1	Gwydir DS Tyreel (418063)	>100 ML/d	1 year	Any time	180 days minimum (or 30 days minimum in very dry years)	Annual	
	BF2	Gwydir DS Tyreel (418063)	>100 ML/d	2 years	September to March	100 days minimum (or 20 days minimum in very dry years)	5–10 years in 10	
Small fresh	SF1	Gwydir DS Tyreel (418063)	>250 ML/d	1 year	October to April (but can occur any time)	10 days minimum	Annual	These EWRs may not be able to be met by HEW alone with the current volumes that are available and under current constraints. Flows >1000 ML/d are dependent on the remaining natural events. At the smaller range of flows, HEW may be used to contribute to these flows if delivered in addition to irrigation deliveries in higher irrigation delivery years, or natural events. Otherwise, HEW can only contribute to these flows if it is already in the system when a natural event occurs.
	SF2	Gwydir DS Tyreel (418063)	>250 ML/d	2 years	September to April	14 days minimum	5–10 years in 10	
Large fresh	LF1	Gwydir DS Tyreel (418063)	>800 ML/d	2 years	July to September (but can occur any time)	5 days minimum	5–10 years in 10	
	LF2	Gwydir DS Tyreel (418063)	>800 ML/d	4 years	October to April	5 days minimum	3–5 years in 10	

Flow component		Gauge	Flow rate / volume (event window)	Maximum inter-event period	Timing	Duration	Frequency	Additional water requirement descriptions and current management limitations
Bankfull	BK1	Gwydir DS Tyreel (418063)	>1,500–3,500 ML/d	N/A	August to February (but can occur any time)	5 days minimum (or 2 days minimum in very dry years)	4 years in 10	These EWRs cannot be met by HEW with the current volumes that are available and under current constraints. Flows >1000 ML/d at Gwydir DS Tyreel and >2000 ML/d at Gwydir @ Yarraman are dependent on the remaining natural events. Remaining natural flows must be protected to meet these flows. These large overbank events will also result in large overbank events in downstream planning units.
Small overbank	OB1	Gwydir @ Allambie (418078)	>10,000 ML event	2 years	September to March (but can occur any time)	3 days minimum, 2–8 months of habitat inundation	7–8 years in 10	
	OB2	Gwydir @ Allambie (418078)	>30,000 ML event	3 years	October to April (but can occur any time	10 days minimum, 2–6 months of habitat inundation	4–7 years in 10	
	OB3	Gwydir @ Allambie (418078)	>60,000 ML event	4 years	August to February (but can occur any time)	5 days minimum, 2–3 months of habitat inundation	3–5 years in 10	
Large overbank	OB4	Gwydir @ Yarraman (418004)	>250,000 ML event (1–2 months)	5 years	September to May (but can occur any time)	3–8 months of habitat inundation	2–3 years in 10	
	OB5	Gwydir @ Yarraman (418004)	>500,000 ML event (1–3 months)	10–15 years	Any time	1–6 months of habitat inundation	1 year in 10	

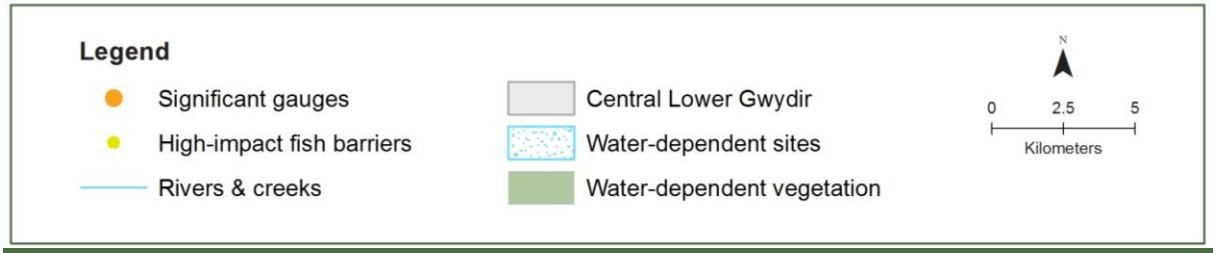
1.5 Goonal Creek



Priority environmental assets	
Goonal Creek, associated inchannel habitat, and fringing and floodplain wetland vegetation communities	
Native fish	No records
Birds	27 water-dependent bird species recorded, including brolga, eastern great egret, Latham's snipe
Native vegetation	Five water-dependent PCTs, including coolibah woodlands and coolibah wetland woodlands
Registered cultural assets	• Modified tree • Ceremonial ring

Flow component		Gauge	Flow rate / volume (event window)	Maximum inter-event period	Timing	Duration	Frequency	Additional description of flow requirements and management limitations
Large overbank	OB4	Gwydir @ Yarraman (418004)	>250,000 ML event (1–2 months)	5 years	September to May (but can occur any time)	3–8 months of habitat inundation	2–3 years in 10	These EWRs cannot be met by HEW with the current volumes that are available and under current constraints. Flows >2000 ML/d at Gwydir @ Yarraman gauge are dependent on the remaining natural events. Remaining natural flows must be protected to meet these flows.
	OB5	Gwydir @ Yarraman (418004)	>500,000 ML event (1–3 months)	10–15 years	Any time	1–6 months of habitat inundation	1 year in 10	

1.6 Central Lower Gwydir

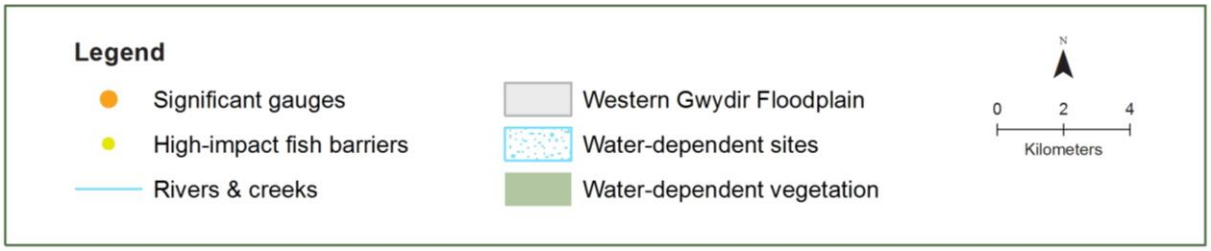


Priority environmental assets			
Old Dromana Ramsar wetland the Gin Holes Bulyeroi Lagoon Wandoona/Troy Waterhole	The largest area of the Gwydir Wetlands Gwydir Watercourse and associated floodplain and wetland vegetation communities		
Native fish	• Australian smelt • carp–gudgeon • Murray–Darling rainbowfish	• silver perch • spangled perch • golden perch	• Murray cod • bony herring • olive perchlet
Birds	68 water-dependent bird species recorded, including:		
	• black-necked stork • sharp-tailed sandpiper • Lantham's snipe	• magpie goose • eastern great egret • common greenshank • blue-billed duck	• gull-billed tern • cattle egret • marsh sandpiper • freckled duck
Native vegetation	12 water-dependent PCTs, including:		
	• river red gum woodlands • coolibah wetland woodlands • river coobah wetlands	• spike rush mixed marshlands • cumbungi rushlands • Lignum shrublands	• water couch marsh grasslands • largest remaining area of marsh club-rush sedgeland
Registered cultural assets	• Modified trees		

Flow component		Gauge	Flow rate / volume (event window)	Maximum inter-event period	Timing	Duration	Frequency	Additional water requirement descriptions and current management limitations
Cease-to-flow	CF1	Gwydir @ Millewa (418066)	0 ML/d	N/A	In line with historical low flow season, typically April to June	6 months maximum	Should occur in no more than 60% of years	When restarting flows, avoid harmful water-quality impacts, such as de-oxygenated refuge pools. Flows should ideally be >0.03–0.05 m/s to de-stratify pools. These EWRs can be met with current volumes of HEW under current constraints in addition to irrigation deliveries and PEW at flows >250 ML/d. Currently HEW may be used to contribute to flows between 250–500 ML/d if delivered in addition to irrigation deliveries in higher irrigation delivery years, or natural events.
Baseflow	BF1	Gwydir @ Millewa (418066)	>50 ML/d	1 year	Any time	190 days minimum (or 30 days minimum in very dry years)	Annual	
	BF2	Gwydir @ Millewa (418066)	>50 ML/d	2 years	September to March	120 days minimum (or 20 days minimum in very dry years)	5–10 years in 10	
Small wetland inundation	WL1	Gwydir @ Millewa (418066)	>6,000 ML event (3–6 months)	1 year	Any time	N/A	9–10 years in 10	These EWRs may not be able to be met with HEW alone with the current volumes that are available and under current constraints. HEW may be used to contribute to these flows if delivered in addition to irrigation deliveries in higher irrigation delivery years, or natural events.
	WL2	Gwydir @ Allambie (418078)	>36,000 ML event (3–6 months)	2 years	September to March (but can occur any time)	2–8 months of habitat inundation	8–9 years in 10	
Large wetland inundation	WL3	Gwydir @ Allambie (418078)	>45,000 ML event (3–6 months)	3 years	October to April	10 days minimum, 2–6 months of habitat inundation	5–8 years in 10	
	WL4	Gwydir @ Allambie (418078)	>65,000 ML event (3-6 months)	5 years	August to February (but can occur any time)	5 days minimum, 2–3 months of habitat inundation	3–5 years in 10	

Flow component		Gauge	Flow rate / volume (event window)	Maximum inter-event period	Timing	Duration	Frequency	Additional water requirement descriptions and current management limitations
Large overbank	OB4	Gwydir @ Yarraman (418004)	>250,000 ML event (1–2 months)	5 years	September to May (but can occur any time)	3–8 months of habitat inundation	2–3 years in 10	These EWRs cannot be met by HEW with the current volumes that are available and under current constraints. Flows >2000 ML/d at Gwydir @ Yarraman are dependent on the remaining natural events. Remaining natural flows must be protected to meet these flows. These large overbank events will also result in large overbank events in downstream planning units.
	OB5	Gwydir @ Yarraman (418004)	>500,000 ML event (1–3 months)	10–15 years	Any time	1–6 months of habitat inundation	1 year in 10	

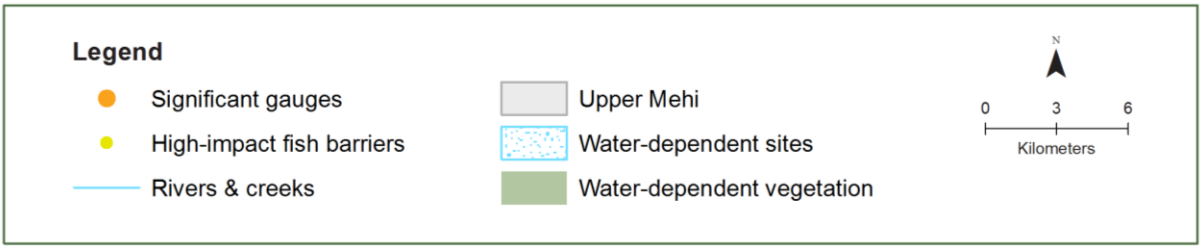
1.7 Western Gwydir Floodplain



Priority environmental assets		
Gwydir Watercourse and its associated floodplain vegetation communities		
Native fish	• olive perchlet	• silver perch
Birds	15 water-dependent bird species recorded	
Native vegetation	Five water-dependent PCTs, including black box woodlands and coolibah woodlands	
Registered cultural assets	• Modified trees	

Flow component		Gauge	Flow rate / volume (event window)	Maximum inter-event period	Timing	Duration	Frequency	Additional water requirement descriptions and current management limitations
Large overbank	OB4	Gwydir @ Yarraman (418004)	>250,000 ML event (1–2 months)	5 years	September to May (but can occur any time)	3–8 months of habitat inundation	2–3 years in 10	These EWRs cannot be met by HEW with the current volumes that are available and under current constraints. Flows >2000 ML/d at Gwydir @ Yarraman gauge are dependent on the remaining natural events. Remaining natural flows must be protected to meet these flows.
	OB5	Gwydir @ Yarraman (418004)	>500,000 ML event (1–3 months)	10–15 years	Any time	1–6 months of habitat inundation	1 year in 10	

1.8 Upper Mehi

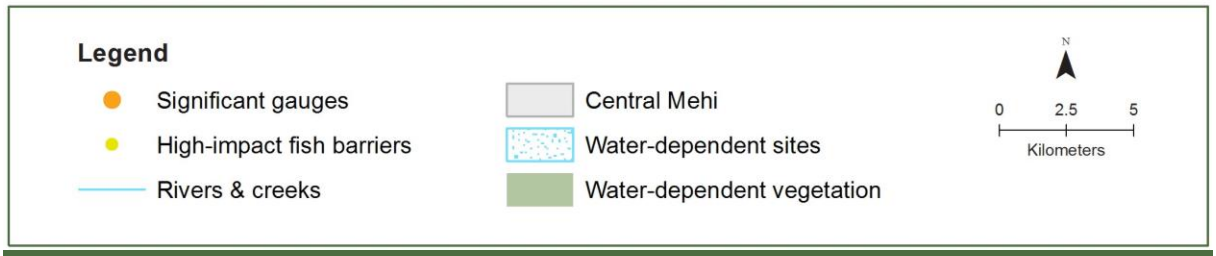


Priority environmental assets			
Mehi River, associated inchannel habitat, and fringing and floodplain wetland vegetation communities		Carlyle Lagoon Whittaker Lagoon	
Native fish	• Australian smelt • unspecked hardyhead • Murray–Darling rainbowfish • silver perch	• golden perch • Murray cod • spangled perch	• bony herring • freshwater catfish • carp–gudgeon
Birds	51 water-dependent bird species recorded, including black-necked stork, magpie goose, sharp-tailed sandpiper, and cattle egret and eastern great egret		
Native vegetation	11 water-dependent PCTs, including river red gum woodlands, coolibah woodlands and coolibah wetland woodlands		
Registered cultural assets	• Modified trees	• Camping areas	

Flow component		Gauge	Flow rate / volume (event window)	Maximum inter-event period	Timing	Duration	Frequency	Additional water requirement descriptions and current management limitations
Cease-to-flow	CF1	Mehi @ Moree (418002)	0 ML/d	N/A	In line with historical low flow season, typically April to June	40–60 days maximum (hot conditions) or 60–80 days maximum (cooler conditions)	Should occur in no more than 15% of years	When restarting flows, avoid harmful water-quality impacts, such as de-oxygenated refuge pools. Flows should ideally be >0.03–0.05 m/s to prevent stratification of pools.
Baseflow	BF1	Mehi @ Moree (418002)	>130 ML/d	1 year	Any time	190 days minimum (or 140 days minimum in very dry years)	Annual	
	BF2	Mehi @ Moree (418002)	>130 ML/d	2 years	September to March	160 days minimum (or 130 days minimum in very dry years)	5–10 years in 10	
Small fresh	SF1	Mehi @ Moree (418002)	>345 ML/d	1 year	October to April (but can occur any time)	10 days minimum	Annual	These EWRs may not be able to be met by HEW alone with the current volumes that are available and under current constraints. Flows >3,000 ML/d are dependent on the remaining natural events. At the smaller range of flows, current volumes of HEW may be used to contribute to these flows if delivered in addition to irrigation deliveries in higher irrigation delivery years, or natural events.
	SF2	Mehi @ Moree (418002)	345–2,800 ML/d	2 years	September to April	14 days minimum	5–10 years in 10	
Large fresh	LF1	Mehi @ Moree (418002)	>2,800 ML/d	2 years	July to September (but can occur any time)	5 days minimum	5–10 years in 10	These EWRs cannot be met by HEW with the current volumes that are available and under current constraints. Flows >3,000 ML/d at Mehi @ Moree are dependent on the remaining natural events. Remaining natural flows must be protected to meet these flows.
	LF2	Mehi @ Moree (418002)	>2,800 ML/d	4 years	October to April	5 days minimum	3–5 years in 10	

Flow component		Gauge	Flow rate / volume (event window)	Maximum inter-event period	Timing	Duration	Frequency	Additional water requirement descriptions and current management limitations
Bankfull	BK1	Mehi @ Moree (418002)	>10,000–20,000 ML/d	N/A	August to February (but can occur any time)	3 days minimum (or 1 days minimum in very dry years)	3–5 years in 10	These larger events will also result in large overbank events in downstream planning units.
Small overbank	OB3	Mehi @ Moree (418002)	>20,000 ML/d	4 years	August to February (but can occur any time)	5 days minimum, 2–3 months of habitat inundation	3–5 years in 10	
Large overbank	OB4	Mehi @ Moree (418002)	>150,000 ML event (1–2 months)	5 years	September to May (but can occur any time)	3–8 months of habitat inundation	2–3 years in 10	
	OB5	Mehi @ Moree (418002)	>250,000 ML event (3–4 months)	10–15 years	Any time	1–6 months of habitat inundation	1 year in 10	

1.9 Central Mehi



Priority environmental assets			
Mehi River, associated inchannel habitat, and fringing and floodplain wetland vegetation communities			Minnaminane Waterhole Coolibah Waterholes Cobban Lagoon
Native fish	• Australian smelt • unspecked hardyhead • Murray–Darling rainbowfish • silver perch	• golden perch • Murray cod • spangled perch	• bony herring • freshwater catfish • carp–gudgeon
Birds	39 water-dependent bird species recorded, including eastern great egret and Latham's snipe		
Native vegetation	11 water-dependent PCTs, including: • river red gum woodlands	• coolibah woodlands and coolibah wetland woodlands	• water couch marsh grasslands
Registered cultural assets	• Modified trees	• Camping areas	

Flow component		Gauge	Flow rate / volume (event window)	Maximum inter-event period	Timing	Duration	Frequency	Additional water requirement descriptions and current management limitations
Cease-to-flow	CF1	Mehi DS Combadello (418037)	0 ML/d	N/A	In line with historical low flow season, typically April to June	40–60 days maximum (hot conditions) or 60–80 days maximum (cooler conditions)	Should occur in no more than 71% of years	When restarting flows, avoid harmful water-quality impacts, such as de-oxygenated refuge pools. Flows should ideally be >0.03–0.05 m/s to prevent stratification of pools.
Baseflow	BF1	Mehi DS Combadello (418037)	>80 ML/d	1 year	Any time	200 days minimum (or 130 days minimum in very dry years)	Annual	
	BF2	Mehi DS Combadello (418037)	>80 ML/d	2 years	September to March	160 days minimum (or 100 days minimum in very dry years)	5–10 years in 10	
Small fresh	SF1	Mehi DS Combadello (418037)	>220 ML/d	1 year	October to April (but can occur any time)	10 days minimum	Annual	These EWRs can be met with current volumes of HEW under current constraints in addition to irrigation deliveries and PEW at flows <2,200 ML/d.
	SF2	Mehi DS Combadello (418037)	220–1,500 ML/d	2 years	September to April	14 days minimum	5–10 years in 10	
Large fresh	LF1	Mehi DS Combadello (418037)	>1,500 ML/d	2 years	July to September (but can occur any time)	5 days minimum	5–10 years in 10	These EWRs may not be able to be met by HEW alone with the current volumes that are available and under current constraints. Flows >2,200 ML/d are dependent on the remaining natural events. Currently, at the smaller range of flows, HEW may be used to contribute to these flows if delivered in addition to irrigation deliveries in higher irrigation delivery years, or natural events.
	LF2	Mehi DS Combadello (418037)	>1,500 ML/d	4 years	October to April	5 days minimum	3–5 years in 10	

Flow component		Gauge	Flow rate / volume (event window)	Maximum inter-event period	Timing	Duration	Frequency	Additional water requirement descriptions and current management limitations
Bankfull	BK1	Mehi DS Combadello (418037)	>8,400–16,000 ML/d	N/A	August to February (but can occur any time)	3 days minimum (or 1 days minimum in very dry years)	3–5 years in 10	These EWRs cannot be met by HEW with the current volumes that are available and under current constraints. Flows >3,000 ML/d at Mehi @ Moree are dependent on the remaining natural events. Remaining natural flows must be protected to meet these flows. These larger events will also result in large overbank events in downstream planning units.
Small overbank	OB3	Mehi @ Moree (418002)	>20,000 ML/d	4 years	August to February (but can occur any time)	5 days minimum, 2–3 months of habitat inundation	3–5 years in 10	
Large overbank	OB4	Mehi @ Moree (418002)	>150,000 ML event (1–2 months)	5 years	September to May (but can occur any time)	3–8 months of habitat inundation	2–3 years in 10	
	OB5	Mehi @ Moree (418002)	>250,000 ML event (3–4 months)	10–15 years	Any time	1–6 months of habitat inundation	1 year in 10	

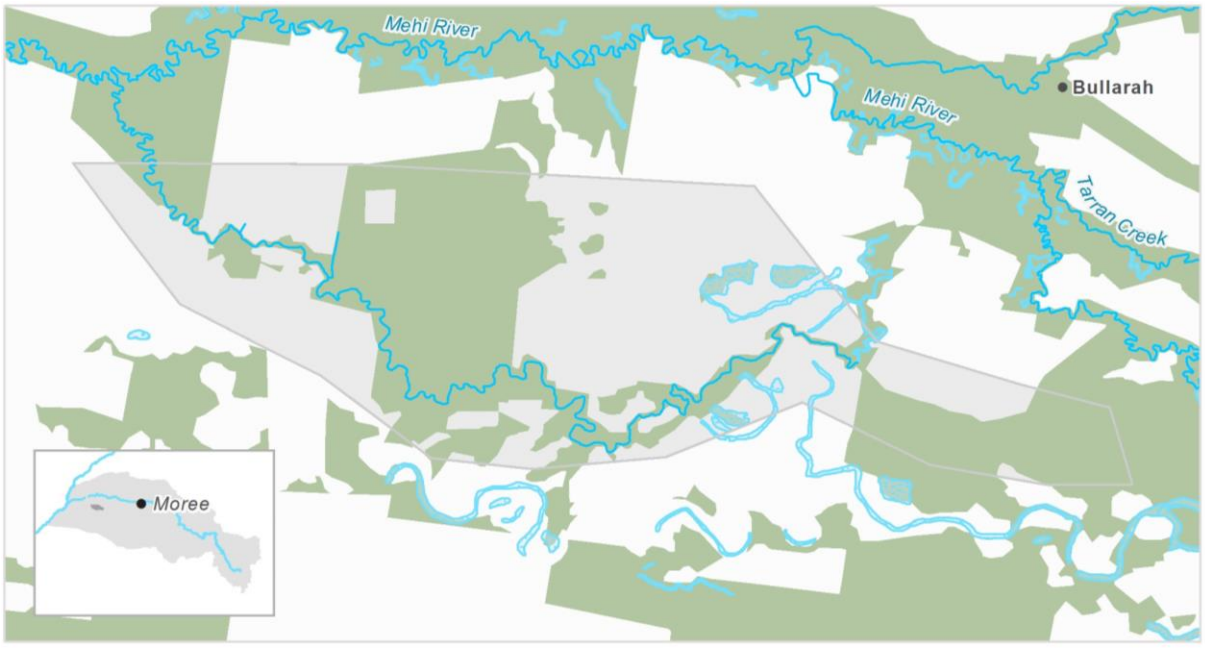
1.10 Lower Mehi

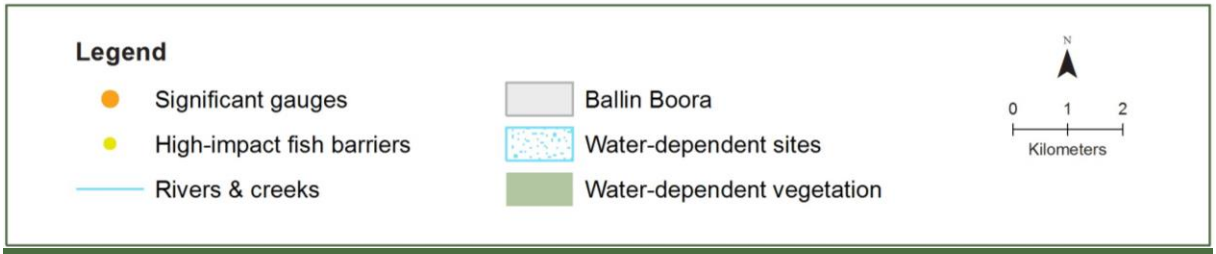
Priority environmental assets			
Mehi River, associated inchannel habitat, and fringing and floodplain wetland vegetation communities			
Native fish	• Australian smelt • unspecked hardyhead • Murray–Darling rainbowfish • silver perch	• spangled perch • golden perch • Murray cod	• carp–gudgeon • bony herring • freshwater catfish
Birds	39 water-dependent bird species recorded including the eastern great egret		
Native vegetation	11 water-dependent PCTs, including: • river red gum woodlands • coolibah woodlands and coolibah wetland woodlands	• black box woodland wetlands	• lignum shrubland wetlands
Registered cultural assets	• Modified trees	• Ceremonial rings	

Flow component		Gauge	Flow rate / volume (event window)	Maximum inter-event period	Timing	Duration	Frequency	Additional water requirement descriptions and current management limitations
Cease-to-flow	CF1	Mehi DS Gundare (418041)	0 ML/d	N/A	In line with historical low flow season, typically April to June	40–60 days maximum (hot conditions) or 60–80 days maximum (cooler conditions)	Should occur in no more than 60% of years	When restarting flows, avoid harmful water-quality impacts, such as de-oxygenated refuge pools. Flows should ideally be >0.03–0.05 m/s to prevent stratification of pools.
Baseflow	BF1	Mehi DS Gundare (418041)	>50 ML/d	1 year	Any time	230 days minimum (or 130 days minimum in very dry years)	Annual	
		Mehi near Collarenebri (418055)	>40 ML/d			170 days minimum (or 70 days minimum in very dry years)		
	BF2	Mehi DS Gundare (418041)	>50 ML/d	2 years	September to March	160 days minimum (or 100 days minimum in very dry years)	5–10 years in 10	
Small fresh	SF1	Mehi DS Gundare (418041)	>100 ML/d	1 year	October to April (but can occur anytime)	10 days minimum	Annual	These EWRs can be met with current volumes of HEW under current constraints in addition to irrigation deliveries and PEW at flows <1,000 ML/d.
	SF2	Mehi DS Gundare (418041)	100–850 ML/d	2 years	September to April	14 days minimum	5–10 years in 10	
	SF3	Mehi near Collarenebri (418055)	>90 ML/d	4 years	October to April (but can occur any time)	10 days minimum	Within 12 months following LF5	
Large fresh	LF1	Mehi DS Gundare (418041)	>850 ML/d	2 years	July to September (but can occur any time)	5 days minimum	5–10 years in 10	These EWRs may not be able to be met by HEW alone with the current volumes that are available and under current constraints. Flows >1,000 ML/d are dependent

Flow component		Gauge	Flow rate / volume (event window)	Maximum inter-event period	Timing	Duration	Frequency	Additional water requirement descriptions and current management limitations
	LF2	Mehi DS Gundare (418041)	>850 ML/d	4 years	October to April	5 days minimum	3–5 years in 10	on the remaining natural events. Currently, at the smaller range of flows, HEW may be used to contribute to these flows if delivered in addition to irrigation deliveries in higher irrigation delivery years, or natural events. Remaining natural flows must be protected to ensure the higher range of flows can occur in the system.
	LF5	Mehi near Collarenebri (418055)	>800 ML/d	4 years	July to September (but can occur any time)	5 days minimum	Triggered when LF1 at Barwon @ Collarenebri is detected within 18 months of LF2 at Darling @ Wilcannia	
Small overbank	OB1	Mehi @ Moree (418002)	>65,000 ML event (2–3 months)	2 years	September to March (but can occur any time)	2–8 months of habitat inundation	7–8 years in 10	These EWRs cannot be met by HEW with the current volumes that are available and under current constraints. Flows >3,000 ML/d at Mehi @ Moree are dependent on the remaining natural events. Remaining natural flows must be protected to meet these flows. These larger events will also result in large overbank events in downstream planning units.
	OB2	Mehi @ Moree (418002)	>85,000 ML event (1–2 months)	3 years	October to April	10 days minimum, 2–6 months of habitat inundation	4–7 years in 10	
	OB3	Mehi @ Moree (418002)	>130,000 ML event (1–2 months)	4 years	August to February (but can occur anytime)	5 days minimum, 2–3 months of habitat inundation	3–5 years in 10	
Large overbank	OB4	Mehi @ Moree (418002)	>150,000 ML event (1–2 months)	5 years	September to May	3–8 months of habitat inundation	2–3 years in 10	
	OB5	Mehi @ Moree (418002)	>250,000 ML event (3–4 months)	10–15 years	Any time	1–6 months of habitat inundation	1 year in 10	

1.11 Ballin Boora Creek

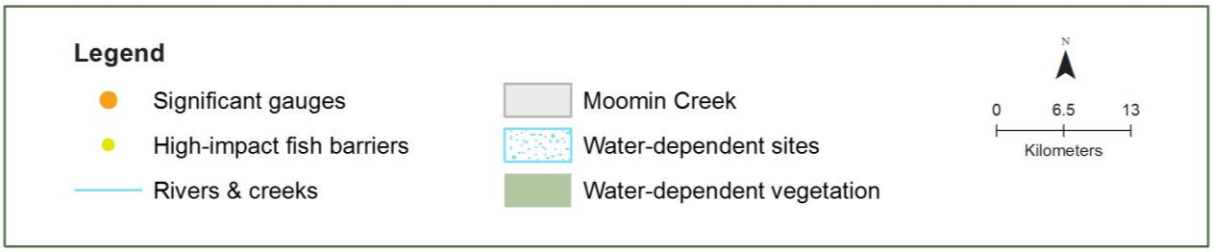




Priority environmental assets			
Ballin Boora Creek and associated floodplain wetland vegetation communities			
Native fish	• silver perch	• purple-spotted gudgeon	
Birds	41 water-dependent bird species recorded, including		
	• black-necked stork • common greenshank	• the cattle egret • eastern great egret • sharp-tailed sandpiper	• marsh sandpiper • magpie goose
Native vegetation	Five water-dependent PCTs, including coolibah wetland woodlands and riparian river cooba wetlands, river redgum woodlands, Cumbungi wetlands, and lignum shrublands		
Registered cultural assets	None registered		

Flow component		Gauge	Flow rate / volume (event window)	Maximum inter-event period	Timing	Duration	Frequency	Additional water requirement descriptions and current management limitations
Baseflow	BF1	No gauge (metered only)	600–1,200 ML event delivered at 10–50 ML/d via infrastructure	3 years	Any time	12–120 days	N/A	
Small overbank	OB1	Mehi US Ballin Boora (418068)	>3,000 ML event (>2,000 ML/d)	2 years	September to March (but can occur any time)	1 day minimum, 2–8 months of habitat inundation	7–8 years in 10	These EWRs cannot be met by HEW with the current volumes that are available and under current constraints. Flows >3,000 ML/d at Mehi @ Moree are dependent on the remaining natural events. Remaining natural flows must be protected to meet these flows.
	OB2	Mehi US Ballin Boora (418068)	>7,000 ML event (>2,000 ML/d)	3 years	October to April (but can occur any time)	2 days minimum, 2–6 months of habitat inundation	4–7 years in 10	
	OB3	Mehi US Ballin Boora (418068)	>21,000 ML event (>2,000 ML/d)	4 years	August to February (but can occur any time)	5 days minimum, 2–3 months of habitat inundation	3–5 years in 10	
Large overbank	OB4	Mehi US Ballin Boora (418068)	>54,000 ML event (>2,000 ML/d)	5 years	September to May (but can occur any time)	9 days minimum, 3–8 months of habitat inundation	2–3 years in 10	
		Mehi @ Moree (418002)	>150,000 ML event (1–2 months)			3–8 months of habitat inundation		
	OB5	Mehi @ Moree (418002)	>250,000 ML event (3–4 months)	10–15 years	Any time	1–6 months of habitat inundation	1 year in 10	

1.12 Moomin Creek

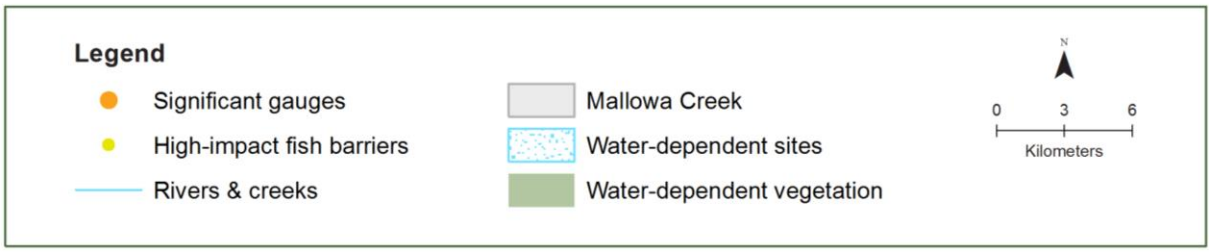


Priority environmental assets			
Moomin Creek, associated inchannel habitat, and fringing and floodplain wetland vegetation communities		Mongyer Lagoon Coolibah Lagoon	
Native fish	• Australian smelt • carp–gudgeon • Murray–Darling rainbowfish	• silver perch • spangled perch • golden perch	• Murray cod • bony herring
Birds	39 water-dependent bird species recorded, including gull-billed tern and eastern great egret		
Native vegetation	13 water-dependent PCTs, including • river red gum woodlands • black box woodland	• coolibah woodlands and coolibah wetland woodlands • lignum shrubland wetlands	• water couch marsh grasslands
Registered cultural assets	• Modified trees	• Midden and open camp sites	

Flow component		Gauge	Flow rate / volume (event window)	Maximum inter-event period	Timing	Duration	Frequency	Additional water requirement descriptions and current management limitations
Cease-to-flow	CF1	Moomin @ Combadello (418048)	0 ML/d	N/A	In line with historical low flow season, typically April to June	Events should not persist longer than 70 days	Should occur in no more than 90% of years	When restarting flows, avoid harmful water-quality impacts, such as de-oxygenated refuge pools. Flows should ideally be >0.03–0.05 m/s to prevent stratification of pools.
Baseflow	BF1	Moomin @ Combadello (418048)	>30 ML/d	1 year	Any time	200 days minimum (or 120 days minimum in very dry years)	Annual	
	BF2	Moomin @ Combadello (418048)	>30 ML/d	2 years	September to March	170 days minimum (or 140 days minimum in very dry years)	5–10 years in 10	
Small fresh	SF1	Moomin @ Combadello (418048)	>80 ML/d	1 year	October to April (but can occur any time)	10 days minimum	Annual	These EWRs can be met with current volumes of HEW under current constraints in addition to irrigation deliveries and PEW at flows <1,500 ML/d. Remaining natural flows must be protected to ensure the higher range of flows can occur in the system.
	SF2	Moomin @ Combadello (418048)	80–500 ML/d	2 years	September to April	14 days minimum	5–10 years in 10	
Large fresh	LF1	Moomin @ Combadello (418048)	>500 ML/d	2 years	July to September (but can occur any time)	5 days minimum	5–10 years in 10	
	LF2	Moomin @ Combadello (418048)	>500 ML/d	4 years	October to April	5 days minimum	3–5 years in 10	

Flow component		Gauge	Flow rate / volume (event window)	Maximum inter-event period	Timing	Duration	Frequency	Additional water requirement descriptions and current management limitations
Bankfull	BK1	Moomin @ Combadello (418048)	>2,200–3,000 ML/d	N/A	August to February (but can occur any time)	2 days minimum (or 1 day minimum in very dry years)	5–7 years in 10	These EWRs cannot be met by HEW with the current volumes that are available and under current constraints. Flows >3,000 ML/d at Mehi @ Moree are dependent on the remaining natural events. Remaining natural flows must be protected to meet these flows. These larger events will also result in large overbank events in downstream planning units.
Small overbank	OB2	Moomin @ Combadello (418048)	>3,000 ML/d	3 years	October to April	10 days minimum, 2–6 months of habitat inundation	4–7 years in 10	
	OB3	Moomin @ Combadello (418048)	>4,000 ML/d	4 years	August to February (but can occur any time)	5 days minimum, 2–3 months of habitat inundation	3–5 years in 10	
Large overbank	OB4	Mehi @ Moree (418002)	>150,000 ML event (1–2 months)	5 years	September to May (but can occur any time)	3–8 months of habitat inundation	2–3 years in 10	
	OB5	Mehi @ Moree (418002)	>250,000 ML event (3–4 months)	10–15 years	Any time	1–6 months of habitat inundation	1 year in 10	

1.13 Mallowa Creek

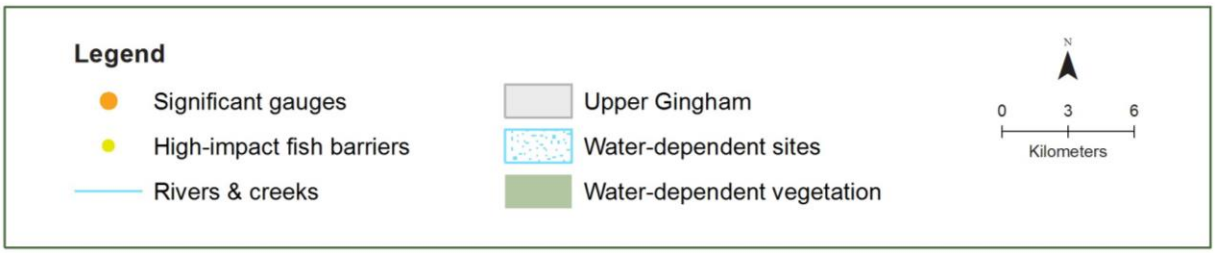


Priority environmental assets			
Mallowa Creek, associated inchannel habitat, and fringing and floodplain wetland vegetation communities Wetland areas potentially capable of supporting colonial waterbird breeding			
Native fish	• carp–gudgeon • Murray–Darling rainbowfish • silver perch	• spangled perch • golden perch • Murray cod	• bony herring • olive perchlet
Birds	42 water-dependent bird species recorded, including endangered Australian painted snipe and cattle egret and eastern great egret		
Native vegetation	Six water-dependent PCTs, including • river red gum woodlands • water couch marshlands • river coobah wetland	• coolibah woodlands and coolibah wetland woodlands	• Lignum shrublands • Spike rush mixed marshlands
Registered cultural assets	• Modified trees		

Flow component		Gauge	Flow rate / volume (event window)	Maximum inter-event period	Timing	Duration	Frequency	Additional water requirement descriptions and current management limitations
Cease-to-flow	CF1	Mallowa @ Regulator (418049)	0 ML/d	N/A	In line with historical low flow season, typically April to June	Events should not persist longer than 50 days	Should occur in no more than 94% of years	When restarting flows, avoid harmful water-quality impacts, such as de-oxygenated refuge pools. Flows should ideally be >0.03–0.05 m/s to prevent stratification of pools.
Baseflow	BF1	Mallowa @ Regulator (418049)	>10 ML/d	1 year	Any time	100 days minimum (or 60 days minimum in very dry years)	Annual	
	BF2	Mallowa @ Regulator (418049)	>10 ML/d	2 years	September to March	60 days minimum (or 20 days minimum in very dry years)	5–10 years in 10	
Small fresh	SF1	Mallowa @ Regulator (418049)	>30 ML/d	1 year	October to April (but can occur any time)	10 days minimum	Annual	These EWRs can be met with current volumes of HEW under current constraints at flows <150 ML/d. Constraints need to be relaxed and the remaining natural flows must be protected to ensure the higher range of flows can occur in the system.
	SF2	Mallowa @ Regulator (418049)	30–150 ML/d	2 years	September to April	14 days minimum	5–10 years in 10	
Large fresh	LF1	Mallowa @ Regulator (418049)	>150 ML/d	2 years	July to September (but can occur any time)	5 days minimum	5–10 years in 10	These EWRs may not be able to be met by HEW alone with the current volumes that are available and under current constraints. Flows >300 ML/d are dependent on the remaining natural events. Constraints need to be relaxed and remaining natural flows
	LF2	Mallowa @ Regulator (418049)	>150 ML/d	4 years	October to April	5 days minimum	3–5 years in 10	
Small wetland inundation	WL1	Mallowa @ Regulator (418049)	>3,000 ML event	18 months	Any time	In line with natural	9–10 years in 10	

Flow component		Gauge	Flow rate / volume (event window)	Maximum inter-event period	Timing	Duration	Frequency	Additional water requirement descriptions and current management limitations
	WL2	Mallowa @ Regulator (418049)	>8,000 ML event (2–4 months)	2 years	September to March (but can occur any time)	2–8 months of habitat inundation	7–9 years in 10	must be protected to meet these flows.
Large wetland inundation	WL3	Mallowa @ Regulator (418049)	>15,000 ML event (2–4 months)	3 years	October to April	10 days minimum, 2–6 months of habitat inundation	5–7 years in 10	
	WL4	Mallowa @ Regulator (418049)	>22,000 ML event (2–6 months)	5 years	August to February (but can occur any time)	5 days minimum, 2–3 months of habitat inundation	3–5 years in 10	
Large overbank	OB4	Mehi @ Moree (418002)	>150,000 ML event (1–2 months)	5 years	September to May (but can occur any time)	3–8 months of habitat inundation	2–3 years in 10	These EWRs cannot be met by HEW with the current volumes that are available and under current constraints. Flows >1,500 ML/d at Mallowa @ Regulator gauge will require large flows in the Mehi system. Flows >3,000 ML/d at Mehi @ Moree gauge are dependent on the remaining natural events. Constraints need to be relaxed and remaining natural flows must be protected to meet these flows.
	OB5	Mehi @ Moree (418002)	>250,000 ML event (3–4 months)	10–15 years	Any time	1–6 months of habitat inundation	1 year in 10	

1.14 Upper Gingham

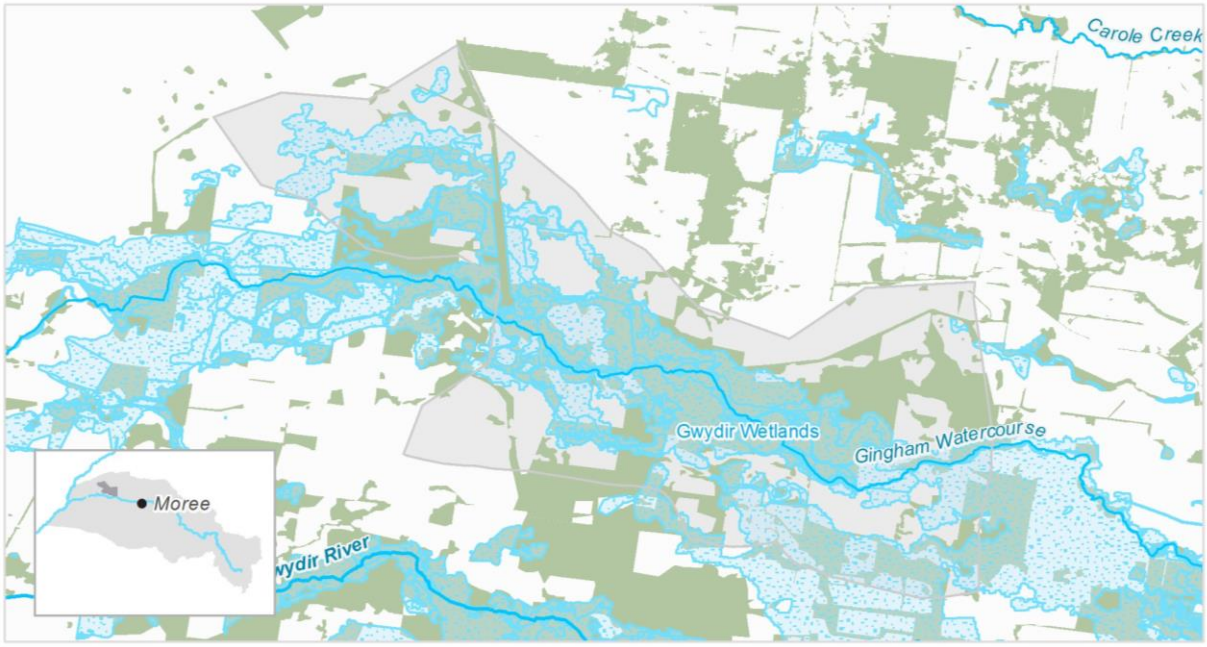


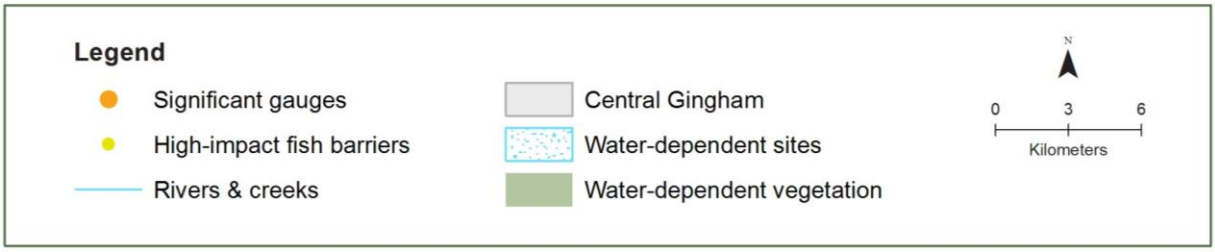
Priority environmental assets			
Gingham Watercourse and associated inchannel habitat and fringing vegetation communities Floodplain and wetland vegetation communities The Raft A portion of the Gingham Wetlands		Remnant wetland including the Gully property (Jackson Paddock) remnant wetlands Gwydir Lagoon Talmoi, Baroona and Tillaloo Waterholes waterbird breeding habitat	
Native fish	• Australian smelt • olive perchlet • unspecked hardyhead • Murray–Darling rainbowfish	• bony herring • silver perch • spangled perch • carp gudgeon	• purple-spotted gudgeon • Murray cod • freshwater catfish • golden perch
Birds	66 water-dependent bird species recorded, including black-necked stork; magpie goose; sharp-tailed sandpiper and common greenshank; brolga; cattle egret and eastern great egret; Latham's snipe, blue-billed duck		
Native vegetation	14 water-dependent PCTs, including coolibah woodlands and coolibah wetland woodlands; water couch marsh grasslands and wetlands; lignum shrublands; river red gum woodlands		
Registered cultural assets	• Modified tree		

Flow component		Gauge	Flow rate / volume (event window)	Maximum inter-event period	Timing	Duration	Frequency	Additional water requirement descriptions and current management limitations
Cease-to-flow	CF1	Gingham @ Teralba (418074)	0 ML/d	N/A	In line with historical low flow season, typically April to June	40–60 days maximum (hot conditions) or 60–80 days maximum (cooler conditions)	Should occur in no more than 15% of years	When restarting flows, avoid harmful water-quality impacts, such as de-oxygenated refuge pools. Flows should ideally be >0.03–0.05 m/s to prevent stratification of pools.
Very-low flow	VF1	Gingham @ Teralba (418074)	>30 ML/d	1 year	Any time	340 days minimum (or 110 days minimum in very dry years)	Annual	
Baseflow	BF1	Gingham @ Teralba (418074)	>100 ML/d	1 year	Any time	250 days minimum (or 40 days minimum in very dry years)	Annual	
	BF2	Gingham @ Teralba (418074)	>100 ML/d	2 years	September to March	150 days minimum (or 40 days minimum in very dry years)	5–10 years in 10	
Small fresh	SF1	Gingham @ Teralba (418074)	>250 ML/d	1 year	October to April (but can occur any time)	10 days minimum	Annual	These EWRs may not be able to be met by HEW alone with the current volumes that are available and under current constraints. Flows >500 ML/d are dependent on the remaining natural events. Currently, HEW may be used to contribute to these flows if delivered in addition to irrigation deliveries in higher irrigation delivery years, or natural events.
	SF2	Gingham @ Teralba (418074)	250-1,000 ML/d	2 years	September to April	14 days minimum	5–10 years in 10	

Flow component		Gauge	Flow rate / volume (event window)	Maximum inter-event period	Timing	Duration	Frequency	Additional water requirement descriptions and current management limitations
Large fresh	LF1	Gingham @ Teralba (418074)	>1,000 ML/d	2 years	July to September (but can occur any time)	5 days minimum	5–10 years in 10	These EWRs cannot be met by HEW with the current volumes that are available and under current constraints. Flows >500 ML/d at Gwydir @ Teralba gauge are dependent on the remaining natural events. Remaining natural flows must be protected to meet these flows.
	LF2	Gingham @ Teralba (418074)	>1,000 ML/d	4 years	October to April	5 days minimum	3–5 years in 10	
Small wetland inundation	WL1	Gingham @ Teralba (418074)	>15,000 ML event (1-3 months)	1 year	Any time	N/A	9-10 years in 10	These EWRs may not be able to be met by HEW alone with the current volumes that are available and under current constraints. Flows >500 ML/d are dependent on the remaining natural events. Currently, HEW may be used to contribute to these flows if delivered in addition to irrigation deliveries in higher irrigation delivery years, or natural events. Remaining natural flows must be protected to meet these flows.
	WL2	Gingham @ Teralba (418074)	>30,000 ML event (1-3 months)	2 years	September to March (but can occur any time)	2–8 months of habitat inundation	8–9 years in 10	
Large wetland inundation	WL3	Gingham @ Teralba (418074)	>45,000 ML event (1-3 months)	3 years	October to April	10 days minimum, 2–6 months of habitat inundation	5–8 years in 10	
	WL4	Gingham @ Teralba (418074)	>60,000 ML event (1-3 months)	5 years	August to February (but can occur any time)	5 days minimum, 2–3 months of habitat inundation	3–5 years in 10	These EWRs cannot be met by HEW with the current volumes that are available and under current constraints. Flows >2000 ML/d at Gwydir @ Yarraman gauge and flows >500 ML/d at Gwydir @ Teralba gauge are dependent on the remaining natural events. Remaining natural flows must be protected to meet these flows.
Large overbank	OB4	Gwydir @ Yarraman (418004)	>250,000 ML event (1–2 months)	5 years	September to May (but can occur any time)	3–8 months of habitat inundation	2–3 years in 10	
	OB5	Gwydir @ Yarraman (418004)	>500,000 ML event (1-3 months)	10–15 years	Any time	1–6 months of habitat inundation	1 year in 10	

1.15 Central Gingham





Priority environmental assets

Gingham watercourse non-woody wetlands areas of water couch, spike rushes, typha and marsh club-rush

Lagoons and waterholes including Gingham Waterhole, Racecourse and Little Lagoons, Bunnor Waterbird Lagoons, and other unnamed lagoons

Endangered ecological communities, including coolibah woodlands, myall woodlands and marsh club rush

Largest continuous intact area of the Gwydir's mosaic of wetlands remaining on the Gwydir floodplain

Egret, heron and ibis colonial nesting waterbird breeding sites including Bunnor, Lynworth, Yarrol, Muwonga and Glendara

Goddard's Lease Ramsar site

Large areas of productive wetland foraging and waterbird breeding habitat

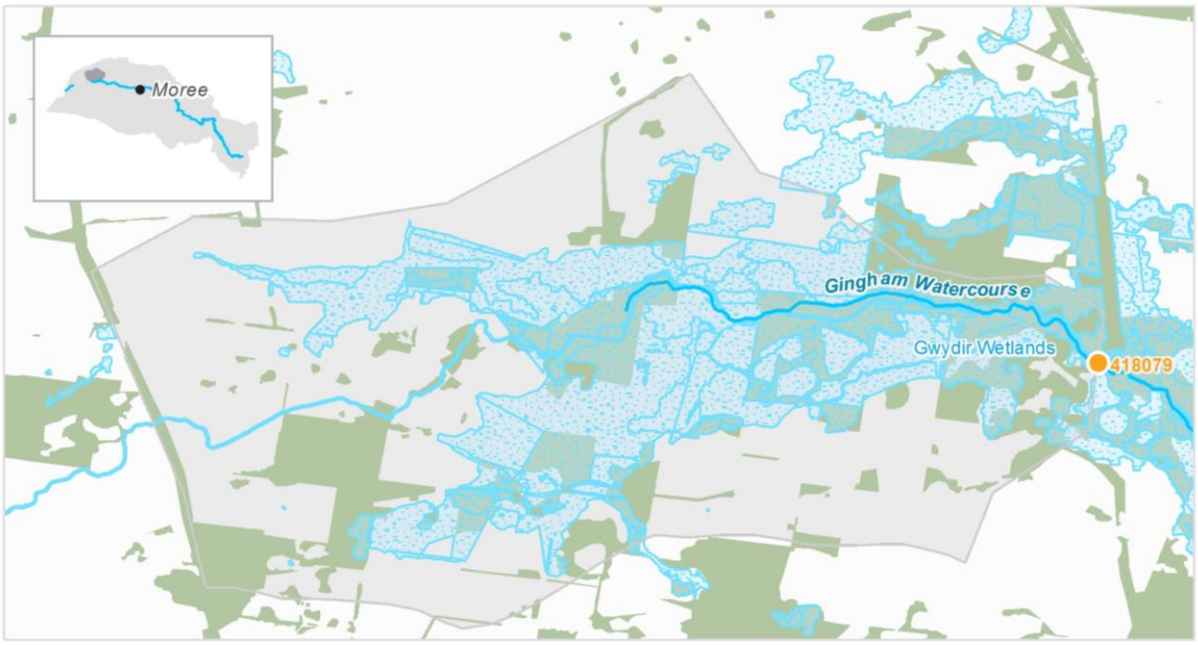
Native fish	• Australian smelt • carp–gudgeon • Murray–Darling rainbowfish	• golden perch • spangled perch • silver perch	• Murray Cod • bony Herring • olive perchlet
Birds	90 water-dependent bird species recorded, including		
	• magpie goose • cattle egret • intermediate egret • eastern great egret • white-necked heron • little egret • white-faced heron	• whiskered tern • silver gull • gull-billed tern • Caspian tern • marsh sandpiper • Australian pelican • glossy ibis	• black-tailed godwit • common greenshank • yellow-billed spoonbill • royal spoonbill • Australian white ibis • straw-necked ibis • Australian bittern

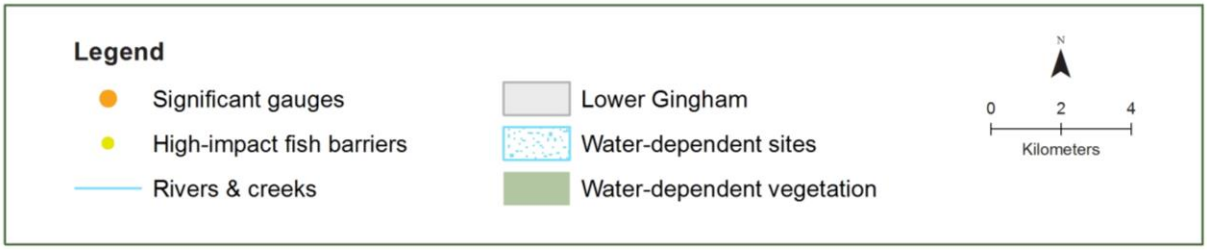
Priority environmental assets			
	• brolga • nankeen night heron • black-necked stork	• sharp-tailed sandpiper • Latham's snipe	• little bittern • Australian painted snipe
Native vegetation	Patches of Lowland Darling River endangered ecological community and • Extensive lignum shrubland • coolibah wetland woodlands	• non-woody wetland vegetation communities	• River red gum woodlands
Registered cultural assets	• Modified trees		

Flow component		Gauge	Flow rate / volume (event window)	Maximum inter-event period	Timing	Duration	Frequency	Additional water requirement descriptions and current management limitations
Cease-to-flow	CF1	Gingham @ Tillaloo (418076)	0 ML/d	N/A	In line with historical low flow season, typically April to June	Events should not persist longer than 180 days	Should occur in no more than 50% of years	When restarting flows, avoid harmful water-quality impacts, such as de-oxygenated refuge pools. Flows should ideally be >0.03–0.05 m/s to prevent stratification of pools.
Very-low flow	VF1	Gingham @ Tillaloo (418076)	>20 ML/d	1 year	Any time	350 days minimum (or 130 days minimum in very dry years)	Annual	
Baseflow	BF1	Gingham @ Tillaloo (418076)	>80 ML/d	1 year	Any time	230 days minimum (or 30 days minimum in very dry years)	Annual	
	BF2	Gingham @ Tillaloo (418076)	>80 ML/d	2 years	September to March	10 days minimum (or 1 days minimum in very dry years)	5–10 years in 10	
Small wetland inundation	WL1	Gingham @ Tillaloo (418076)	>15,000 ML event (2-6 months)	1 year	Any time	N/A	9-10 years in 10	These EWRs may not be able to be met by HEW alone with the current volumes that are available and under current constraints. Flows >250 ML/d are mainly dependent on the remaining natural events. Currently, HEW may be used to contribute to these flows if delivered in addition to irrigation deliveries in higher irrigation delivery years, or natural events. Constraints need to be relaxed and
	WL2	Gingham @ Tillaloo (418076)	>30,000 ML event (2-6 months)	2 years	September to March (but can occur any time)	2–8 months of habitat inundation	8–9 years in 10	
Large wetland inundation	WL3	Gingham @ Tillaloo (418076)	>40,000 ML event (2-6 months)	3 years	October to April	10 days minimum, 2–6 months of habitat inundation	5–8 years in 10	

Flow component		Gauge	Flow rate / volume (event window)	Maximum inter-event period	Timing	Duration	Frequency	Additional water requirement descriptions and current management limitations
	WL4	Gingham @ Tillaloo (418076)	>60,000 ML event (2-6 months)	5 years	August to February (but can occur any time)	5 days minimum, 2–3 months of habitat inundation	3–5 years in 10	remaining natural flows must be protected to meet these flows.
Large overbank	OB4	Gwydir @ Yarraman (418004)	>250,000 ML event (1–2 months)	5 years	September to May (but can occur any time)	3–8 months of habitat inundation	2–3 years in 10	These EWRs cannot be met by HEW with the current volumes that are available and under current constraints. Flows >2000 ML/d at Gwydir @ Yarraman gauge are dependent on the remaining natural events. Remaining natural flows must be protected to meet these flows.
	OB5	Gwydir @ Yarraman (418004)	>500,000 ML event (1-3 months)	10–15 years	Any time	1–6 months of habitat inundation	1 year in 10	

1.16 Lower Gingham



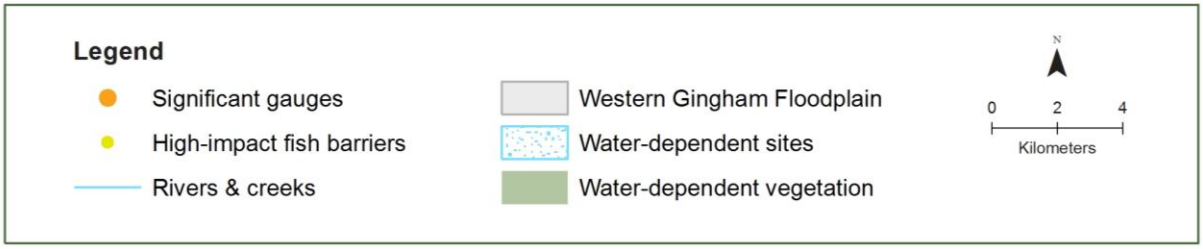


Priority environmental assets			
Windella and Crinolyn Ramsar sites Bronkeedna Waterhole Brighton Waterhole		A portion of the Gingham Wetlands Boyanga Waterhole Aid Blair Waterhole Waterbird feeding and breeding habitat	
Native fish	• olive perchlet	• silver perch	
Birds	54 water-dependent bird species recorded, including • black-necked stork • brolga	• common greenshank	• eastern great egret
Native vegetation	Eight water-dependent PCTs, including • river coobah wetlands • Lignum shrublands	• coolibah wetland woodlands	• water couch marsh grasslands
Registered cultural assets	• Burial sites	• Modified trees	

Flow component		Gauge	Flow rate / volume (event window)	Maximum inter-event period	Timing	Duration	Frequency	Additional water requirement descriptions and current management limitations
Cease-to-flow	CF1	Gingham @ Gingham Brd (418079)	0 ML/d	N/A	In line with historical low flow season, typically April to June	Events should not persist longer than 70 days	Should occur in no more than 50% of years	When restarting flows, avoid harmful water-quality impacts, such as de-oxygenated refuge pools. Flows should ideally be >0.03–0.05 m/s to prevent stratification of pools.
Very-low flow	VF1	Gingham @ Gingham Brd (418079)	>20 ML/d	1 year	Any time	270 days minimum (or 40 days minimum in very dry years)	Annual	
Small wetland inundation	WL1	Gingham @ Gingham Brd (418079)	>3,000 ML event (1-4 months)	1 year	Any time	N/A	9-10 years in 10	These EWRs may not be able to be met by HEW alone with the current volumes that are available and under current constraints. Flows >250 ML/d at Gwydir @ Tillaloo gauge are mainly dependent on the remaining natural events. Currently, HEW may be used to contribute to these flows if delivered in addition to irrigation deliveries in higher irrigation delivery years, or natural events. Constraints need to be relaxed and remaining natural flows must be protected to meet these flows.
	WL2	Gingham @ Gingham Brd (418079)	>15,000 ML event (1-4 months)	2 years	September to March (but can occur any time)	2–8 months of habitat inundation	8–9 years in 10	
Large wetland inundation	WL3	Gingham @ Gingham Brd (418079)	>20,000 ML event (1-4 months)	3 years	October to April	10 days minimum, 2–6 months of habitat inundation	5–8 years in 10	
	WL4	Gingham @ Gingham Brd (418079)	>30,000 ML event (1-4 months)	5 years	August to February (but can occur any time)	5 days minimum, 2–3 months of habitat inundation	3–5 years in 10	

Flow component		Gauge	Flow rate / volume (event window)	Maximum inter-event period	Timing	Duration	Frequency	Additional water requirement descriptions and current management limitations
Large overbank	OB4	Gwydir @ Yarraman (418004)	>250,000 ML event (1–2 months)	5 years	September to May (but can occur any time)	3–8 months of habitat inundation	2–3 years in 10	These EWRs cannot be met by HEW with the current volumes that are available and under current constraints. Flows >2000 ML/d at Gwydir @ Yarraman gauge are dependent on the remaining natural events. Remaining natural flows must be protected to meet these flows.
	OB5	Gwydir @ Yarraman (418004)	>500,000 ML event (1-3 months)	10–15 years	Any time	1–6 months of habitat inundation	1 year in 10	

1.17 Western Gingham Floodplain



Priority environmental assets			
Floodplain vegetation communities associated with the Gingham watercourse			
Native fish	• olive perchlet • Murray–Darling rainbowfish • purple-spotted gudgeon	• silver perch • spangled perch • golden perch	• carp–gudgeon • Murray Cod • bony Herring
Birds	Five water-dependent birds recorded, including the brolga		
Native vegetation	Six water-dependent PCTs, including • black box woodland wetlands • River red gum woodlands	• coolibah woodlands and wetland woodlands	• water couch marsh grasslands
Registered cultural assets	None registered		

Flow component		Gauge	Flow rate / volume (event window)	Maximum inter-event period	Timing	Duration	Frequency	Additional water requirement descriptions and current management limitations
Large overbank	OB4	Gwydir @ Yarraman (418004)	>250,000 ML event (1–2 months)	5 years	September to May (but can occur any time)	3–8 months of habitat inundation	2–3 years in 10	These EWRs cannot be met by HEW with the current volumes that are available and under current constraints. Flows >2000 ML/d at Gwydir @ Yarraman gauge are dependent on the remaining natural events. Remaining natural flows must be protected to meet these flows.
	OB5	Gwydir @ Yarraman (418004)	>500,000 ML event (1-3 months)	10–15 years	Any time	1–6 months of habitat inundation	1 year in 10	

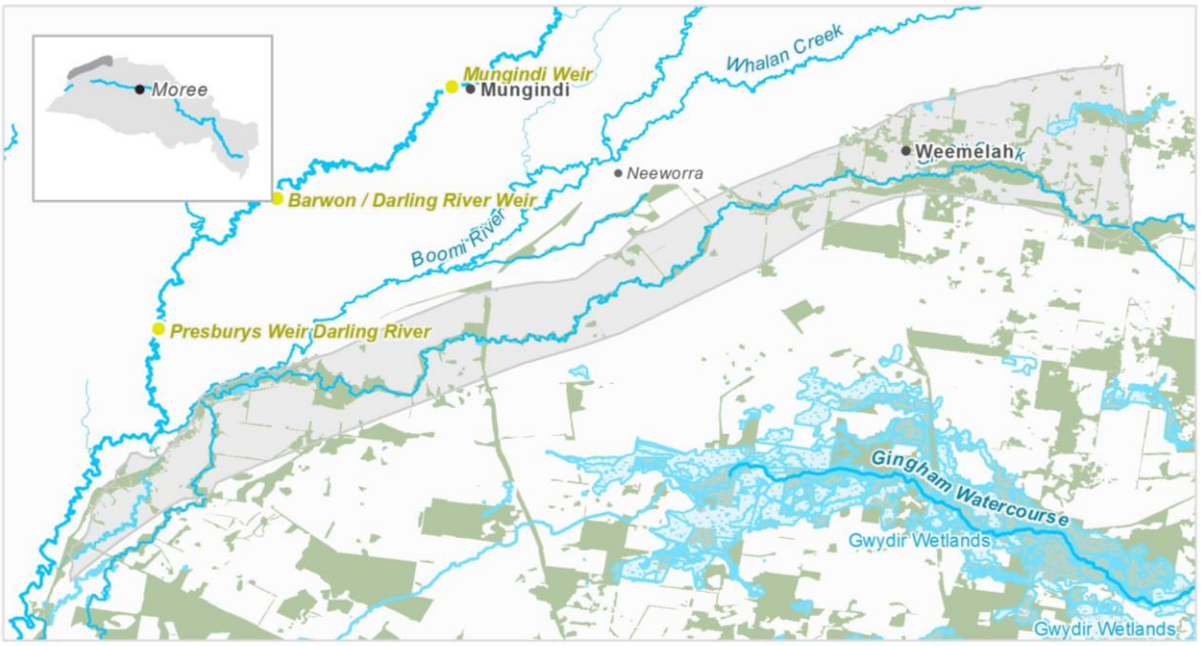
1.18 Carole Creek

Priority environmental assets			
Boonoona Waterhole Carole Creek, associated inchannel habitat, and fringing and floodplain wetland vegetation communities			Moorina Waterhole Moorah Waterhole
Native fish	• Australian smelt • carp–gudgeon • Murray–Darling rainbowfish	• golden perch • Murray cod	• bony herring • spangled perch
Birds	39 water-dependent bird species recorded, including • black-necked stork • brolga	• gull-billed tern	• cattle egret • eastern great egret
Native vegetation	Sixteen water-dependent PCTs, including • river red gum woodlands • black box floodplain woodlands	• coolibah woodlands and coolibah wetland woodlands • lignum shrubland wetlands	• water couch marsh grasslands
Registered cultural assets	• Modified trees		

Flow component		Gauge	Flow rate / volume (event window)	Maximum inter-event period	Timing	Duration	Frequency	Additional water requirement descriptions and current management limitations
Cease-to-flow	CF1	Carole near Garah (418052)	0 ML/d	N/A	In line with historical low flow season, typically April to June	40–60 days maximum (hot conditions) or 60–80 days maximum (cooler conditions)	Should occur in no more than 100% of years	When restarting flows, avoid harmful water-quality impacts, such as de-oxygenated refuge pools. Flows should ideally be >0.03–0.05 m/s to prevent stratification of pools.
Baseflow	BF1	Carole near Garah (418052)	>70 ML/d	1 year	Any time	160 days minimum (or 100 days minimum in very dry years)	Annual	
	BF2	Carole near Garah (418052)	>70 ML/d	2 years	September to March	140 days minimum (or 90 days minimum in very dry years)	5–10 years in 10	
Small fresh	SF1	Carole near Garah (418052)	>200 ML/d	1 year	October to April (but can occur any time)	10 days minimum	Annual	These EWRs can be met with current volumes of HEW under current constraints in addition to irrigation deliveries and PEW at flows <1,500 ML/d. Remaining natural flows must be protected to ensure the higher range of flows can occur in the system.
	SF2	Carole near Garah (418052)	200-900 ML/d	2 years	September to April	14 days minimum	5–10 years in 10	
Large fresh	LF1	Carole near Garah (418052)	>900 ML/d	2 years	July to September (but can occur any time)	5 days minimum	5–10 years in 10	These EWRs may not be able to be met by HEW alone with the current volumes that are available and under current constraints. Flows >1,500 ML/d are dependent on the remaining natural events. Remaining natural flows must be protected to meet these flows.
	LF2	Carole near Garah (418052)	>900 ML/d	4 years	October to April	5 days minimum	3–5 years in 10	

Flow component		Gauge	Flow rate / volume (event window)	Maximum inter-event period	Timing	Duration	Frequency	Additional water requirement descriptions and current management limitations
Bankfull	BK1	Carole near Garah (418052)	>1,500–2,000 ML/d	N/A	August to February (but can occur any time)	3 days minimum (or 1 days minimum in very dry years)	8–9 years in 10	These EWRs cannot be met by HEW with the current volumes that are available and under current constraints. Flows >1,500 ML/d are dependent on the remaining natural events. Remaining natural flows must be protected to meet these flows.
Small overbank	OB1	Carole near Garah (418052)	>2,000 ML/d	2 years	September to March (but can occur any time)	2–8 months of habitat inundation	7–8 years in 10	
	OB2	Carole near Garah (418052)	>3,000 ML/d	3 years	October to April	10 days minimum, 2–6 months of habitat inundation	4–7 years in 10	
	OB3	Carole near Garah (418052)	>5,000 ML/d	4 years	August to February (but can occur any time)	5 days minimum, 2–3 months of habitat inundation	3–5 years in 10	
Large overbank	OB4	Carole Creek DS Regulator (418011)	130,000 ML event (3 months)	5 years	September to May (but can occur any time)	3–8 months of habitat inundation	2–3 years in 10	
	OB5	Carole Creek DS Regulator (418011)	160,000 ML event (3 months)	10–15 years	Any time	1–6 months of habitat inundation	1 year in 10	

1.19 Gil Gil Creek



Priority environmental assets			
Gil Gil Creek, associated inchannel habitat, and fringing and floodplain wetland vegetation communities			Bengerang Waterhole Gunnyanna Waterhole Wadden Wadden Waterhole
Native fish	• carp gudgeon • Murray–Darling rainbowfish	• spangled perch • golden perch • Australian smelt	• Murray cod • bony herring
Birds	54 water-dependent bird species recorded, including • black-necked stork • brolga	• eastern great egret	• Latham's snipe
Native vegetation	18 water-dependent PCTs, including: • river red gum woodlands • lignum shrublands	• coolibah woodlands and coolibah wetland woodlands • black box woodland	• water couch marsh grasslands
Registered cultural assets	• Modified trees • Fishing areas		• Ceremonial ring

Flow component		Gauge	Flow rate / volume (event window)	Maximum inter-event period	Timing	Duration	Frequency	Additional water requirement descriptions and current management limitations
Cease-to-flow	CF1	Gil Gil @ Weemalah (416027)	0 ML/d	N/A	In line with historical low flow season, typically April to June	Events should not persist longer than 35 days	Should occur in no more than 97% of years	When restarting flows, avoid harmful water-quality impacts, such as de-oxygenated refuge pools. Flows should ideally be >0.03–0.05 m/s to prevent stratification of pools.
		Gil Gil @ Galloway (416052)						
Baseflow	BF1	Gil Gil @ Weemalah (416027)	>60 ML/d	1 year	Any time	130 days minimum (or 70 days minimum in very dry years)	Annual	
		Gil Gil @ Galloway (416052)	>25 ML/d			120 days minimum (or 40 days minimum in very dry years)		
	BF2	Gil Gil @ Weemalah (416027)	>60 ML/d	2 years	September to March	90 days minimum (or 50 days minimum in very dry years)	5–10 years in 10	
Small fresh	SF1	Gil Gil @ Weemalah (416027)	>160 ML/d	1 year	October to April (but can occur any time)	10 days minimum	Annual	These EWRs can be met with current volumes of HEW under current constraints in addition to irrigation deliveries and PEW at flows <1,000 ML/d at Gil Gil @ Weemalah gauge and <750 ML/d at Gil Gil @ Galloway. Remaining natural flows must be protected to ensure the higher range of flows can occur in the system.
	SF2	Gil Gil @ Weemalah (416027)	160-1,900 ML/d	2 years	September to April	14 days minimum	5–10 years in 10	
	SF3	Gil Gil @ Galloway (416052)	>45 ML/d	4 years	October to April (but can occur any time)	10 days minimum	Within 12 months following LF5	

Flow component		Gauge	Flow rate / volume (event window)	Maximum inter-event period	Timing	Duration	Frequency	Additional water requirement descriptions and current management limitations
Large fresh	LF1	Gil Gil @ Weemalah (416027)	>1,900 ML/d	2 years	July to September (but can occur any time)	5 days minimum	5–10 years in 10	These EWRs cannot be met by HEW with the current volumes that are available and under current constraints. Flows >1,000 ML/d at Gil Gil @ Weemalah gauge, >750 ML/d at Gil Gil @ Galloway, and >1,500 ML/d at Carole Creek DS Regulator are dependent on the remaining natural events. Remaining natural flows must be protected to meet these flows.
	LF2	Gil Gil @ Weemalah (416027)	>1,900 ML/d	4 years	October to April	5 days minimum	3–5 years in 10	
	LF5	Gil Gil @ Galloway (416052)	>750 ML/d	4 years	July to September (but can occur any time)	5 days minimum	Triggered when LF1 at Barwon @ Collarenebri is detected within 18 months of LF2 at Darling @ Wilcannia	
Bankfull	BK1	Gil Gil @ Weemalah (416027)	>2,700-3,700 ML/d	N/A	August to February (but can occur any time)	4 days minimum (or 1 days minimum in very dry years)	8 years in 10	
Small overbank	OB1	Gil Gil @ Weemalah (416027)	>3,700 ML/d	2 years	September to March (but can occur any time)	2–8 months of habitat inundation	7–8 years in 10	
	OB2	Gil Gil @ Weemalah (416027)	>10,000 ML/d	3 years	October to April	10 days minimum, 2–6 months of habitat inundation	4–7 years in 10	

Flow component		Gauge	Flow rate / volume (event window)	Maximum inter-event period	Timing	Duration	Frequency	Additional water requirement descriptions and current management limitations
	OB3	Gil Gil @ Weemalah (416027)	>20,000 ML/d	4 years	August to February (but can occur any time)	5 days minimum, 2–3 months of habitat inundation	3–5 years in 10	
Large overbank	OB4	Carole Creek DS Regulator (418011)	130,000 ML event (3 months)	5 years	September to May (but can occur any time)	3–8 months of habitat inundation	2–3 years in 10	
	OB5	Carole Creek DS Regulator (418011)	160,000 ML event (3 months)	10–15 years	Any time	1–6 months of habitat inundation	1 year in 10	

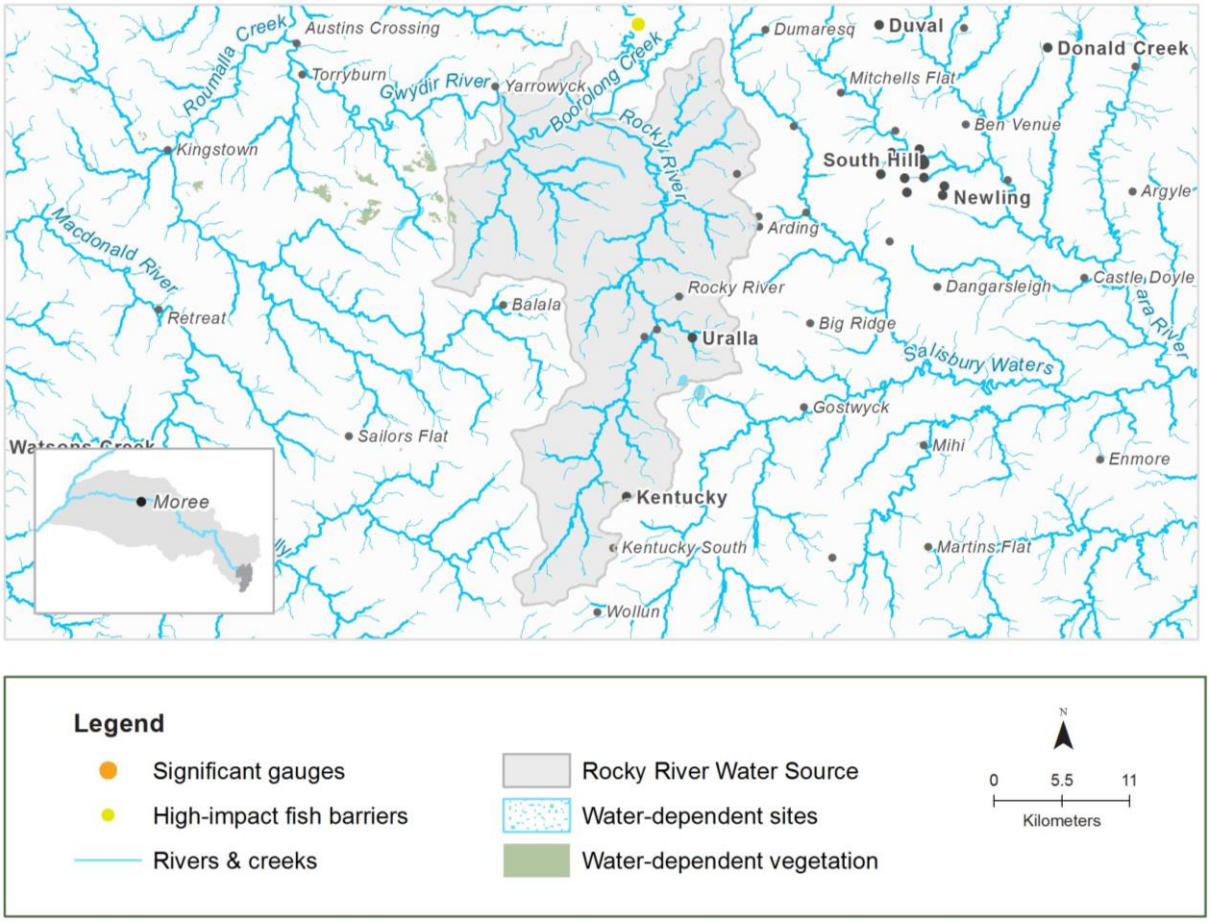
Zone B planning units

Zone B PUs are located upstream of Zone A planning units and cannot be managed with held environmental water. Instead, they rely on natural inflows, rules and conditions that provide planned environmental water in the planning unit, and planned environmental water from upstream planning units to meet the water needs of the priority assets and functions they support.

Rules in the Gwydir WSP that govern access to water for consumptive use are the primary mode of environmental water management in in Zone B planning units. To accommodate for this policy-based approach to environmental water management, Zone B planning unit boundaries are based on the water source boundaries described in the *Gwydir Water Resource Plan Risk Assessment*. This means that the water requirements of priority assets and functions in Zone B can be more easily managed through the policy mechanisms that govern planned environmental water in these areas.

Key to hydrological alteration from *Lachlan Water Resource Plan Risk Assessment* (NSW DOI-W, in prep)
L= Low: less than 20% departure (+/-) from the base case for each hydrologic metric
M = Medium: 20-50% departure (+/-); from the base case for each hydrologic metric
H = High: greater than 50% departure (+/-) from the base case for each hydrologic metric
N/A = no risk outcome or modelling available due to no hydrological data available
$^{+}$ increase near-natural condition
$^{-}$ decrease near-natural condition
^{0} no change from near-natural condition

1.20 Rocky River water source



Priority environmental assets		
Wilsons Creek Tolleys Gully Tributaries to Rocky River		Racecourse Lagoon Rocky River and its associated inchannel habitat and fringing vegetation communities
Native fish	• purple-spotted gudgeon	• freshwater catfish
Birds	73 water-dependent bird species recorded, including: • sharp-tailed sandpiper • Latham's snipe	• common greenshank • marsh sandpiper • cattle egret • eastern great egret • blue-billed duck
Native vegetation	Five water-dependent PCTs, including: river red gum woodlands, sedgeland fens wetlands and upland wetlands	
Registered cultural assets	None registered	

Hydrology			
Gauge – Gwydir River at Yarrowick (418014)	80th percentile – 1.9 ML/day	50th percentile – 16.8 ML/day	20th percentile – 98 ML/day

Cease-to-flow periods and low flows are moderately altered as assessed by the *Gwydir WRPA Risk Assessment*. Cease-to-flow periods currently occur more frequently and low flows occur less frequently compared to the 'without development' model scenario.

One large licence exists on Kentucky Creek and several small licences are dispersed in the upper part of this planning unit. It is characterised by very low flows, and water is mainly diverted when the

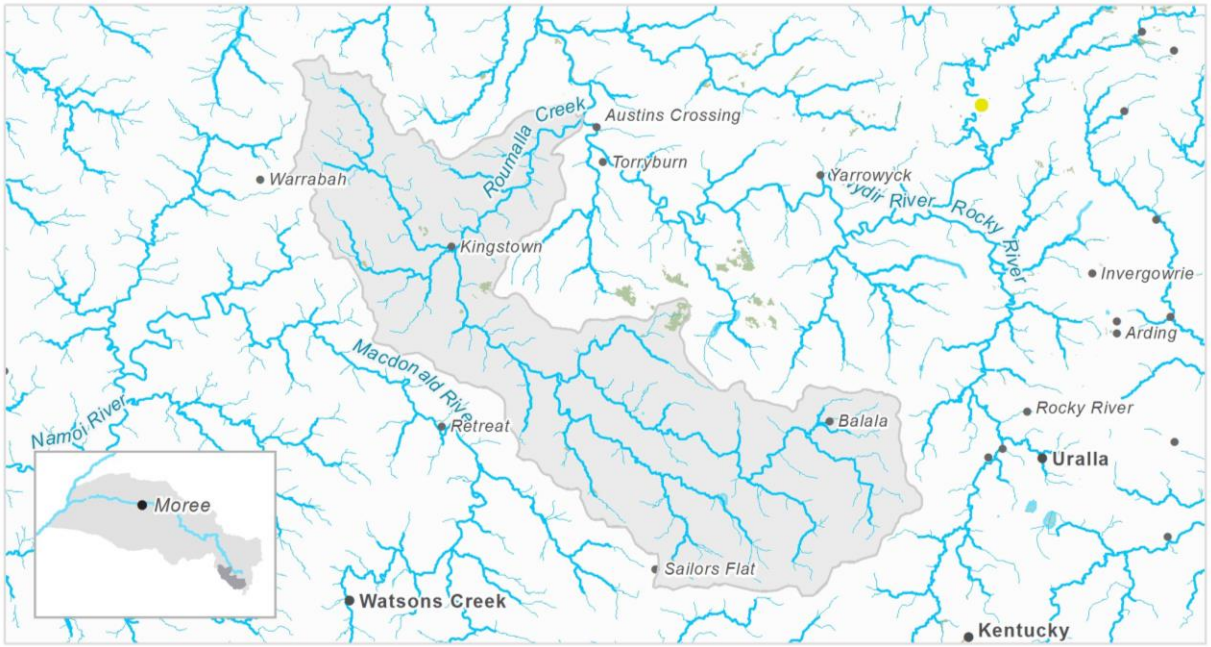
rainfall has been inadequate. This means that lower flows may be impacted by extraction (as confirmed by the risk assessment).

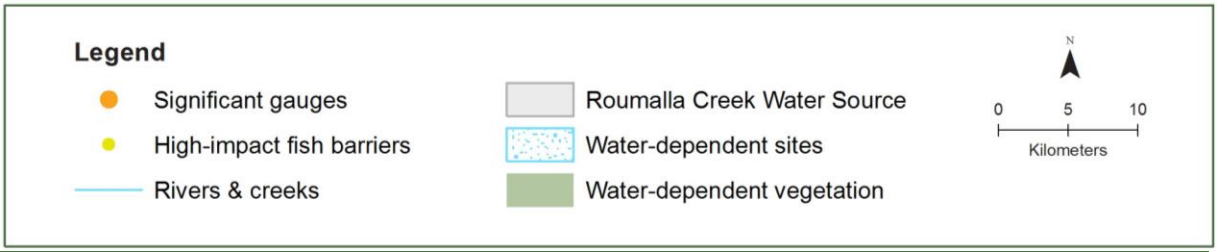
	Cease-to-flow	Low flow and Baseflow	Freshes	Overbanks
Hydrological alteration	M^+	M^-	L^-	L^0
Relevant rules	Cease to pump when there is no visible flow Trade not permitted into the water source			

Recommendations

- Investigate opportunities to reduce length of cease-to-flow periods and extraction pressure on baseflows in the *Water Sharing Plan for the Gwydir Unregulated Water Sources* within five years.
    - Consider rostering landholder water access during dry summer months.
    - Consider reviewing cease-to-pump rules to better protect low flows, especially during dry times or ecologically important months.
- Maintain current rules in the *Water Sharing Plan for the Gwydir Unregulated Water Sources*.
- Monitor for changes in land use and water demand and review access rules if current usage is high or if the pattern changes.

1.21 Roumalla Creek water source





Priority environmental assets			
Roumalla Creek and its associated inchannel habitat and fringing vegetation communities			
Native fish	• purple-spotted gudgeon	• freshwater catfish	
Birds	32 water-dependent bird species recorded		
Native vegetation	Four water-dependent PCTs, including river red gum woodlands, sedgeland–forbland wetlands & sedgeland fens wetlands		
Registered cultural assets	None registered		
Hydrology			
Gauge – Roumalla Creek (418024)	80th percentile – 2.4ML/day	50th percentile – 17.6ML/day	20th percentile – 103.9ML/day

Cease-to-flow periods are highly altered and low flows are moderately altered as assessed by the *Gwydir WRPA* Risk Assessment. Cease-to-flow periods currently occur more frequently and low flows occur less frequently compared to the 'without development' model scenario.

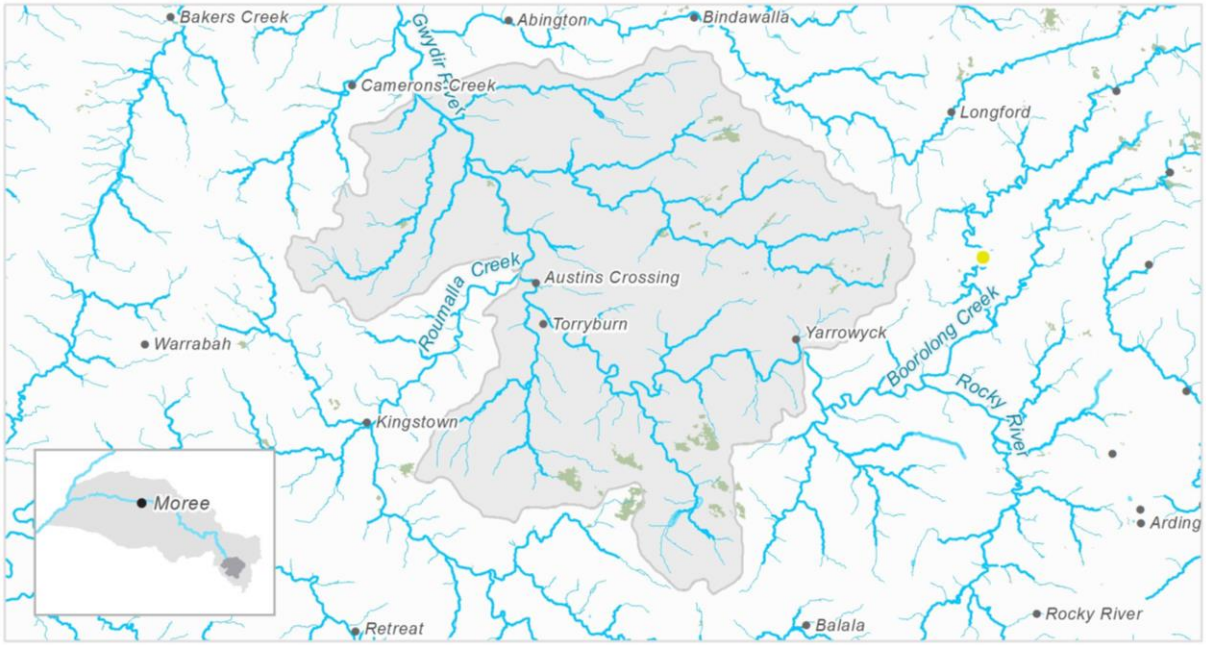
Several small licences are distributed along Roumalla Creek. It is characterised by very low flows, and water is mainly diverted when the rainfall has been inadequate. This means that lower flows may be substantially impacted by extraction (as confirmed by the risk assessment).

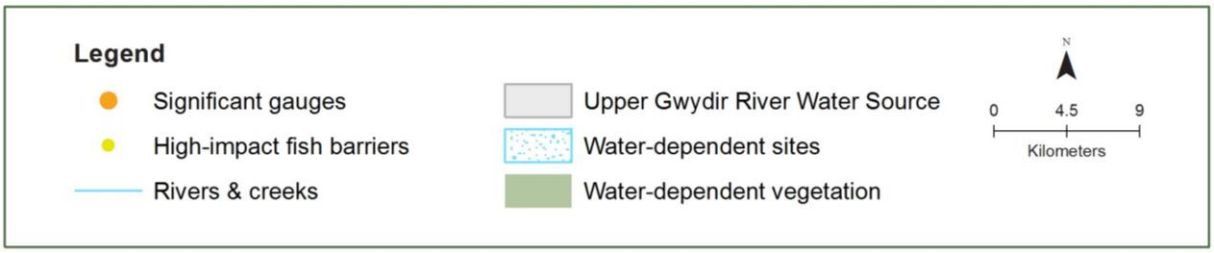
	Cease-to-flow	Low flow and Baseflow	Freshes	Overbanks
Hydrological alteration	H^+	M^-	L^0	L^0
Relevant rules	Cease to pump when there is no visible flow Trade not permitted into the water source			

Recommendations

- Investigate opportunities to reduce length of cease-to-flow periods and extraction pressure on baseflows in the *Water Sharing Plan for the Gwydir Unregulated Water Sources* within five years.
    - Consider rostering landholder water access during dry summer months.
    - Consider reviewing cease-to-pump rules to better protect low flows, especially during dry times or ecologically important months.
- Maintain current rules in the *Water Sharing Plan for the Gwydir Unregulated Water Sources*.
- Monitor for changes in land use and water demand and review access rules if current usage is high or if the pattern changes.

1.22 Upper Gwydir River water source





Priority environmental assets			
Gwydir River and its associated inchannel habitat and fringing vegetation communities Tributaries to the Gwydir River			
Native fish	• Murray cod • carp–gudgeon • river blackfish	• golden perch • Darling river hardyhead • freshwater catfish	• bony herring • Australian smelt • mountain galaxias
Birds	52 water-dependent bird species recorded, including blue-billed duck, Latham's snipe & eastern great egret		
Native vegetation	Three water-dependent PCTs, including river red gum woodlands & sedgeland fens wetlands		
Registered cultural assets	None registered		

Hydrology			
Gauge – Gwydir River at Stonybatter (418029)	80th percentile – 4.6ML/day	50th percentile – 44.6ML/day	20th percentile – 285.3ML/day

Cease-to-flow periods and low flows are highly altered as assessed by the *Gwydir WRPA* Risk Assessment. Cease-to-flow periods currently occur more frequently and low flows occur less frequently compared to the 'without development' model scenario.

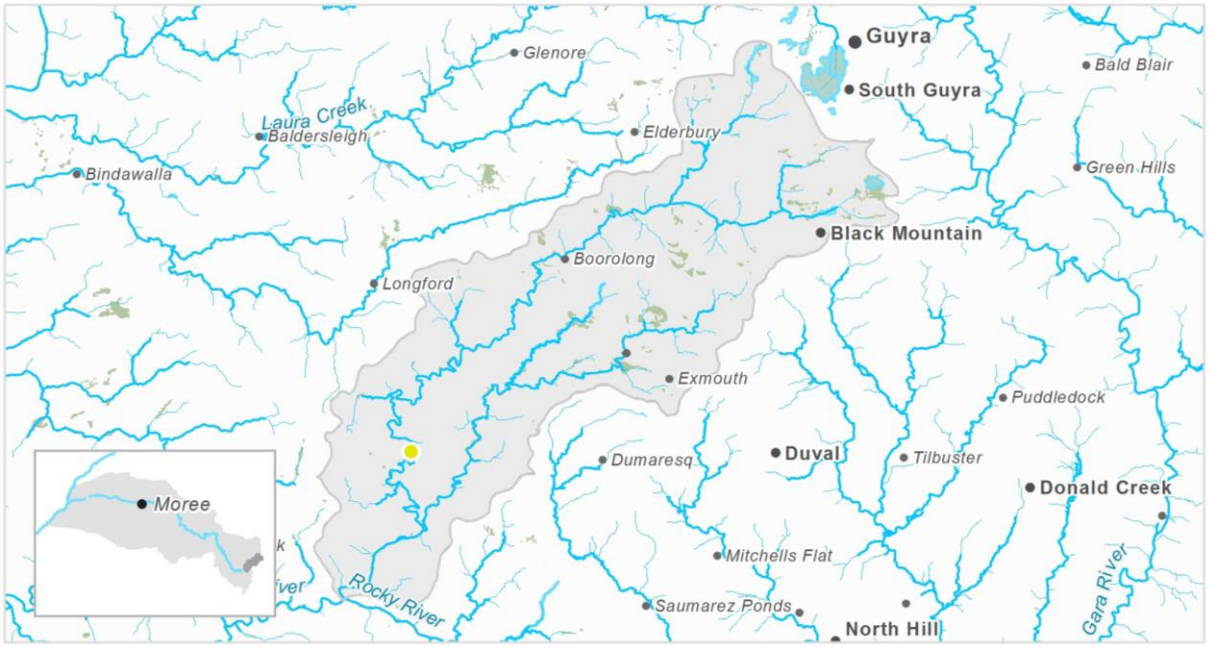
Several small licences are distributed throughout the Upper Gwydir River. It is characterised by low flows, and water is mainly diverted when the rainfall has been inadequate. This means that lower flows may be substantially impacted by extraction (as confirmed by the risk assessment).

	Cease-to-flow	Low flow and Baseflow	Freshes	Overbanks
Hydrological alteration	H+	H-	L-	L^0
Relevant rules	Cease to pump when there is no visible flow Trade not permitted into the water source			

Recommendations

- Investigate opportunities to reduce length of cease-to-flow periods and extraction pressure on baseflows in the *Water Sharing Plan for the Gwydir Unregulated Water Sources* within five years.
    - Consider rostering landholder water access during dry summer months.
    - Consider reviewing cease-to-pump rules to better protect low flows, especially during dry times or ecologically important months.
- Maintain current rules in the *Water Sharing Plan for the Gwydir Unregulated Water Sources*.
- Monitor for changes in land use and water demand and review access rules if current usage is high or if the pattern changes.

1.23 Boorolong Creek water source



Priority environmental assets			
Toms Creek Boorolong Creek and its associated inchannel habitat and fringing vegetation communities	Tributaries to Boorolong Creek		
Native fish	• purple-spotted gudgeon	• freshwater catfish	
Birds	28 water-dependent bird species recorded, including the magpie goose		
Native vegetation	Five water-dependent PCTs, including • river red gum woodlands • heath swamps	• sedgeland fens wetlands	• upland wetlands
Registered cultural assets	None registered		

Hydrology			
Gauge – Boorolong Creek (418020)	80th percentile – 0ML/day	50th percentile – 6.2ML/day	20th percentile – 58.9ML/day

Baseflows are moderately altered, as assessed by the *Gwydir WRPA* Risk Assessment. They currently occur less frequently compared to the 'without development' model scenario.

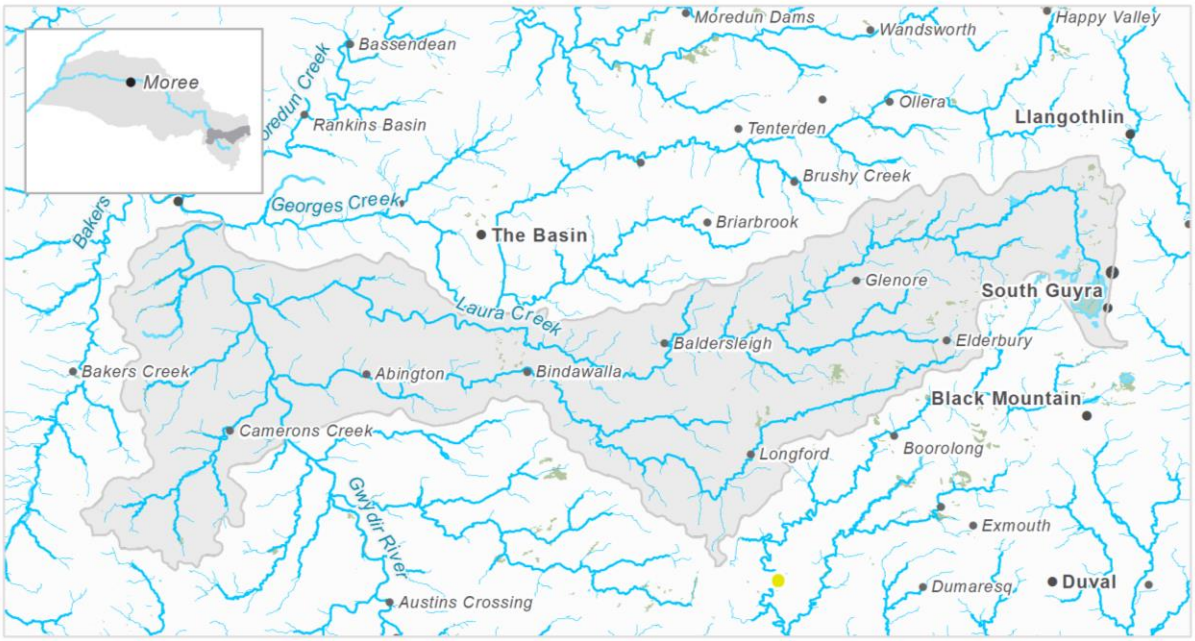
A small number of small licences are distributed along Boorolong Creek. This planning unit has very low flows, and water is mainly diverted when the rainfall has been inadequate. This means that lower flows may be substantially impacted by extraction (as confirmed by the risk assessment).

	Cease-to-flow	Low flow and Baseflow	Freshes	Overbanks
Hydrological alteration	L^0	M^-	L^-	L^0
Relevant rules	Cease to pump when there is no visible flow Trade not permitted into the water source			

Recommendations

- Investigate opportunities to reduce impact on baseflows in the *Water Sharing Plan for the Gwydir Unregulated Water Sources* within five years.
    - Consider rostering landholder water access during dry summer months.
    - Consider reviewing cease-to-pump rules to better protect low flows, especially during dry times or ecologically important months.
- Maintain current rules in the *Water Sharing Plan for the Gwydir Unregulated Water Sources*.
- Monitor for changes in land use and water demand and review access rules if current usage is high or if the pattern changes.

1.24 Laura Creek water source



Priority environmental assets			
Laura Creek and its associated inchannel habitat and fringing vegetation communities Mother of Ducks Lagoon		New England Wetlands	
Native fish	• freshwater catfish • Australian smelt • golden perch	• Darling river hardyhead • river blackfish • mountain galaxias	• carp gudgeon • purple spotted gudgeon • Murray cod
Birds	85 water-dependent bird species recorded, including • curlew sandpiper • Australian painted snipe • brolga • Latham's snipe • blue-billed duck	• gull-billed tern • white-winged black tern • sharp-tailed sandpiper • red-necked phalarope	• cattle egret • eastern great egret • marsh sandpiper • Pacific golden plover • comb-crested jacana
Native vegetation	Seven water-dependent PCTs, including: • river red gum woodlands • heath swamps	• montane bogs • sedgeland–forbland wetlands	• sedgeland fens wetlands • upland wetlands
Registered cultural assets	• Aboriginal ceremony and dreaming sites		

Hydrology			
Gauge – Laura Creek (418021)	80th percentile – 0.1ML/day	50th percentile – 9ML/day	20th percentile – 63.1ML/day

Flows do not seem to be altered by more than 20% compared to the 'without development' model scenario as assessed by the *Gwydir WRPA* Risk Assessment.

A small number of small licences are distributed along Laura Creek. This planning unit has very low flows, and water is mainly diverted when the rainfall has been inadequate. This means that lower flows could be substantially impacted by extraction.

	Cease-to-flow	Low flow and Baseflow	Freshes	Overbanks
Hydrological alteration	L^0	L^-	L^-	L^-
Relevant rules	Cease to pump when there is no visible flow Trade not permitted into the water source			

Recommendations

- Maintain current rules in the *Water Sharing Plan for the Gwydir Unregulated Water Sources*
- Monitor for changes in land use and water demand and review access rules if current usage is high or if the pattern changes.

1.25 Georges Creek water source

Priority environmental assets			
Winter Station Creek		Georges Creek and its associated inchannel habitat and fringing vegetation communities	
Native fish	• Purple-spotted gudgeon	• freshwater catfish	
Birds	28 water-dependent bird species recorded		
Native vegetation	Five water-dependent PCTs, including • river red gum woodlands • heath swamps	• sedgeland fens wetlands	• upland wetlands
Registered cultural assets	None registered		

Hydrology			
Gauge – Georges Creek (418022)	80th percentile – 0.1ML/day	50th percentile – 8.8ML/day	20th percentile – 91.4ML/day

Cease-to-flow periods are highly altered, as assessed by the *Gwydir WRPA* Risk Assessment. Cease-to-flows currently occur more frequently compared to the 'without development' model scenario.

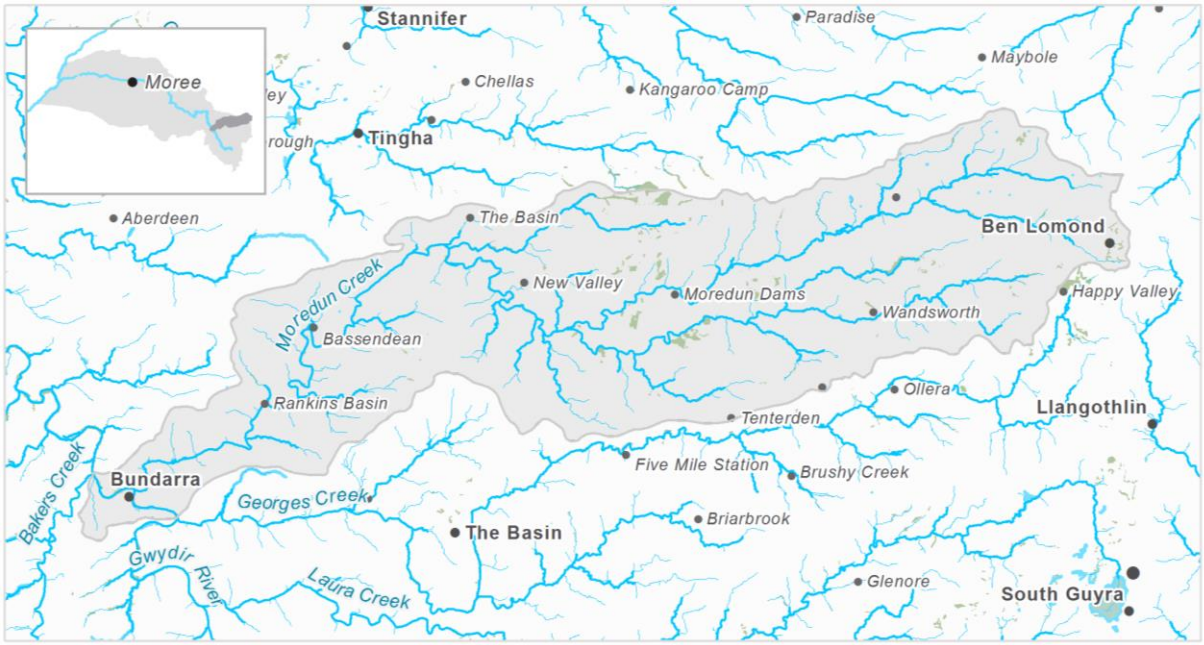
A small number of small licences are distributed along Georges Creek. This planning unit has very low flows, and water is mainly diverted when the rainfall has been inadequate. This means that lower flows may be substantially impacted by extraction (as confirmed by the risk assessment).

	Cease-to-flow	Low flow and Baseflow	Freshes	Overbanks
Hydrological alteration	H^+	L^-	L^-	L^0
Relevant rules	Cease to pump when there is no visible flow Trade not permitted into the water source			

Recommendations

- Investigate opportunities to reduce length of cease-to-flow periods in the *Water Sharing Plan for the Gwydir Unregulated Water Sources* within five years.
    - Consider rostering landholder water access during dry summer months.
    - Consider reviewing cease-to-pump rules to better protect against extended cease-to-flow periods, especially during dry times or ecologically important months.
- Maintain current rules in the *Water Sharing Plan for the Gwydir Unregulated Water Sources*.
- Monitor for changes in land use and water demand and review access rules if current usage is high or if the pattern changes.

1.26 Moredun Creek water source



Priority environmental assets			
Moredun Creek and its associated inchannel habitat and fringing vegetation communities			
Native fish	• Australian smelt • mountain galaxias • river blackfish	• golden perch • carp–gudgeon • Murray cod	• freshwater catfish • Darling river hardyhead • purple spotted gudgeon
Birds	47 water-dependent bird species recorded, including blue-billed duck, Latham's snipe & eastern great egret		
Native vegetation	Seven water-dependent PCTs, including • river red gum woodlands • sedgeland–forbland wetlands	• sedgeland fens wetlands • upland wetlands	• heath swamps
Registered cultural assets	None registered		

Hydrology			
Gauge – Moredun Creek (418023)	80th percentile – 3.2ML/day	50th percentile – 26ML/day	20th percentile – 153.1ML/day
Cease-to-flow periods and low flows are highly altered, as assessed by the *Gwydir WRPA* Risk Assessment. Cease-to-flow periods currently occur more frequently and low flows occur less frequently compared to the 'without development' model scenario.			

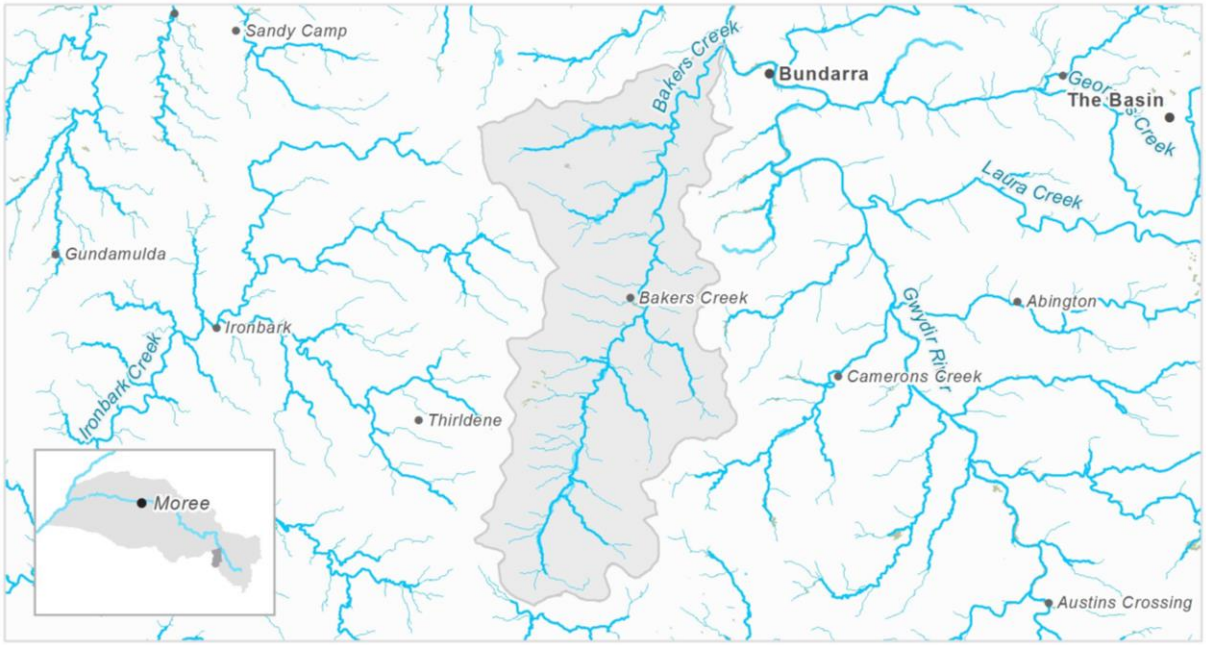
Several small licences are distributed along Moredun Creek. Water is mainly diverted when the rainfall has been inadequate. This means that lower flows may be substantially impacted by extraction (as confirmed by the risk assessment).

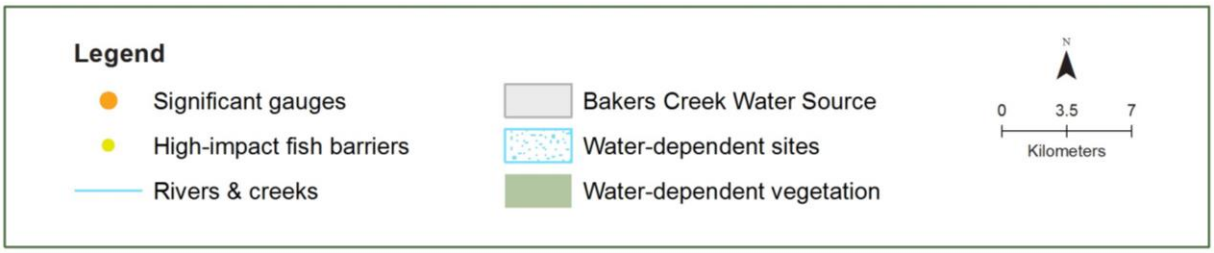
	Cease-to-flow	Low flow and Baseflow	Freshes	Overbanks
Hydrological alteration	H^+	H^-	L^0	L^0
Relevant rules	Cease to pump when there is no visible flow Trade not permitted into the water source			

Recommendations

- Investigate opportunities to reduce length of cease-to-flow periods in the *Water Sharing Plan for the Gwydir Unregulated Water Sources* within five years.
    - Consider rostering landholder water access during dry summer months.
    - Consider reviewing cease-to-pump rules to better protect low flows, especially during dry times or ecologically important months.
- Maintain current rules in the *Water Sharing Plan for the Gwydir Unregulated Water Sources*.
- Monitor for changes in land use and water demand and review access rules if current usage is high or if the pattern changes

1.27 Bakers Creek water source





Priority environmental assets		
Bakers Creek and its associated inchannel habitat and fringing vegetation communities		
Native fish	• purple-spotted gudgeon	• freshwater catfish
Birds	20 water-dependent birds recorded	
Native vegetation	Five water-dependent PCTs, including river red gum woodlands, montane bogs & sedgeland fens wetlands	
Registered cultural assets	None registered	

Hydrology			
Gauge – Bakers Creek at Bundarra (418033)	80th percentile – 1.1ML/day	50th percentile – 6.5ML/day	20th percentile – 32.7ML/day

Cease-to-flow periods are highly altered, as assessed by the *Gwydir WRPA* Risk Assessment. They currently occur more frequently compared to the 'without development' model scenario.

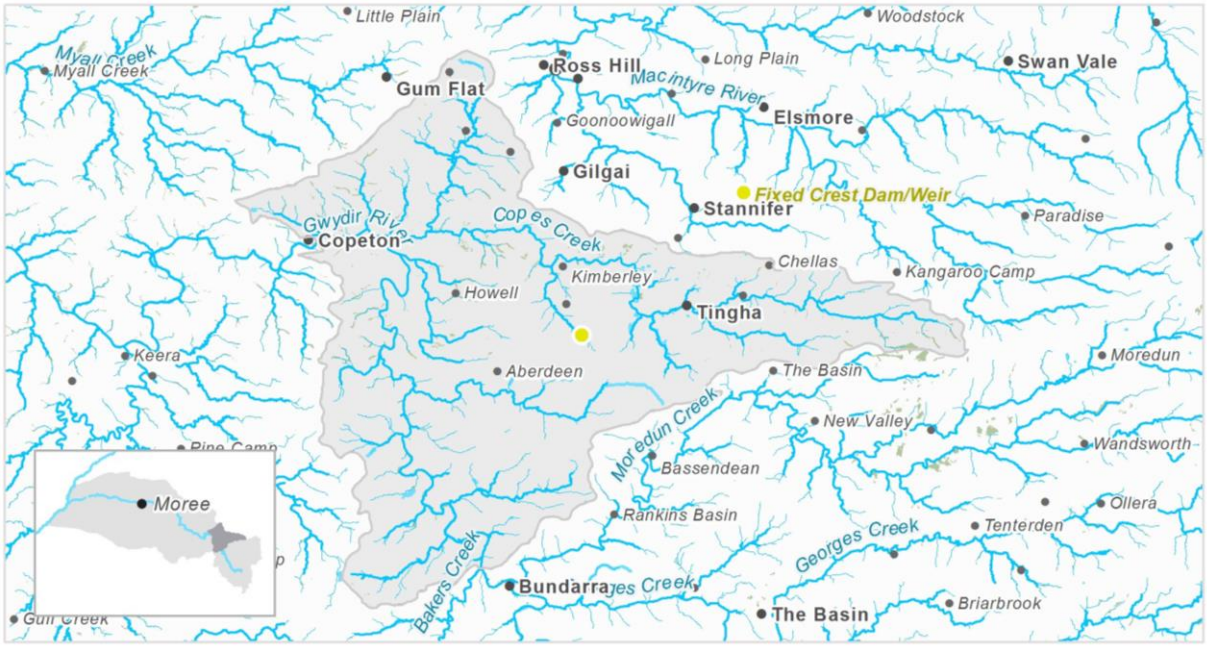
A small number of small licences are distributed along Bakers Creek. This planning unit has very low flows, and water is mainly diverted when the rainfall has been inadequate. This means that lower flows may be substantially impacted by extraction (as confirmed by the risk assessment).

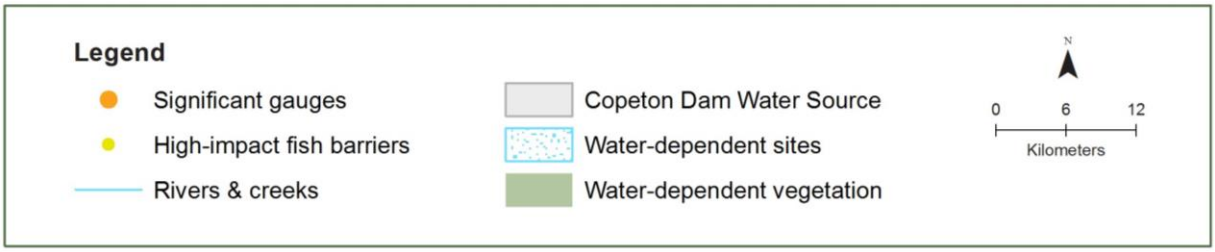
	Cease-to-flow	Low flow and Baseflow	Freshes	Overbanks
Hydrological alteration	H^+	L^-	L^-	L^0
Relevant rules	Cease to pump when there is no visible flow Trade not permitted into the water source			

Recommendations

- Investigate opportunities to reduce length of cease-to-flow periods in the *Water Sharing Plan for the Gwydir Unregulated Water Sources* within five years.
    - Consider rostering landholder water access during dry summer months.
    - Consider reviewing cease-to-pump rules to better protect low flows, especially during dry times or ecologically important months.
- Maintain current rules in the *Water Sharing Plan for the Gwydir Unregulated Water Sources*
- Monitor for changes in land use and water demand and review access rules if current usage is high or if the pattern changes.

1.28 Copeton Dam water source





Priority environmental assets			
Murray Waters	Copes Creek and its associated inchannel habitat and fringing vegetation communities		
Native fish	• Australian smelt • carp–gudgeon • golden perch	• Darling river hardyhead • freshwater catfish	• Murray cod • purple spotted gudgeon
Birds	53 water-dependent bird species recorded, including the eastern great egret		
Native vegetation	Nine water-dependent PCTs, including • river red gum woodlands • montane bogs	• sedgeland–forbland wetlands	• sedgeland fens wetlands
Registered cultural assets	• Modified trees		

Hydrology			
Gauge – Copes Creek (418005)	80th percentile – 0.4ML/day	50th percentile – 3.1ML/day	20th percentile – 16.2ML/day
Cease-to-flow periods and low flows are highly altered, and freshes are moderately altered as assessed by the *Gwydir WRPA* Risk Assessment. Cease-to-flow periods currently occur more frequently, and low flows and freshes occur less frequently compared to the 'without development' model scenario.			

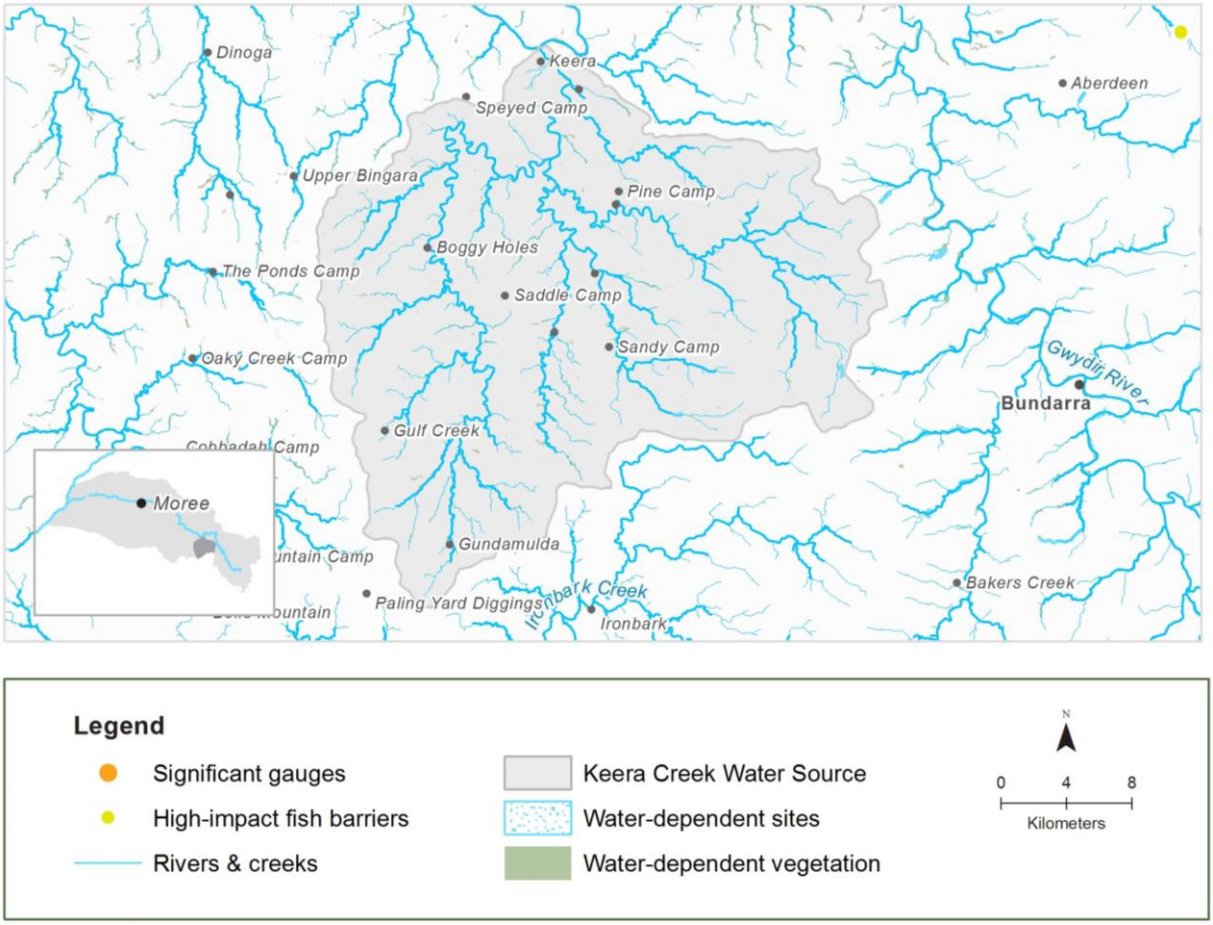
A small number of small licences are distributed within Copeton Dam water source. Water is mainly diverted when the rainfall has been inadequate. This means that lower flows may be substantially impacted by extraction (as confirmed by the risk assessment).

	Cease-to-flow	Low flow and Baseflow	Freshes	Overbanks
Hydrological alteration	H^+	H^-	M^-	L^-
Relevant rules	Cease to pump when there is no visible flow Trade not permitted into the water source			

Recommendations

- Investigate opportunities to reduce length of cease-to-flow periods and extraction pressure on baseflows and freshes in the *Water Sharing Plan for the Gwydir Unregulated Water Sources* within five years.
    - Consider rostering landholder water access during dry summer months.
    - Consider reviewing cease-to-pump rules to better protect low flows, especially during dry times or ecologically important months.
    - Consider protecting freshes at ecologically relevant times to support native fish species movement, distribution and condition
- Maintain current rules in the *Water Sharing Plan for the Gwydir Unregulated Water Sources*
- Monitor for changes in land use and water demand and review access rules if current usage is high or if the pattern changes.

1.29 Keera Creek water source



Priority environmental assets			
Keera Creek and its associated inchannel habitat and fringing vegetation communities	Tributaries to Keera Creek		
Native fish	• purple-spotted gudgeon • freshwater catfish • unspecked hardyhead • carp gudgeon	• spangled perch • golden perch • Murray–Darling rainbowfish	• bony herring • Darling river hardyhead • Australian smelt
Birds	51 water-dependent bird species recorded, including the endangered Australian painted snipe		
Native vegetation	Seven water-dependent PCTs, including river red gum forests & woodlands, & sedgeland fens wetlands		
Registered cultural assets	• Burial sites		

Hydrology			
Gauge – Keera Creek (418018)	80th percentile – 1.4 ML/day	50th percentile – 10.7 ML/day	20th percentile – 59.5 ML/day
Cease-to-flow periods and low flows are highly altered, as assessed by the *Gwydir WRPA* Risk Assessment. Cease-to-flows currently occur more frequently and low flows occur less frequently compared to the 'without development' model scenario.			

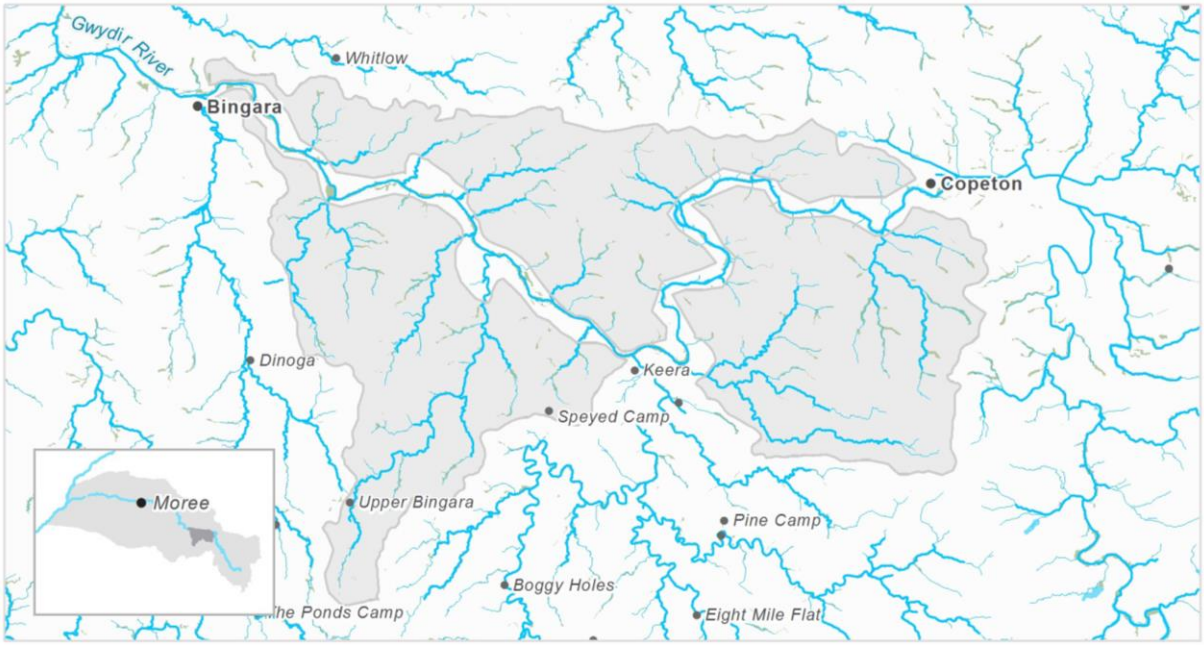
A small number of small licences are distributed along Keera Creek. This planning unit has very low flows, and water is mainly diverted when the rainfall has been inadequate. This means that lower flows may be substantially impacted by extraction (as confirmed by the risk assessment).

	Cease-to-flow	Low flow and Baseflow	Freshes	Overbanks
Hydrological alteration	H^+	H^-	L^-	L^0
Relevant rules	Cease to pump when there is no visible flow Trade not permitted into the water source			

Recommendations

- Investigate opportunities to reduce length of cease-to-flow periods and extraction pressure on baseflows in the *Water Sharing Plan for the Gwydir Unregulated Water Sources* within five years.
    - Consider rostering landholder water access during dry summer months.
    - Consider reviewing cease-to-pump rules to better protect low flows, especially during dry times or ecologically important months.
- Maintain current rules in the *Water Sharing Plan for the Gwydir Unregulated Water Sources*
- Monitor for changes in land use and water demand and review access rules if current usage is high or if the pattern changes.

1.30 Mackenzies Flat water source



Priority environmental assets			
Tributaries to the Gwydir River and its associated inchannel habitat and fringing vegetation communities			
Native fish	• purple-spotted gudgeon • darling river hardyhead	• unspecked hardyhead	• carp gudgeon
Birds	40 water-dependent bird species recorded, including the eastern great egret		
Native vegetation	Eight water-dependent PCTs, including river red gum woodlands & sedgeland fens wetlands		
Registered cultural assets	None registered		

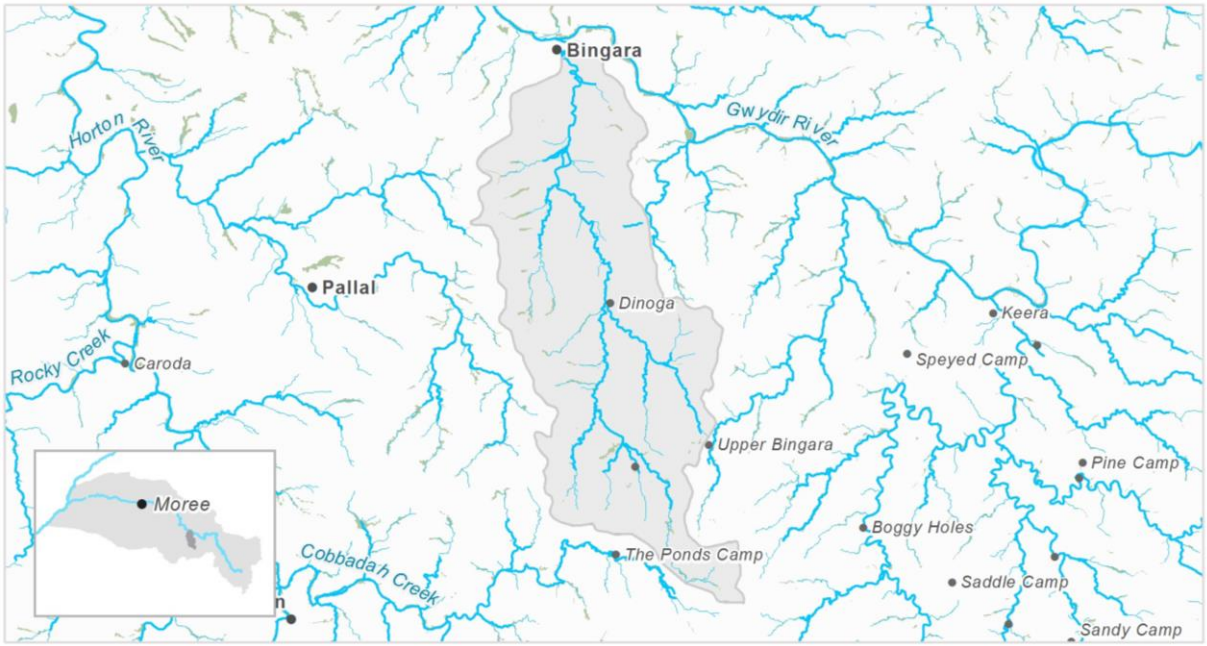
Hydrology			
No gauge – Halls Creek at Bingara (418025)	80th percentile – 2.4ML/day	50th percentile – 4.3ML/day	20th percentile – 8.7ML/day
Flows do not seem to be altered by more than 20% compared to the 'without development' model scenario as assessed by the *Gwydir WRPA* Risk Assessment. Only one small licence exists in the Mackenzies Flat planning unit, which likely minimally impacts flows.			

	Cease-to-flow	Low flow and Baseflow	Freshes	Overbanks
Hydrological alteration	L^0	L^0	L^0	L^0
Relevant rules	Cease to pump when there is no visible flow Trade not permitted into the water source			

Recommendations

- Maintain current rules in the *Water Sharing Plan for the Gwydir Unregulated Water Sources*.
- Monitor for changes in land use and water demand and review access rules if current usage is high or if the pattern changes.

1.31 Halls Creek water source



Priority environmental assets			
Halls Creek and its associated inchannel habitat and fringing vegetation communities			
Native fish	• freshwater catfish • purple-spotted gudgeon	• Darling river hardyhead	• carp gudgeon
Birds	59 water-dependent bird species recorded, including • Australasian bittern	• eastern great egret	• Latham's snipe
Native vegetation	Six water-dependent PCTs, including river red gum woodlands		
Registered cultural assets	None registered		

Hydrology			
Gauge – Halls Creek at Bingara (418025)	80th percentile – 4ML/day	50th percentile – 7.3ML/day	20th percentile – 14.8ML/day

Cease-to-flow periods are highly altered and low flows are moderately altered, as assessed by the *Gwydir WRPA* Risk Assessment. Cease-to-flows currently occur more frequently and low flows occur less frequently compared to the 'without development' model scenario.

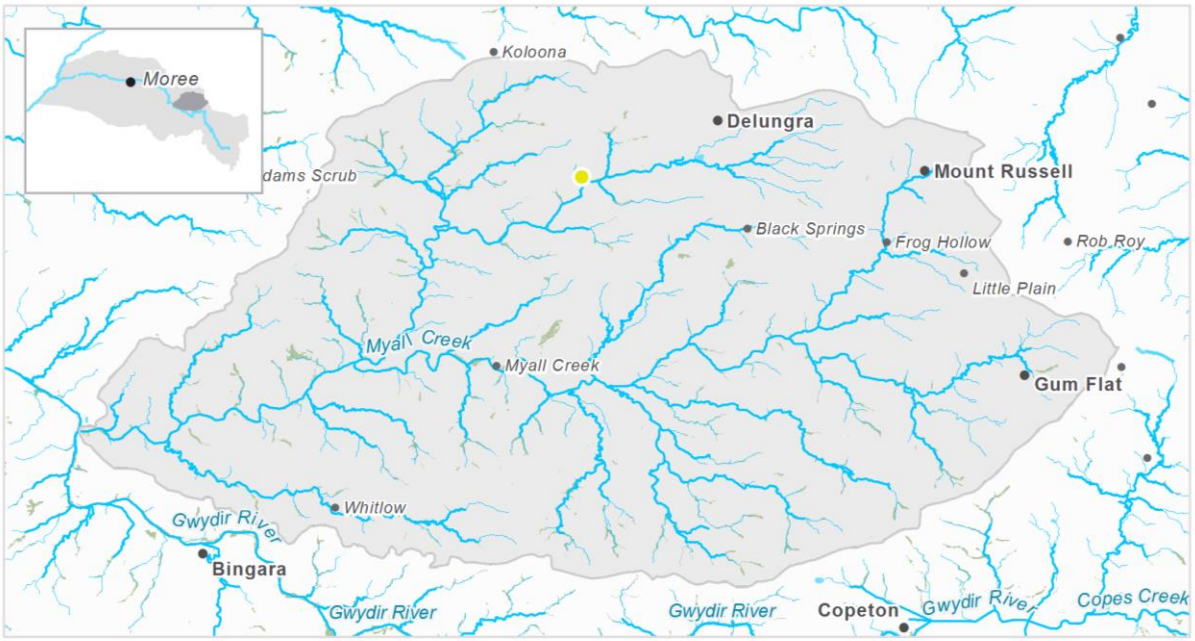
A small number of small licences are distributed along Halls Creek. This planning unit has very low flows, and water is mainly diverted when the rainfall has been inadequate. This means that lower flows may be substantially impacted by extraction (as confirmed by the risk assessment).

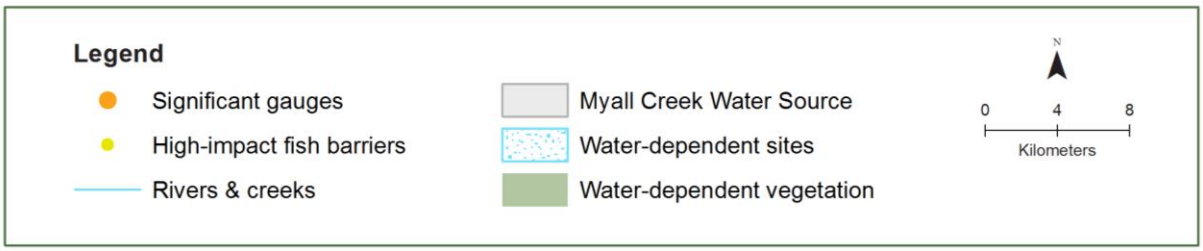
	Cease-to-flow	Low flow and Baseflow	Freshes	Overbanks
Hydrological alteration	H^+	M^-	L^-	L^0
Relevant rules	Trade not permitted into the water source			
	Halls Creek Tributaries MZ Cease to pump when there is no visible flow		**Halls Creek MZ** Cease to pump when there is no visible flow at Halls Creek at Bingara gauge (418025)	

Recommendations

- Investigate opportunities to reduce length of cease-to-flow periods and extraction pressure on baseflows in the *Water Sharing Plan for the Gwydir Unregulated Water Sources* within five years.
    - Consider rostering landholder water access during dry summer months.
    - Consider reviewing cease-to-pump rules to better protect low flows, especially during dry times or ecologically important months.
- Maintain current rules in the *Water Sharing Plan for the Gwydir Unregulated Water Sources*
- Monitor for changes in land use and water demand and review access rules if current usage is high or if the pattern changes.

1.32 Myall Creek water source





Priority environmental assets			
Areas of high biodiversity Myall Creek and its associated inchannel habitat and fringing vegetation communities		Lowland Darling River endangered ecological community Tributaries to Myall Creek	
Native fish	• Australian smelt • Darling river hardyhead • carp–gudgeon • purple-spotted gudgeon	• freshwater catfish • spangled perch • golden perch	• Murray cod • Unspecked hardyhead • bony herring
Birds	47 water-dependent bird species recorded, including the eastern great egret		
Native vegetation	Nine water-dependent PCTs, including river red gum woodlands & sedgeland fens wetlands		
Registered cultural assets	None registered		

Hydrology			
Gauge – Myall Creek (418017)	80th percentile – 1.9ML/day	50th percentile – 10.4ML/day	20th percentile – 39.1ML/day
Cease-to-flow periods and low flows are highly altered as assessed by the *Gwydir WRPA* Risk Assessment. Cease-to-flow periods currently occur more frequently and low flows occur less frequently compared to the 'without development' model scenario.			

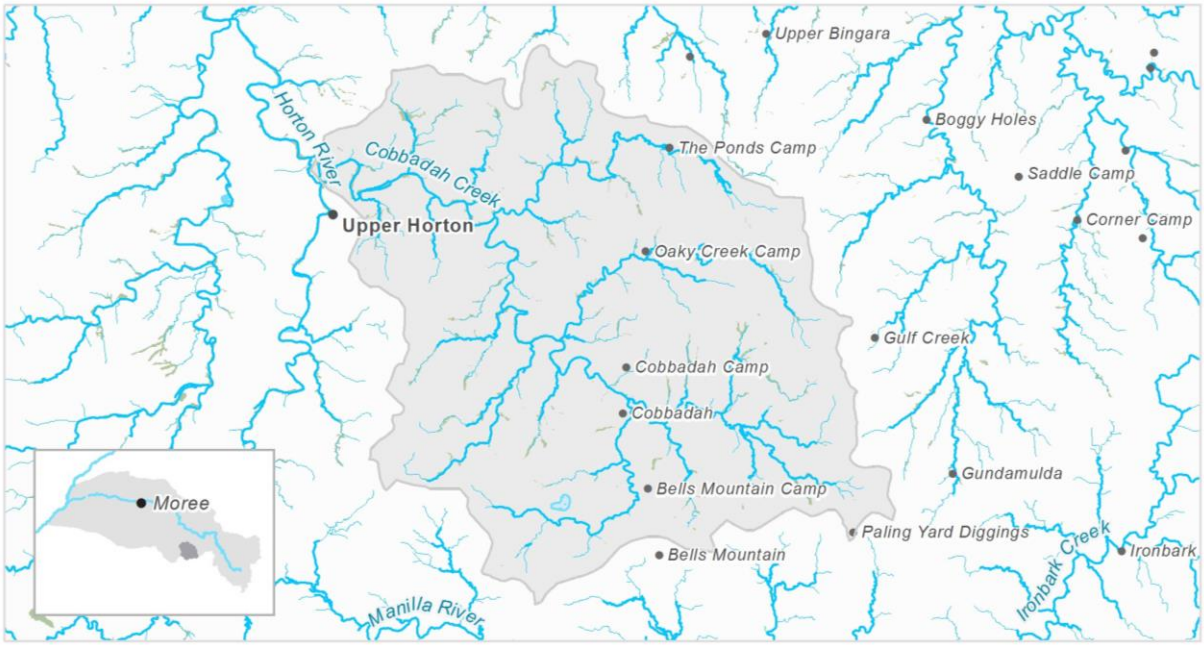
Several small licences are distributed along Myall Creek. This planning unit is characterised by very low flows, and water is mainly diverted when the rainfall has been inadequate. This means that lower flows may be substantially impacted by extraction (as confirmed by the risk assessment).

	Cease-to-flow	Low flow and Baseflow	Freshes	Overbanks
Hydrological alteration	H^+	H^-	L^-	L^-
Relevant rules	Cease to pump when there is no visible flow Trade not permitted into the water source			

Recommendations

- Investigate opportunities to reduce length of cease-to-flow periods and extraction pressure on baseflows in the *Water Sharing Plan for the Gwydir Unregulated Water Sources* within five years.
    - Consider rostering landholder water access during dry summer months.
    - Consider reviewing cease-to-pump rules to better protect low flows, especially during dry times or ecologically important months.
- Maintain current rules in the *Water Sharing Plan for the Gwydir Unregulated Water Sources*.
- Monitor for changes in land use and water demand and review access rules if current usage is high or if the pattern changes.

1.33 Cobbadah Creek water source



Priority environmental assets			
Chain of Ponds Creek		Cobbadah Creek and its associated inchannel habitat and fringing vegetation communities	
Native fish	• Australian smelt • carp–gudgeon • spangled Perch	• freshwater Catfish • Murray cod	• Darling river hardyhead • purple-spotted gudgeon
Birds	48 water-dependent bird species recorded, including the eastern great egret		
Native vegetation	Seven water-dependent PCTs, including river red gum woodlands		
Registered cultural assets	None registered		

Hydrology			
No gauge – Horton River at Horton Dam (418027)	80th percentile – 1.1ML/day	50th percentile – 8.5ML/day	20th percentile – 47.4ML/day
Cease-to-flow periods and baseflows are highly altered, as assessed by the *Gwydir WRPA* Risk Assessment. Cease-to-flows currently occur more frequently and baseflows occur less frequently compared to the 'without development' model scenario.			

A small number of small licences are distributed along Cobbodah Creek. This planning unit has very low flows, and water is mainly diverted when the rainfall has been inadequate. This means that lower flows may be substantially impacted by extraction (as confirmed by the risk assessment).

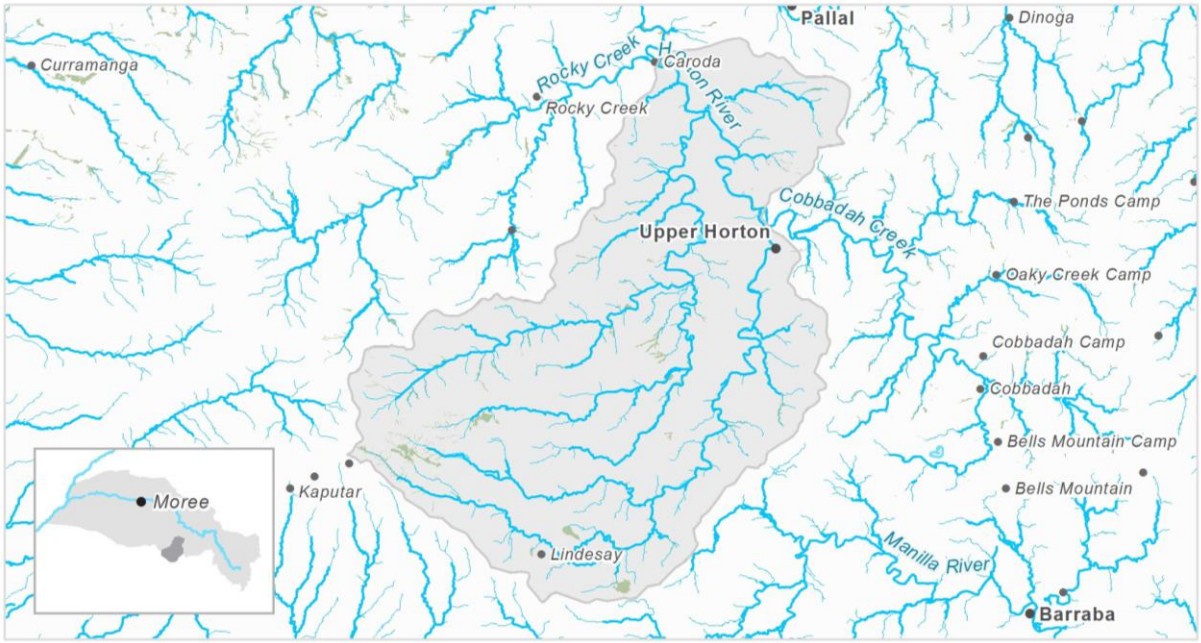
Cobbodah Creek is a priority planning unit to investigate since low flows are highly impacted and there is potential to achieve significant environmental benefits with improved protection of critical flows.

	Cease-to-flow	Low flow and Baseflow	Freshes	Overbanks
Hydrological alteration	H^+	H^-	L^-	L^0
Relevant rules	Cease to pump when there is no visible flow Trade not permitted into the water source			

Recommendations

- Investigate opportunities to reduce length of cease-to-flow periods and extraction pressure on baseflows in the *Water Sharing Plan for the Gwydir Unregulated Water Sources* within five years.
    - Consider rostering landholder water access during dry summer months.
    - Consider reviewing cease-to-pump rules to better protect low flows, especially during dry times or ecologically important months.
- Maintain current rules in the *Water Sharing Plan for the Gwydir Unregulated Water Sources*
- Monitor for changes in land use and water demand and review access rules if current usage is high or if the pattern changes.

1.34 Upper Horton water source



Priority environmental assets			
Horton River and its associated inchannel habitat and fringing vegetation communities			
Native fish	• Australian smelt • unspecked hardyhead • Murray–Darling rainbowfish	• spangled perch • golden perch • Carp–gudgeon	• Murray cod • freshwater catfish • purple spotted gudgeon
Birds	52 water-dependent bird species recorded, including • Latham's snipe	• eastern great egret	
Native vegetation	Eight water-dependent PCTs, including river red gum woodlands & sedgeland fens wetlands		
Registered cultural assets	• Modified trees		

Hydrology			
Gauge – Horton River at Horton Dam (418027)	80th percentile – 8.5ML/day	50th percentile – 39.3ML/day	20th percentile – 180ML/day

Cease-to-flow periods and low flows are highly altered as assessed by the *Gwydir WRPA* Risk Assessment. Cease-to-flows currently occur more frequently and low flows occur less frequently compared to the 'without development' model scenario.

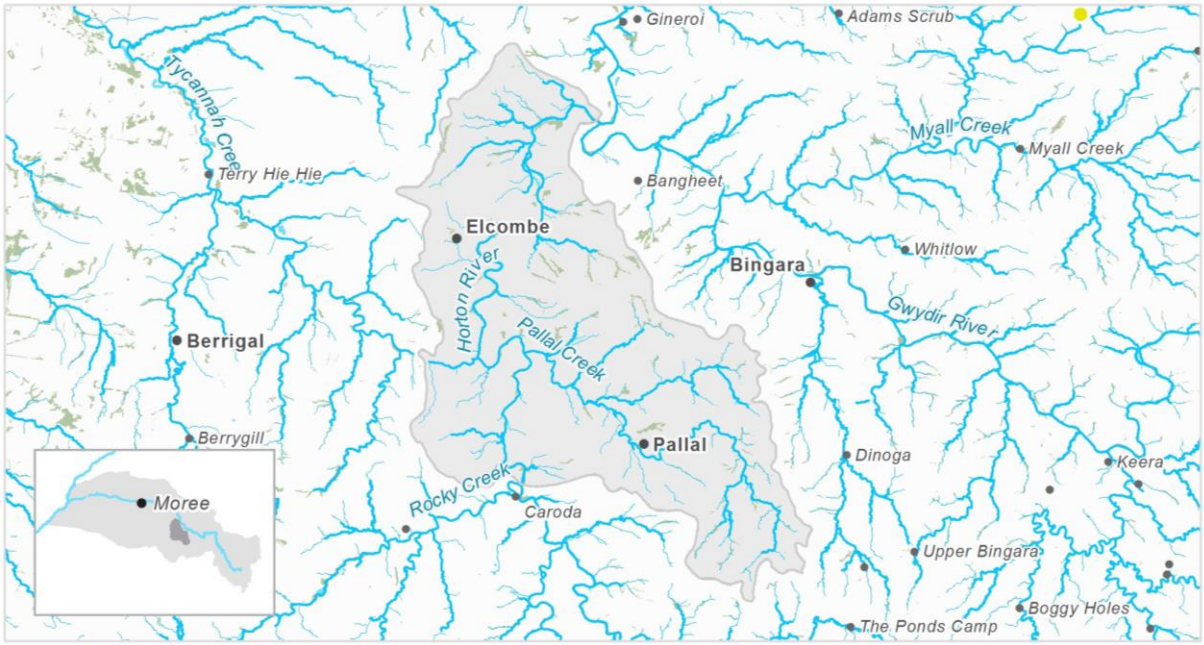
A small number of small licences are distributed along the Upper Horton River. Water is mainly diverted when the rainfall has been inadequate. This means that lower flows may be substantially impacted by extraction (as confirmed by the risk assessment).

	Cease-to-flow	Low flow and Baseflow	Freshes	Overbanks
Hydrological alteration	H^+	H^-	L^-	L^0
Relevant rules	Cease to pump when there is no visible flow Trade not permitted into the water source			

Recommendations

- Investigate opportunities to reduce length of cease-to-flow periods in the *Water Sharing Plan for the Gwydir Unregulated Water Sources* within five years.
    - Consider rostering landholder water access during dry summer months.
    - Consider reviewing cease-to-pump rules to better protect low flows, especially during dry times or ecologically important months.
- Maintain current rules in the *Water Sharing Plan for the Gwydir Unregulated Water Sources*.
- Monitor for changes in land use and water demand and review access rules if current usage is high or if the pattern changes.

1.35 Lower Horton water source



Priority environmental assets			
Areas of Lowland Darling River endangered ecological community		Horton River and its associated inchannel habitat and fringing vegetation communities	
Native fish	• Australian smelt • carp–gudgeon • Murray–Darling rainbowfish • unspecked hardyhead	• Murray cod • golden perch • spangled perch	• bony herring • freshwater catfish • purple spotted gudgeon
Birds	64 water-dependent bird species recorded including • common greenshank • Latham's snipe	• comb-crested jacana	• brolga
Native vegetation	Eight water-dependent PCTs, including river red gum woodlands		
Registered cultural assets	None registered		

Hydrology			
Gauge – Horton River at Rider Gauge (418015)	80th percentile – 18.5ML/day	50th percentile – 66.4ML/day	20th percentile – 252.9ML/day

The Horton River is one of the main unregulated tributaries of the Gwydir River. The confluence of the Horton and Gwydir Rivers is approximately 15km downstream of Bingara. Low flows are highly altered, as assessed by the *Gwydir WRPA* Risk Assessment. Low flows occur less frequently compared to the 'without development' model scenario.

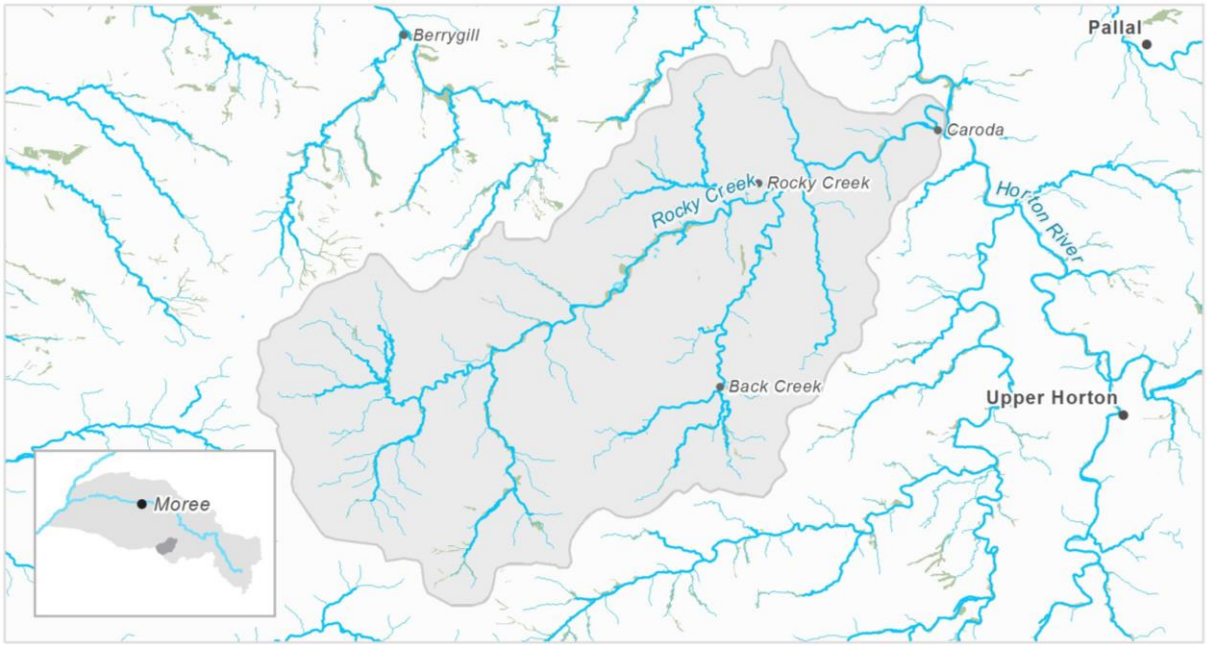
Several small and medium licences are distributed along the Lower Horton. This planning unit has very low flows, and water is mainly diverted when the rainfall has been inadequate. This means that lower flows may be substantially impacted by extraction (as confirmed by the risk assessment).

	Cease-to-flow	Low flow and Baseflow	Freshes	Overbanks
Hydrological alteration	L^0	H^-	L^-	L^0
Relevant rules	Cease to pump when there is no visible flow Cease to pump at 4ML/day at Horton River at Rider Gauge (418015) Trade not permitted into the water source			

Recommendations

- Investigate opportunities to reduce extraction pressure on low flows in the *Water Sharing Plan for the Gwydir Unregulated Water Sources* within five years.
    - Consider replacing perennial cease-to-pump rules with rostering low flow water access.
    - Consider reviewing cease-to-pump rules to better protect low flows, especially during dry times or ecologically important months.
        - Cease-to-pump at 10 ML/day at Horton River at Rider Gauge (418015)
- Maintain current rules in the *Water Sharing Plan for the Gwydir Unregulated Water Sources*
- Monitor for changes in land use and water demand and review access rules if current usage is high or if the pattern changes.

1.36 Rocky Creek water source



Priority environmental assets			
Tycannah Creek and its associated inchannel habitat and fringing vegetation communities			
Native fish	• unspecked hardyhead • Murray–Darling rainbowfish • Purple-spotted gudgeon	• spangled perch • Murray cod • Australian smelt	• carp–gudgeon • freshwater catfish • Darling river hardyhead
Birds	34 water-dependent bird species recorded		
Native vegetation	Six water-dependent PCTs, including river red gum woodlands		
Registered cultural assets	None registered		

Hydrology			
No gauge – Horton River at Horton Dam (418027)	80th percentile – 0.5ML/day	50th percentile – 9.6ML/day	20th percentile – 75.9ML/day

Cease-to-flow periods and low flows are highly altered as assessed by the *Gwydir WRPA* Risk Assessment. Cease-to-flow periods currently occur more frequently and low flows occur less frequently compared to the 'without development' model scenario.

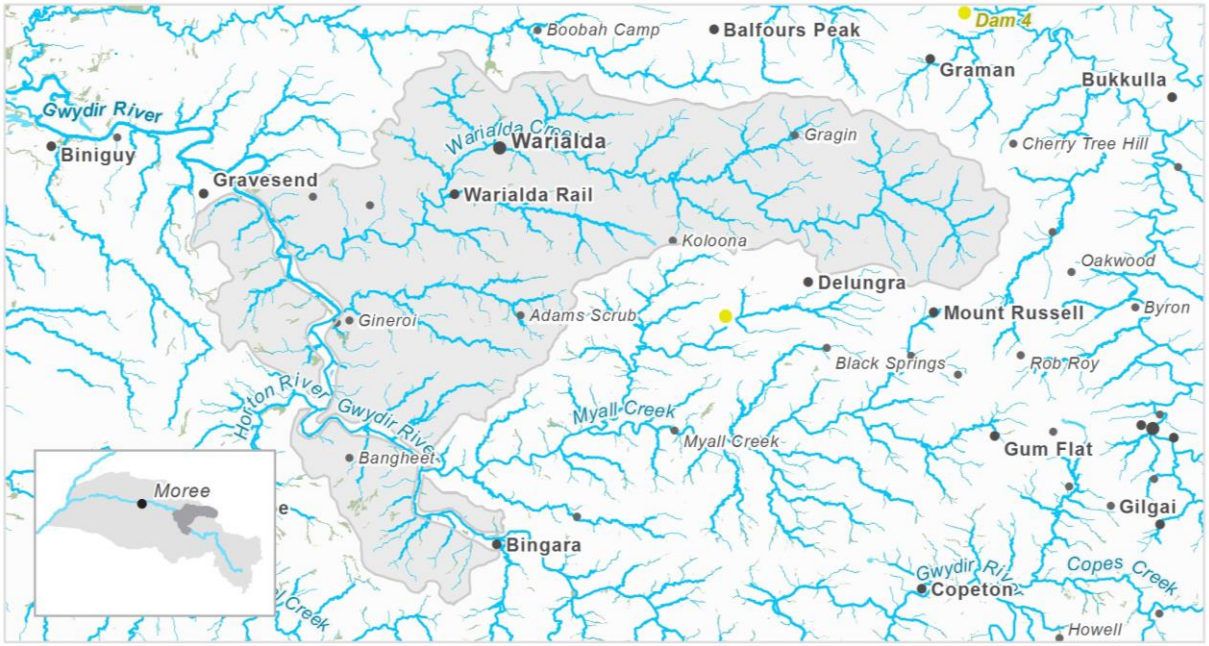
Several small licences are distributed along Rocky Creek. This planning unit is characterised by very low flows, and water is mainly diverted when the rainfall has been inadequate. This means that lower flows may be substantially impacted by extraction (as confirmed by the risk assessment).

	Cease-to-flow	Low flow and Baseflow	Freshes	Overbanks
Hydrological alteration	H^+	H^-	L^-	L^0
Relevant rules	Cease to pump when there is no visible flow Trade not permitted into the water source			

Recommendations

- Investigate opportunities to reduce length of cease-to-flow periods and extraction pressure on baseflows in the *Water Sharing Plan for the Gwydir Unregulated Water Sources* within five years.
    - Consider rostering landholder water access during dry summer months.
    - Consider reviewing cease-to-pump rules to better protect low flows, especially during dry times or ecologically important months.
- Maintain current rules in the *Water Sharing Plan for the Gwydir Unregulated Water Sources*.
- Monitor for changes in land use and water demand and review access rules if current usage is high or if the pattern changes.

1.37 Warialda Creek water source



Priority environmental assets			
Warialda Creek and its associated inchannel habitat and fringing vegetation communities	Tributaries to Warialda Creek		
Native fish	• Australian smelt • unspecked hardyhead • purple-spotted gudgeon • spangled perch	• golden perch • bony herring • carp–gudgeon	• Murray cod • freshwater catfish • Darling river hardyhead
Birds	69 water-dependent bird species recorded, including the eastern great egret		
Native vegetation	12 water-dependent PCTs, including • river red gum woodlands	• river coobah wetlands	• sedgeland fens wetlands
Registered cultural assets	None registered		

Hydrology			
Gauge – Warialda Creek at Bundarra (418016)	80th percentile – 0.3ML/day	50th percentile – 3.2ML/day	20th percentile – 18.8ML/day
Cease-to-flow periods are highly altered and low flows are moderately altered, as assessed by the *Gwydir WRPA* Risk Assessment. Cease-to-flows currently occur more frequently and low flows occur less frequently compared to the 'without development' model scenario.			

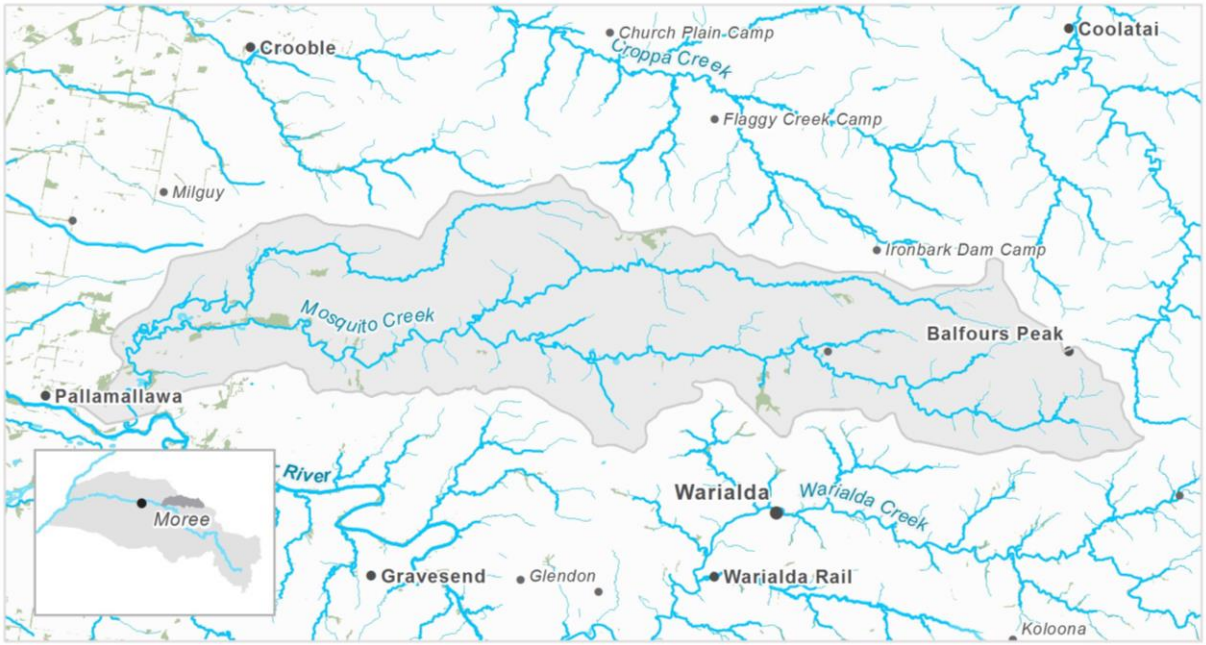
A small number of small licences are distributed along Warialda Creek. Water is mainly diverted when the rainfall has been inadequate. This means that lower flows may be substantially impacted by extraction (as confirmed by the risk assessment).

	Cease-to-flow	Low flow and Baseflow	Freshes	Overbanks
Hydrological alteration	H^+	M^-	L^-	L^-
Relevant rules	Cease to pump when there is no visible flow Trade not permitted into the water source			

Recommendations

- Investigate opportunities to reduce length of cease-to-flow periods and extraction pressure on low flows in the *Water Sharing Plan for the Gwydir Unregulated Water Sources* within five years.
    - Consider rostering landholder water access during dry summer months.
    - Consider reviewing cease-to-pump rules to better protect low flows, especially during dry times or ecologically important months.
- Maintain current rules in the *Water Sharing Plan for the Gwydir Unregulated Water Sources*.
- Monitor for changes in land use and water demand and review access rules if current usage is high or if the pattern changes.

1.38 Mosquito Creek water source



Priority environmental assets			
No priority environmental assets in this planning unit Important environmental assets listed below			
Native fish	• purple-spotted gudgeon	• freshwater catfish	
Birds	39 water-dependent bird species recorded		
Native vegetation	14 water-dependent PCTs, including: • river red gum woodlands	• coolibah woodlands and coolibah wetland woodlands	• water couch marsh grasslands
Registered cultural assets	• Modified trees		

Hydrology			
Gauge – N/A	80th percentile	50th percentile	20th percentile
Low flows are moderately altered as assessed by the *Gwydir WRPA* Risk Assessment. Low flows and freshes occur less frequently compared to the 'without development' model scenario. No licences exist in Mosquito Creek.			

	Cease-to-flow	Low flow and Baseflow	Freshes	Overbanks
Hydrological alteration	L^0	M^-	L^-	L^0
Relevant rules	Cease to pump when there is no visible flow Trade not permitted into the water source			

Recommendations

- Maintain current rules in the *Water Sharing Plan for the Gwydir Unregulated Water Sources*.

1.39 Slaughterhouse Creek water source

Priority environmental assets			
No priority environmental assets in this planning unit Important environmental assets listed below			
Native fish	• purple-spotted gudgeon	• freshwater catfish	
Birds	50 water-dependent bird species recorded, including the eastern great egret		
Native vegetation	16 water-dependent PCTs, including • river red gum woodlands • common reed grasslands	• coolibah woodlands and coolibah wetland woodlands • shallow freshwater wetland sedgelands	• tall rushlands, reedlands and sedgelands
Registered cultural assets	• Modified trees		

Hydrology			
No gauge – Tycannah Creek at Horseshoe Lagoon (418032)	80th percentile – 0ML/day	50th percentile – 0.3ML/day	20th percentile – 1.7ML/day
Flows do not seem to be altered by more than 20% as assessed by the *Gwydir WRPA* Risk Assessment. There are no extraction licences in this planning unit.			

	Cease-to-flow	Low flow and Baseflow	Freshes	Overbanks
Hydrological alteration	L^0	L^0	L^0	L^0
Relevant rules	Cease to pump when there is no visible flow Trade not permitted into the water source			

Recommendations

- Maintain current rules in the *Water Sharing Plan for the Gwydir Unregulated Water Sources*.

1.40 Moree water source

Priority environmental assets			
Inchannel habitat and fringing vegetation communities associated with Marshall's Pond and other tributaries to Gwydir River, Mehi River, and Carole Creek	Mia Mia Lagoon		
Native fish	No records		
Birds	70 water-dependent bird species recorded, including the eastern great egret		
Native vegetation	14 water-dependent PCTs, including • river red gum woodlands • river coobah wetlands	• coolibah woodlands and coolibah wetland woodlands • shallow freshwater wetland sedgelands	• water couch marsh grasslands
Registered cultural assets	• Modified trees		

Hydrology			
No gauge – Tycannah Creek at Horseshoe Lagoon	80th percentile – 1.1ML/day	50th percentile – 6.5 ML/day	20th percentile – 32.7 ML/day

Cease-to-flow periods and low flows are highly altered, and freshes are moderately altered as assessed by the *Gwydir WRPA* Risk Assessment. Cease-to-flow periods currently occur more

frequently and low flows and freshes occur less frequently compared to the 'without development' model scenario.

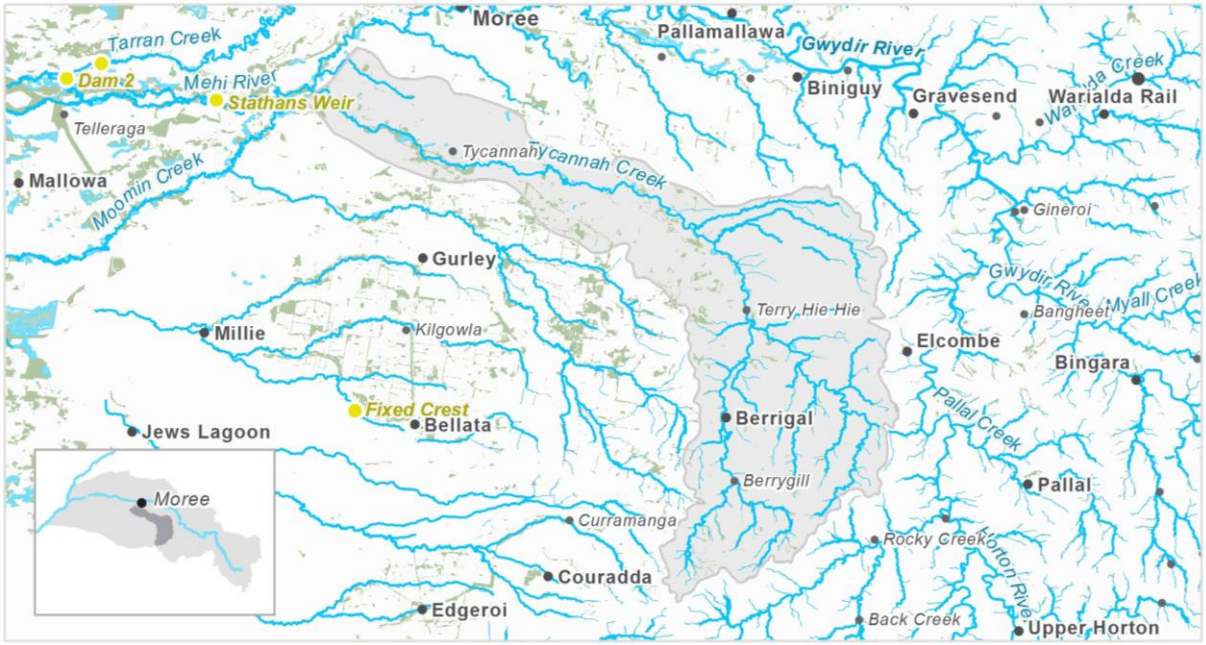
One large licence at the bottom of Marshalls Ponds Creek, which may increase downstream zero flow periods, and reduce baseflows and freshes. The principle impact may be on connectivity with Carole Creek during low flow and fresh events.

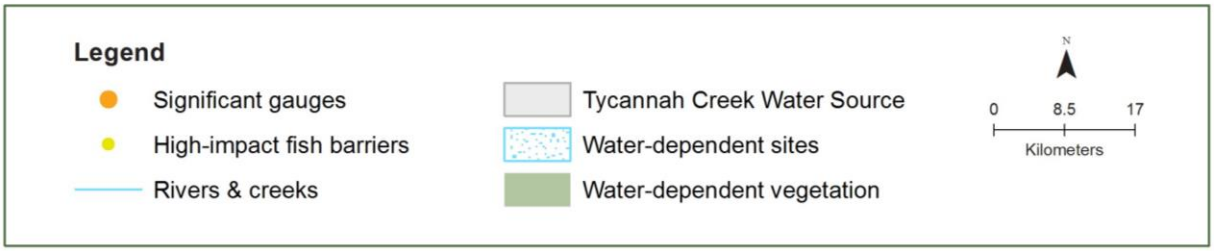
	Cease-to-flow	Low flow and Baseflow	Freshes	Overbanks
Hydrological alteration	H^{+}	H^{-}	M^{-}	L^{0}
Relevant rule	Cease to pump when there is no visible flow Trade not permitted into the water source			

Recommendations

- Investigate opportunities to reduce length of cease-to-flow periods and extraction pressure on baseflows in the *Water Sharing Plan for the Gwydir Unregulated Water Sources* within five years.
    - Consider rostering landholder water access during dry summer months.
    - Consider reviewing cease-to-pump rules to better protect low flows, especially during dry times or ecologically important months.
- Investigate opportunities to protect higher flows that provide connectivity with Carole Creek in the *Water Sharing Plan for the Gwydir Unregulated Water Sources* within next 5 years
- Consider implementing a total extraction limit to improve connectivity during ecologically important months
- Maintain current rules in the *Water Sharing Plan for the Gwydir Unregulated Water Sources*.
- Monitor for changes in land use and water demand and review access rules if current usage is high or if the pattern changes.

1.41 Tycannah Creek water source





Priority environmental assets			
Horseshoe Lagoon Mill-Bullah Waterholes Menadool Lagoon	Dirty Lagoon Gyan Waterhole Tycannah Creek and its associated inchannel habitat and fringing vegetation communities		
Native fish	• Australian smelt • unspecked hardyhead • Murray–Darling rainbowfish	• spangled perch • golden perch • Murray cod	• carp–gudgeon • bony herring • freshwater catfish
Birds	52 water-dependent bird species recorded, including the eastern great egret (JAMBA)		
Native vegetation	22 water-dependent PCTs, including • river red gum woodlands • sedgelands fens wetlands	• river coobah wetlands • coolibah woodlands and coolibah wetland woodlands	• shallow freshwater wetland sedgelands • water couch marsh grasslands
Registered cultural assets	• Modified trees	• Burial sites	

Hydrology			
Gauge – Tycannah Creek (418032)	80th percentile – 0.1ML/day	50th percentile – 5.4ML/day	20th percentile – 28ML/day

Cease-to-flow periods and low flows are highly altered as assessed by the *Gwydir WRPA* Risk Assessment. Cease-to-flow periods currently occur more frequently and low flows occur less frequently compared to the 'without development' model scenario.

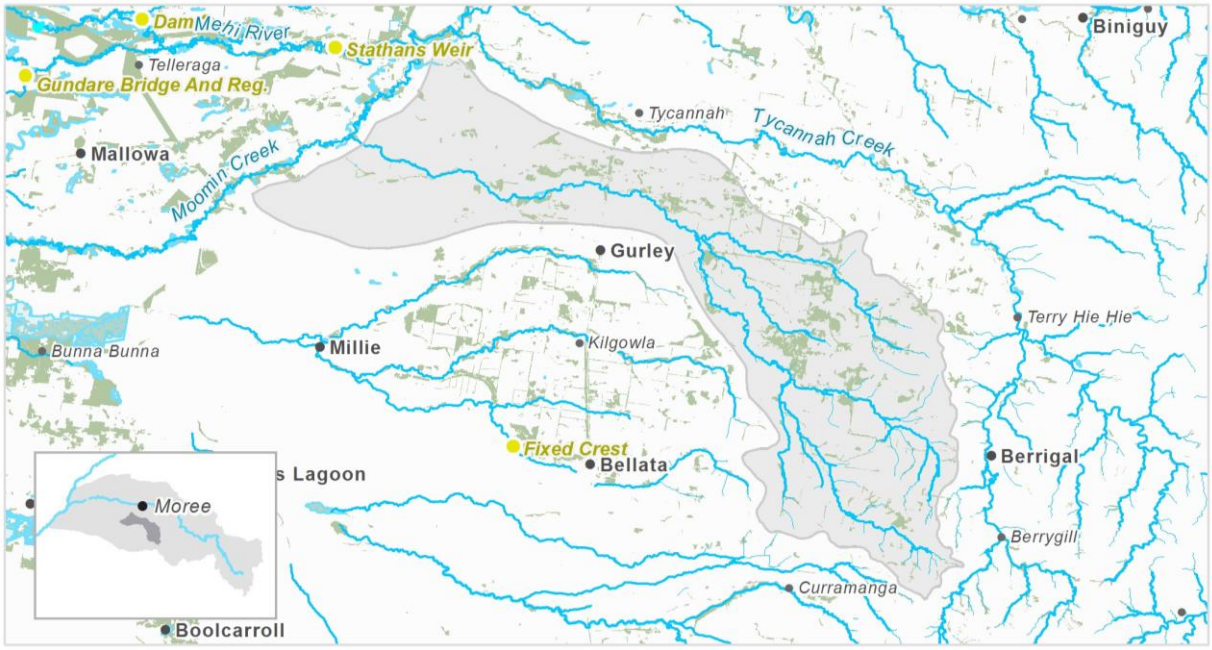
Several small licences are distributed throughout Tycannah Creek planning unit. It is characterised by very low flows, and water is mainly diverted when the rainfall has been inadequate. This means that lower flows may be substantially impacted by extraction (as confirmed by the risk assessment). In addition, one large licence exists at the bottom of Tycannah Creek, which may increase downstream cease-to-flow periods and reduce baseflows and freshes. The principle impact may be on connectivity with the Mehi River during low flow and fresh events.

	Cease-to-flow	Low flow and Baseflow	Freshes	Overbanks
Hydrological alteration	H^+	H^-	L^-	L^-
Relevant rules	Cease to pump when there is no visible flow Trade not permitted into the water source			

Recommendations

- Investigate opportunities to reduce length of cease-to-flow periods and extraction pressure on baseflows in the *Water Sharing Plan for the Gwydir Unregulated Water Sources* within five years.
    - Consider rostering landholder water access during dry summer months.
    - Consider reviewing cease-to-pump rules to better protect low flows, especially during dry times or ecologically important months.
- Maintain current rules in the *Water Sharing Plan for the Gwydir Unregulated Water Sources*.
- Monitor for changes in land use and water demand and review access rules if current usage is high or if the pattern changes.

1.42 Gurley Creek water source



Priority environmental assets			
No priority environmental assets. Important environmental assets listed below			
Native fish	• purple-spotted gudgeon	• freshwater catfish	
Birds	34 water-dependent bird species recorded, including the eastern great egret		
Native vegetation	20 water-dependent PCTs, including • river red gum woodlands • river coobah wetlands	• coolibah woodlands and coolibah wetland woodlands • shallow freshwater wetland sedgelands	• water couch marsh grasslands
Registered cultural assets	• Modified trees		

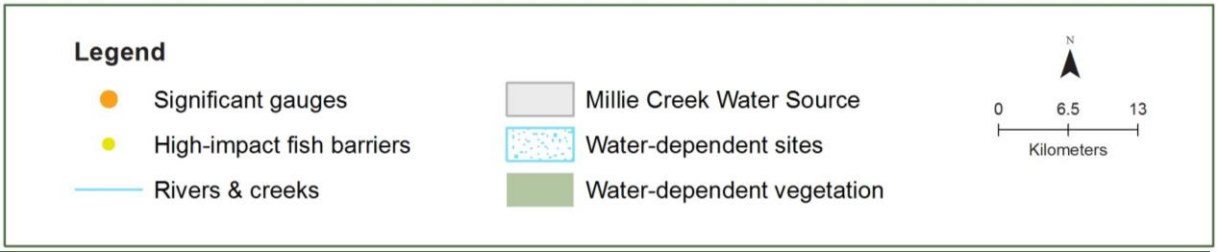
Hydrology			
No gauge – Tycannah Creek at Horseshoe Lagoon (418032)	80th percentile – 0.1ML/day	50th percentile – 3ML/day	20th percentile – 15.7ML/day
Flows do not seem to be altered by more than 20% as assessed by the *Gwydir WRPA* Risk Assessment. There are no extraction licences in this planning unit.			

	Cease-to-flow	Low flow and Baseflow	Freshes	Overbanks
Hydrological alteration	L^0	L^0	L^0	L^0
Relevant rules	Cease to pump when there is no visible flow Trade not permitted into the water source			

Recommendations

- Maintain current rules in the *Water Sharing Plan for the Gwydir Unregulated Water Sources*.

1.43 Millie Creek water source



Priority environmental assets			
Millie Creek and its associated inchannel habitat and fringing vegetation communities			
Native fish	• purple-spotted gudgeon	• freshwater catfish	
Birds	44 water-dependent bird species recorded		
Native vegetation	20 water-dependent PCTs, including • coolibah woodlands and coolibah wetland woodlands • shallow freshwater wetland sedgelands	• river red gum woodlands • lignum shrubland wetlands	• water couch marsh grasslands • sedgeland fens wetlands
Registered cultural assets	• Modified trees	• Burial sites	• Camping sites

Hydrology			
No gauge – Tycannah Creek at Horseshoe Lagoon (418032)	80th percentile – 0ML/day	50th percentile – 0ML/day	20th percentile – 0.6ML/day
Cease-to-flow periods and low flows are highly altered, as assessed by the *Gwydir WRPA* Risk Assessment. Cease-to-flow periods currently occur more frequently and low flows occur less frequently compared to the 'without development' model scenario.			

Two large licences exist at the bottom of Millie Creek, which may increase downstream zero flow periods, and reduce baseflows and freshes. The principle impact may be on connectivity with Moomin Creek during fresh events.

	Cease-to-flow	Low flow and Baseflow	Freshes	Overbanks
Hydrological alteration	H^+	H^-	L^-	L^-
Relevant rules	Cease to pump when there is no visible flow Trade not permitted into the water source			

Recommendations

- Investigate opportunities to reduce length of cease-to-flow periods and extraction pressure on baseflows in the *Water Sharing Plan for the Gwydir Unregulated Water Sources* within five years.
    - Consider rostering landholder water access during dry summer months.
    - Consider reviewing cease-to-pump rules to better protect low flows, especially during dry times or ecologically important months.
- Investigate opportunities to protect higher flows that provide connectivity with Moomin Creek in the *Water Sharing Plan for the Gwydir Unregulated Water Sources* within next 5 years
- Consider implementing a total extraction limit to improve connectivity during ecologically important months
- Maintain current rules in the *Water Sharing Plan for the Gwydir Unregulated Water Sources*.
- Monitor for changes in land use, floodplain harvesting, and water demand and review access rules if current usage is high or if the pattern changes.

1.44 Thalabah Creek water source

Priority environmental assets			
Jews Lagoon Camp Lagoon Pidgee Waterhole	Thalabah Creek and its associated inchannel habitat and fringing vegetation communities Mallarum Waterholes		Collytootela Lagoon Brigalow Tree Waterhole
Native fish	• Carp–gudgeon • spangled perch	• golden perch • Murray cod	• bony herring
Birds	46 water-dependent bird species recorded, including the brolga		
Native vegetation	18 water-dependent PCTs, including • black box woodland wetlands • coolibah woodlands and coolibah wetland woodlands	• shallow freshwater wetland sedgelands	• water couch marsh grasslands
Registered cultural assets	• Modified trees		

Hydrology

No hydrological modelling data is available for this water source due to the effluent nature of the watercourse.

Streams are connected by overland flows.

	Cease-to-flow	Low flow and Baseflow	Freshes	Overbanks
Hydrological alteration	NA	NA	NA	NA
Relevant rules	Cease to pump when there is no visible flow Trade not permitted into the water source			

Recommendations

- Maintain current rules in the *Water Sharing Plan for the Gwydir Unregulated Water Sources*.
- Monitor for changes in land use, floodplain harvesting, and water demand and review access rules if current usage is high or if the pattern changes.

1.45 Gwydir water source

Priority environmental assets			
Outer floodplain vegetation communities associated with the Gwydir watercourse			
Native fish	• olive perchlet	• silver perch	
Birds	27 water-dependent bird species recorded, including magpie goose, brolga & eastern great egret		
Native vegetation	Seven water-dependent PCTs, including • black box woodland wetlands	• coolibah wetland woodlands	• river coobah wetlands
Registered cultural assets	• Modified trees	• Evidence of Aboriginal resources and gathering	

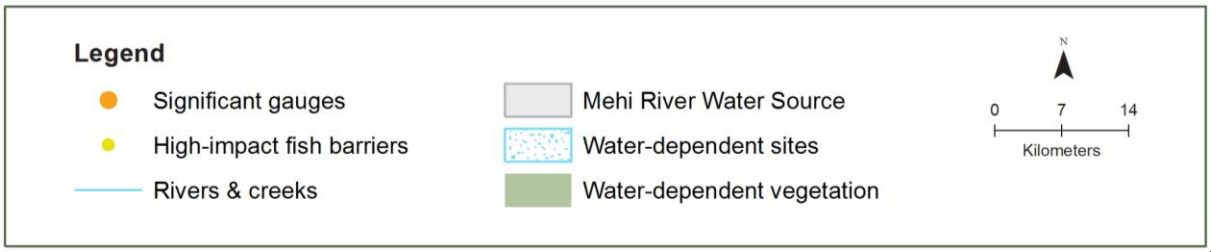
Hydrology
Freshes and overbank flows are highly altered as assessed by the *Gwydir WRPA* Risk Assessment. Freshes and overbank flows occur less frequently compared to the 'without development' model scenario, which may be mostly influenced by planned and held environmental water from the regulated river.

	Cease-to-flow	Low flow and Baseflow	Freshes	Overbanks
Hydrological alteration	L^0	L^0	H^-	H^-
Relevant rules	Trade not permitted into the water source Very low flow – cease to pump when flows at Gwydir River at Millewa (418066) are ≤ 250ML/day A Class – access when flows at Gwydir River at Millewa (418066) are ≥250ML/day Access when the flow is greater than the announced environmental water flow in ML/day			

Recommendations

- Consider protection of environmental flows from the Gingham Watercourse planning unit into the Northern Gingham Floodplain planning unit to reduce impact on freshes and overbank flows in the *Water Sharing Plan for the Gwydir Unregulated Water Sources* and the Gwydir WRPA WSP within five years.
    - Investigate providing discretionary control of a portion of planned environmental water to OEH
- Maintain current rules in the *Water Sharing Plan for the Gwydir Unregulated Water Sources*
- Monitor for changes in land use and water demand and review access rules if current usage is high or if the pattern changes.

1.46 Mehi water source



Priority environmental assets			
Floodplain vegetation communities Outer floodplains associated with the Mehi River, and Mallowa and Moomin Creek			Mogo Watercourse Wolongimba Creek
Native fish	• olive perchlet	• silver perch	• purple-spotted gudgeon
Birds	70 water-dependent bird species recorded, including • black-necked stork • Australian painted snipe • eastern great egret	• brolga • Latham's snipe • cattle egret	• wood sandpiper • marsh sandpiper • Caspian tern
Native vegetation	17 water-dependent PCTs, including • river red gum woodlands • lignum shrubland wetlands	• coolibah woodlands and coolibah wetland woodlands • black box woodland wetlands	• water couch marsh grasslands
Registered cultural assets	• Modified trees		

Hydrology
Flows do not seem to be altered by more than 20% compared to the 'without development' model scenario as assessed by the *Gwydir WRPA* Risk Assessment. Several large licences are located throughout the planning unit, which may impact on connectivity with the Mehi River during low flows or fresh events.

	Cease-to-flow	Low flow and Baseflow	Freshes	Overbanks
Hydrological alteration	L^0	L^0	L^0	L^0
Relevant rules	Cease to pump when there is no visible flow Trade not permitted into the water source			

Recommendations

- Maintain current rules in the *Water Sharing Plan for the Gwydir Unregulated Water Sources*.
- Monitor for changes in land use, floodplain harvesting, and water demand, and review access rules if current usage is high or if the pattern changes.

1.47 Gil Gil Creek water source

Priority environmental assets			
Gunnyanna Waterhole Wadden Wadden Waterhole Bengerang Waterhole	Wallon Creek Bengerang Waterhole Gil Gil Creek and its associated inchannel habitat and fringing vegetation communities		
Native fish	• carp gudgeon • Murray–Darling rainbowfish • Australian smelt	• spangled perch • golden perch	• Murray cod • bony herring
Birds	54 water-dependent bird species recorded, including: • black-necked stork • brolga	• eastern great egret	• Latham's snipe
Native vegetation	18 water-dependent PCTs, including: • river red gum woodlands • lignum shrubland wetlands	• coolibah woodlands and coolibah wetland woodlands • black box woodland wetlands	• water couch marsh grasslands
Registered cultural assets	• Fishing areas		

Hydrology

Cease-to-flow periods are moderately altered and low flows are highly altered, as assessed by the *Gwydir WRPA* Risk Assessment. Cease-to-flows currently occur more frequently and low flows occur less frequently compared to the 'without development' model scenario.

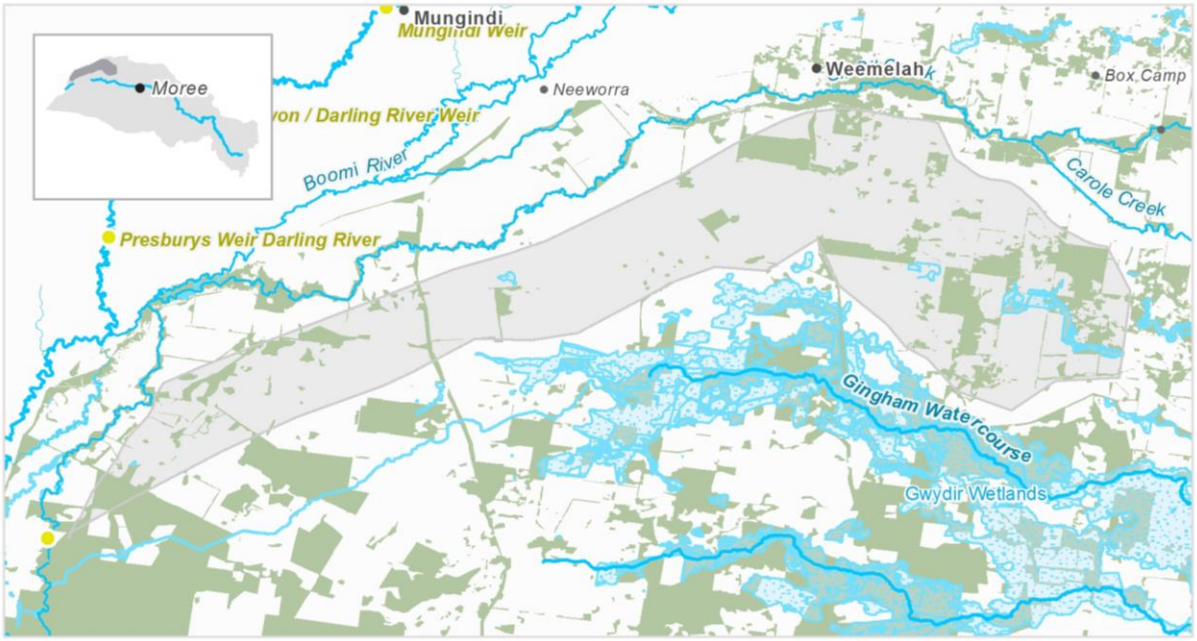
A small number of small licences are distributed along Gil Gil Creek. One large licence exists at the bottom of the unregulated section of Gil Gil Creek, which may impact on connectivity with the downstream regulated section.

	Cease-to-flow	Low flow and Baseflow	Freshes	Overbanks
Hydrological alteration	M^+	H^-	L^-	L^0
Relevant rules	Cease to pump when there is no visible flow Trade not permitted into the water source			

Recommendations

- Investigate potential impact of extraction pressure on ability to meet EWRs in the Gil Gil planning unit within five years.
- Maintain current rules in the *Water Sharing Plan for the Gwydir Unregulated Water Sources*
- Monitor for changes in land use and water demand and review access rules if current usage is high or if the pattern changes.

1.48 Gingham water source



Priority environmental assets			
Outer floodplain vegetation communities associated with the Gingham watercourse			
Native fish	• olive perchlet	• freshwater catfish	• silver perch
Birds	Eight water-dependent bird species recorded including the eastern great egret (JAMBA)		
Native vegetation	13 water-dependent PCTs, including		
	• black box woodland wetlands	• coolibah woodlands and coolibah wetland woodlands	• water couch marsh grasslands
Registered cultural assets	None registered		

Hydrology

Freshes and overbank flows are highly altered as assessed by the *Gwydir WRPA* Risk Assessment. Freshes and overbank flows occur less frequently compared to the 'without development' model scenario, which may be mostly influenced by planned and held environmental water from the regulated river.

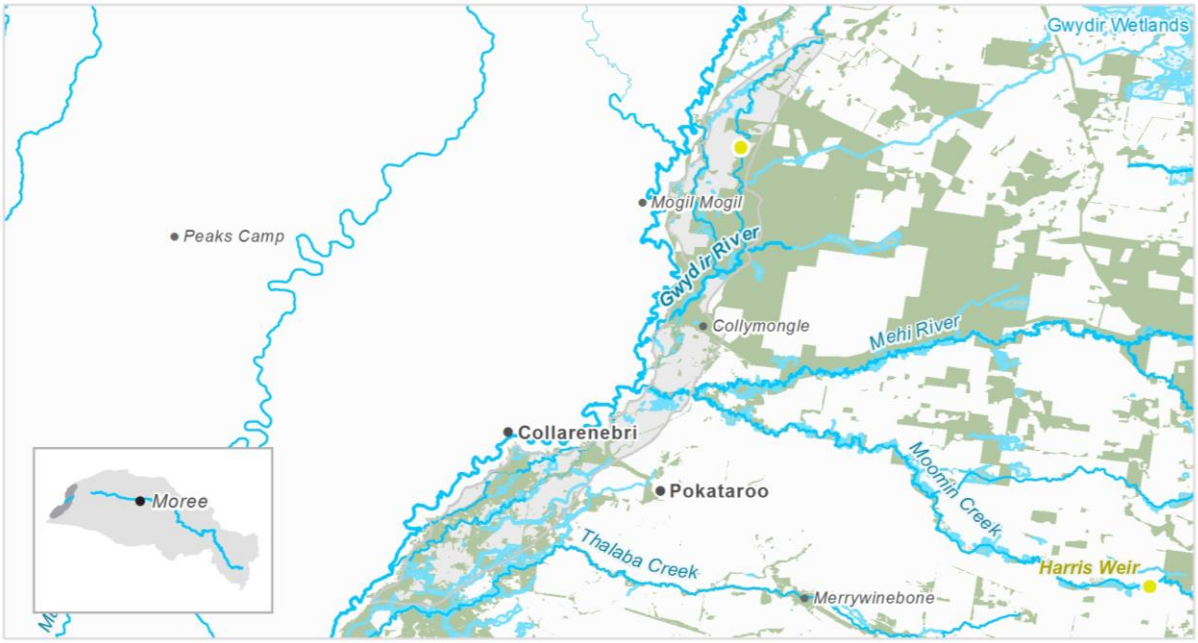
One larger licence exists within the Gingham water source planning unit.

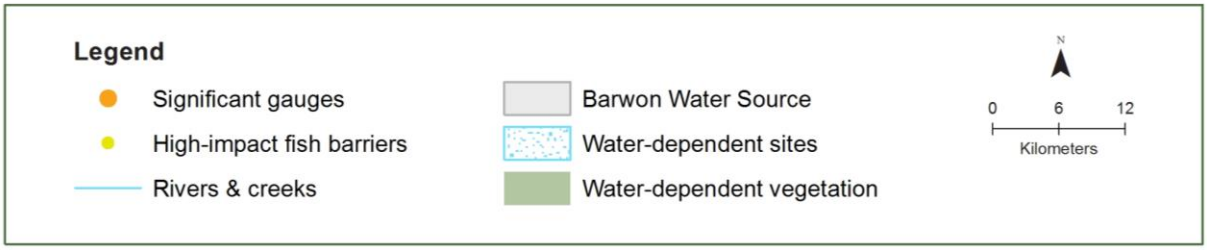
<table>
<tr><th></th><th>Cease-to-flow</th><th>Low flow and Baseflow</th><th>Freshes</th><th>Overbanks</th></tr>
<tr><td>Hydrological alteration</td><td>L^0</td><td>L^0</td><td>H^-</td><td>H^-</td></tr>
<tr><td rowspan="2">Relevant rules</td><td colspan="4">Cease to pump when there is no visible flow
Trade not permitted into the water source
Access when the flow is greater than the announced environmental water flow in ML/day</td></tr>
<tr><td colspan="2">Upper Gingham Watercourse MZ
Cease to pump when flows at Tillaloo (418076) is≤250ML/day
A Class – access when flow at Tillaloo (418076) is ≥250ML/day</td><td colspan="2">Lower Gingham Watercourse MZ
Very low flows – access when the flow depth at Gingham Bridge (418079) is >1m and <4000ML/day and there is visible flow at the Gingham Watercourse at Morialta Road
A Class – cease to pump when the flow depth at Gingham Bridge (418079) is <1m and <4000ML/day and there is no visible flow at the Gingham Watercourse at Morialta Road</td></tr>
</table>

Recommendations

- Consider protection of environmental flows from the Gingham Watercourse planning unit into the Northern Gingham Floodplain planning unit to reduce impact on freshes and overbank flows in the *Water Sharing Plan for the Gwydir Unregulated Water Sources* and the Gwydir WRPA WSP within five years.
    - Investigate providing discretionary control of a portion of planned environmental water to OEH
- Maintain current rules in the *Water Sharing Plan for the Gwydir Unregulated Water Sources*.
- Monitor for changes in land use, floodplain harvesting and water demand and review access rules if current usage is high or if the pattern changes.

1.49 Barwon water source





Priority environmental assets			
Collymongle Lagoon The Big Waterhole First Lagoon	Second Lagoon Butti Lagoon Floodplain and wetland vegetation communities associated with Barwon River		
Native fish	• olive perchlet • silver perch • carp–gudgeon	• golden perch • spangled perch • Murray cod	• Murray–Darling rainbowfish • bony herring • Australian smelt
Birds	24 water-dependent birds recorded, including white necked heron & little pied cormorants		
Native vegetation	10 water-dependent PCTs, including • river red gum woodlands • black box woodlands	• coolibah woodlands and coolibah wetland woodlands	• lignum shrubland wetlands
Registered cultural assets	None registered		

Hydrology

No extraction licences in this planning unit

	Cease-to-flow	Low flow and Baseflow	Freshes	Overbanks
Hydrological alteration	N/A	N/A	N/A	N/A
Relevant rules	Cease to pump when there is no visible flow Trade not permitted into the water source			

Recommendations

- Investigate opportunities to protect flow rates from the Lower Mehi and Gil Gil planning units that provide connectivity with the Barwon River during ecologically relevant times in the *Water Sharing Plan for the Gwydir Unregulated Water Sources* and the *Gwydir Regulated River Water Sharing Plan* within five years
- Maintain current rules in the *Water Sharing Plan for the Gwydir Unregulated Water Sources*
- Monitor for changes in land use and water demand and review access rules if current usage is high or if the pattern changes.