



Australian Government
Productivity Commission

Assessment of National Water Initiative implementation progress (2017–2020)

Productivity Commission
Draft Report

February 2021

This is a draft report prepared for further public consultation and input. The Commission will finalise its report after these processes have taken place.



Except for the Commonwealth Coat of Arms and content supplied by third parties, this copyright work is licensed under a Creative Commons Attribution 3.0 Australia licence. To view a copy of this licence, visit <http://creativecommons.org/licenses/by/3.0/au>. In essence, you are free to copy, communicate and adapt the work, as long as you attribute the work to the Productivity Commission (but not in any way that suggests the Commission endorses you or your use) and abide by the other licence terms.

Use of the Commonwealth Coat of Arms

Terms of use for the Coat of Arms are available from the Department of the Prime Minister and Cabinet's website: <https://www.pmc.gov.au/government/commonwealth-coat-arms>

Third party copyright

Wherever a third party holds copyright in this material, the copyright remains with that party. Their permission may be required to use the material, please contact them directly.

Attribution

This work should be attributed as follows, *Source: Productivity Commission, National Water Reform 2020, Draft Report*.

If you have adapted, modified or transformed this work in anyway, please use the following, *Source: based on Productivity Commission data, National Water Reform 2020, Draft Report*.

An appropriate reference for this publication is:

Productivity Commission 2021, *National Water Reform 2020*, Draft Report, Canberra.

Publications enquiries

Media, Publications and Web, phone: (03) 9653 2244 or email: mpw@pc.gov.au

The Productivity Commission

The Productivity Commission is the Australian Government's independent research and advisory body on a range of economic, social and environmental issues affecting the welfare of Australians. Its role, expressed most simply, is to help governments make better policies, in the long term interest of the Australian community.

The Commission's independence is underpinned by an Act of Parliament. Its processes and outputs are open to public scrutiny and are driven by concern for the wellbeing of the community as a whole.

Further information on the Productivity Commission can be obtained from the Commission's website (www.pc.gov.au).

Contents

Introduction	3
Information and data sources	4
Overview of progress and areas for further work	5
1. Water access entitlements and planning frameworks	13
1.1 Water access entitlements	16
1.2 Water planning	19
1.3 Water for environmental and other public benefit outcomes	29
1.4 Addressing overallocated and overused systems	32
1.5 Assigning risks for changes in allocation	35
1.6 Indigenous access	36
1.7 Interception	45
1.8 Integrating surface water and groundwater management	48
2. Water markets and trading	51
2.1 Trade barriers	52
2.2 Water registers	58
2.3 Water market information	62
2.4 Trade approval service standards	66
3. Best practice water pricing and institutional arrangements	69
3.1 Best practice pricing and economic regulation	72
3.2 Investment in new or refurbished infrastructure	98
3.3 Cost recovery for water planning and management activities	109
3.4 Environmental externalities of water use	113
3.5 Release of unallocated water	115
3.6 Separation of water management from service delivery	119
3.7 Performance benchmarking	119

4. Integrated management of water for environmental and other public benefit outcomes	121
4.1 Identification of specific environmental and public benefit outcomes	123
4.2 Management and institutional arrangements	130
5. Water resource accounting	145
5.1 Water accounts	147
5.2 Environmental water accounting	150
5.3 Water metering and measurement	152
5.4 Compliance and enforcement	158
6. Urban water reform	165
6.1 Urban water service quality	165
6.2 Water reuse, end use efficiency, water sensitive urban design and innovation	174
7. Knowledge and capacity building	177
7.1 Developments since 2017	178
7.2 The Commission's view	189
8. Community partnerships and adjustment	191
8.1 Community partnerships	192
8.2 Assistance for structural adjustment	202
References	207

Assessment of National Water Initiative implementation progress (2017–2020)

Introduction

This assessment of jurisdictions' progress since 2017 towards achieving the outcomes and objectives of the National Water Initiative (NWI):

- broadly describes the actions jurisdictions agreed to under the NWI and subsequent agreements, and the extent to which they have completed these actions
- provides the Commission's view on the extent to which current progress in water reform is meeting the outcomes and objectives of the NWI and identifies specific areas for further policy development.

The assessment of progress is structured around the eight elements of the NWI. These are:

- water access entitlements and planning frameworks (section 1)
- water markets and trading (section 2)
- best-practice water pricing and institutional arrangements (section 3)
- integrated management of water for environmental and other public benefit outcomes (section 4)
- water resource accounting (section 5)
- urban water reform (section 6)
- knowledge and capacity building (section 7)
- community partnerships and adjustment (section 8).

The Commission's approach to assessing progress varies depending on the nature of the NWI commitment. In many areas, the NWI sets out precise actions, outcomes and objectives that can be readily assessed. For example, 'States and Territories will prepare water plans along the lines of the characteristics and components at Schedule E'.¹ In other areas, the assessment of progress is less straightforward. Some NWI requirements are qualified in some way (such as 'where practicable') or are ongoing in nature, and some NWI agreements are open to a degree of interpretation. In these instances, the Commission has defined what it considers to be the criteria for meeting the NWI requirements. The terminology for the Commission's assessment of progress is set out in box 1.

¹ NWI paragraph 39.

Box 1 **Assessment of progress ratings and indicators**

The Commission has adopted the following ratings to indicate progress in meeting the outcomes and objectives of the National Water Initiative (NWI).

- **Achieved:** All requirements to achieve the relevant outcomes and objectives of the NWI have been met.
- **Largely achieved:** Requirements to achieve the relevant outcomes and objectives of the NWI have generally been met, with some exceptions (for example, there are one or two non-compliant jurisdictions or reforms do not extend to all water users or sectors).
- **Partially achieved:** Only some requirements to achieve the relevant outcomes and objectives of the NWI have been met (for example, there are several non-compliant jurisdictions or most jurisdictions do not meet a number of key requirements).
- **Not achieved:** None of the requirements to achieve the relevant outcomes and objectives of the NWI have been met.

Some requirements in the NWI are one-off actions (such as removing legislative barriers to water trading) while others require ongoing effort (such as monitoring). Hence, 'achieved' does not necessarily indicate that no further action is required in the future.

In addition to the point-in-time assessments provided by these ratings, the direction of progress since 2017 has also been assessed. Progress signals are used to reflect an overall assessment of whether, on the whole across jurisdictions, reforms have moved closer to consistency with the NWI in the three years since 2017.

- An arrow pointing upward indicates progress.
- A flat line indicates no change.
- A downward arrow indicates poorer performance or backsliding.



Information and data sources

To inform the assessment of progress, the Commission collated information on current arrangements and key developments in each jurisdiction since 2017 from publicly-available sources. The Commission conducted initial consultations with NWI parties and sent all jurisdictions information requests in early July 2020 to confirm key developments since the 2017 assessment and to fill information gaps. This was then followed up with requests for updates on specific matters as needed.

Unless otherwise indicated, factual information presented in this assessment draws on NWI parties' responses to the Commission's information requests and subsequent correspondence.

The Commission's assessment of progress also draws on other sources including: the Commission's supporting papers to the inquiry report, other independent reviews and inquiries, academic and policy papers, input from the stakeholder working group, roundtables, and submissions to this inquiry. These sources are referenced accordingly.

Overview of progress and areas for further work

In the 17 years since the NWI was agreed, many of the commitments in the agreement have been met. Progress has continued in a number of areas since 2017. For example, updated and newly established water plans in a number of jurisdictions improved the specification of environmental and other public benefit outcomes. Some of those water plans improved water access for Aboriginal and Torres Strait Islander peoples. Reform in metering and compliance has picked up pace in New South Wales, Queensland and Western Australia. But, in a number of areas, progress has slowed since 2017, and the recent drought has exposed weaknesses in some jurisdictional frameworks and processes. A summary of progress is in table 1. An assessment of progress prior to 2017 can be found in appendix B of the Commission’s 2017 inquiry report (PC 2017).

Table 1 Summary of progress against the NWI

Element

1. Water access entitlements and planning frameworks

- All jurisdictions, except Western Australia and the Northern Territory, have enacted legislation required to create secure, NWI-consistent water access entitlements for consumptive uses. Some progress has been made since 2017, particularly in the Northern Territory, where exemptions (from entitlements frameworks) for minerals and petroleum industries have been removed.
- Water planning arrangements have been established for all areas of intensive water use. Most jurisdictions have more than 80 per cent of water use managed under water plans. This means the sharing of water resources between consumptive uses and the environment has been established in consultative processes, and informed by scientific and other assessments. However there has been inadequate progress to incorporate climate change and extreme events into water planning.

2. Water markets and trading

- Water markets have been established, allowing water to be traded to higher-value uses. Further steps have been taken by jurisdictions to improve the efficiency of their functioning. The largest water markets are located in the Murray–Darling Basin (MDB) and may provide the largest efficiency gains from further reform.

(continued next page)

Table 1 continued

3. Best-practice water pricing and institutional arrangements

- Urban service providers are generally pricing at the levels required by the NWI, despite some instances of underpricing.
- Independent economic regulators set prices or revenues for major urban water service providers in New South Wales, Victoria, South Australia, Tasmania and the ACT. The independent economic regulator reviews and recommends prices upon the request of the respective State Government for the state-wide provider in Western Australia and the major bulk water provider in Queensland. The Northern Territory, Queensland (except the major bulk water provider) and much of regional New South Wales, do not have independent economic regulation.
- Pricing for government-owned rural water providers is compliant with the 2010 NWI pricing principles in jurisdictions with independent economic regulation. In other jurisdictions, pricing objectives are compliant, however there is insufficient publicly available data to confirm if pricing outcomes are compliant. User-owned networks have incentives to price efficiently. There is limited independent scrutiny over the operations (including investment and renewal decisions) of cross-jurisdictional infrastructure providers.
- Some government-funded major water infrastructure is unlikely to be economically viable. Queensland, Western Australia and Tasmania could make better use of economic regulation for irrigation services.

4. Integrated management of water for environmental and other public benefit outcomes

- Environmental sustainability has been supported by formal provisions of water for the environment and progress has slowed on rebalancing overallocated systems.
- All jurisdictions have managers with responsibility for environmental water provision, and some arrangements are in place to coordinate water use for water resources shared across jurisdictions.
- The recent drought has exposed weaknesses in achieving agreed outcomes in some systems.

5. Water resource accounting

- Water accounting is generally providing practical, credible and reliable information, but there is room for improvement. Public demand for information and timely provision of it has increased over time. Most States and Territories are still in the process of implementing non-urban metering policies on the ground to meet the National Non-Urban Metering Framework and NWI requirements.
- Greater compliance and enforcement activity has occurred in some MDB jurisdictions, after existing arrangements were found to be insufficient to support investor and community confidence. The Northern Territory and Tasmania still do not publicly report on compliance activities.

6. Urban water reform

- Water reuse, water use efficiency, water-sensitive urban design and innovation have improved since the introduction of the NWI.
- Drinking water quality generally meets existing guidelines. Issues remain, particularly in some regional and remote communities and especially during droughts, and data are patchy. Tasmania has made significant progress in improving drinking water quality for regional and remote communities.

7. Knowledge and capacity building

- There have been advances in knowledge and capacity to support implementation of the NWI, although many jurisdictions lack a clear process for identifying knowledge and capacity building priorities.

8. Community partnerships and adjustment

- All jurisdictions have sought to improve the scale and quality of their engagement with communities and Aboriginal and Torres Strait Islander people. However, a range of concerns have been expressed through submissions and meetings about the adequacy and effectiveness of some engagement processes undertaken since 2017, particularly within the New South Wales part of the MDB.
-

There remain, however, a number of areas where further work is needed. While the Commission's assessments in this inquiry focus on the current NWI, the report and supporting papers provide the Commission's views on this renewal process, which are shaped by the assessments and progress against the current NWI. The prospective renewal of the NWI will act to reaffirm collective jurisdictional commitment to water reform. It will

provide contemporised outcomes and objectives that jurisdictions will be assessed against going forward.

Priorities for all jurisdictions

There are some areas where improvements against commitments made under the NWI are needed by all Australian, State and Territory Governments. Priorities include:

- continuing to improve the specification of environmental and other public benefit outcomes (particularly in relation to Indigenous cultural values and social benefits) and incorporating climate change and extreme events in water planning
- further integration of environmental water management into natural resource management
- better monitoring, review and reporting arrangements to support achievement of environmental and other public benefit outcomes
- engaging with Aboriginal and Torres Strait Islander communities
- improving service delivery around water trade processing and information provision
- improving decision-making processes for new infrastructure to ensure economic viability and environmental sustainability.

A summary of recent progress and areas for further work for each jurisdiction is set out below.

New South Wales

Since 2017, New South Wales has faced extreme rainfall deficiencies due to drought. The drought has exposed weaknesses across many areas including planning, accounting, compliance and reporting. Commitment to completing the implementation of New South Wales' major reform agenda — the *Water Reform Action Plan* — will be necessary to ensure these shortcomings are addressed. Compliance and enforcement have been particular areas of focus, with some improvement, but more work is needed in other areas. Funding and regulatory arrangements for regional urban water providers have improved to be more consistent with the NWI.

Key priorities for New South Wales include:

- revising water plans to better define agreed environmental and public benefit outcomes, provide secure environmental water and use of adaptive management approaches in recognition of climate change and extreme events
- reaching agreement to enable cross-border trade with the ACT
- decision making accountability for new irrigation infrastructure given poor economic viability of some committed investments, such as Dungowan Dam

- ensuring accountability for the best use of environmental water, free from political interference
- moving towards transparent community service obligation (CSO) payments for regional urban water providers, instead of grant programs
- delivering effective community engagement processes on all water matters.

Victoria

Victoria continues to make progress against its reform agenda, *Water for Victoria*, released in 2016. Recent legislation has improved the specification of environmental outcomes to support the effectiveness of its integrated environmental water and natural resource management regime. Penalties for unauthorised take and water corporations' powers to enforce compliance have been strengthened, and recommendations from an independent review into Victoria's compliance systems and processes in 2020 have been accepted to strengthen monitoring, governance, reporting and public engagement. These aim to implement a consistent zero-tolerance approach to unauthorised water take. Victoria's water register functionality and access to water market information also reduce transaction costs and improve water market efficiency.

Key priorities for Victoria include:

- better aligning water planning and management levies with cost recovery principles
- clearly establishing a specific risk assignment framework
- keeping all options on the table in managing urban water supplies, particularly in removing explicit or implicit barriers to urban and rural water trade.

Queensland

Drought conditions in central and southern Queensland since 2017 have strained water resources and put pressure on water service quality. The Queensland Government's reforms since 2017 have nevertheless significantly improved water planning and management frameworks. This has been demonstrated in water plan updates and in providing policy guidance on the management of strategic water reserves. Strategies to improve the monitoring and evaluation of environmental outcomes have been adopted. Water access for Aboriginal and Torres Strait Islander people has been improved in the Cape York Water Plan area, with the establishment of a water reserve to support economic and social aspirations. Compliance and enforcement processes have also improved, with legislative changes to the types of offences and penalties for unauthorised water take.

Key priorities for Queensland include:

- expanding independent economic regulation for urban providers, and replacing capital grant funding for regional urban providers with transparent CSO payments

-
- finalising accurate measurement, accounting and management of overland flow harvesting
 - improving the accessibility of water entitlement and trade information availability through registers
 - improved decision making for new irrigation infrastructure.

South Australia

In South Australia, legislative changes to natural resource management have included further water reform measures. South Australia has allocated funding to upgrade its water register and associated systems, and has moved from annual to quarterly water accounting and compliance in its River Murray Prescribed Watercourse, with penalties reflective of water market values. Requirements for reviewing water allocation plans have been strengthened and require reporting on the review of the principles in the plan and the success of the plan. Long-term environmental water plans have been established as part of the Basin Plan, and improve the specification of environmental and public benefit outcomes in the MDB. Aboriginal communities have been engaged in these processes.

South Australia should ensure that transparent information is available to assess the new Northern Adelaide Irrigation Scheme's compliance with the NWI before the Commission's 2023 assessment.

Western Australia

The Western Australian Government is increasingly adjusting its water resource management approaches to adapt to the challenges of climate change. It has significantly improved its metering of water take (97 per cent of licenced water entitlements are now metered), which is important to sustainably manage its primarily groundwater resources. The engagement of Traditional Owners has been significantly improved in planning processes, with mechanisms formalised in policy. Although it continues to work to establish statutory entitlement arrangements, significant legislative change has not yet occurred. Draft legislation on water reform is, however, currently being considered.

Key priorities for Western Australia include:

- enacting legislation required to create secure, NWI-consistent water access entitlements, and statutory water allocation plans and extraction limits
- strengthening independent economic regulation to align water service pricing with cost recovery principles
- increased transparency of information on prices, costs and subsidies for irrigation services.

Tasmania

Since 2017, Tasmania has made steady progress in water reform, commensurate with increases in the development of water systems in the state. Significant progress has been made in improving regional and remote drinking water quality. The Tasmanian Government is in the process of developing a *Rural Water Use Strategy* to guide Tasmania's future water management arrangements.

Key priorities for Tasmania include:

- addressing underpricing by the state-wide water service provider
- increased transparency of information on prices, costs and subsidies for irrigation services
- publicly reporting compliance and enforcement activities
- specifying cultural and spiritual outcomes for Aboriginal communities in water plans
- implementing risk assignment arrangements that specify the risk sharing provision between licence holders and government, based on the NWI risk assignment framework.

Northern Territory

In the Northern Territory, significant legislative changes since 2017 now provide statutory protection to water entitlements. These changes also provide for strategic Aboriginal water reserves when new water plans are established or existing plans revised. Several new plans provide caps on consumptive use and foster conditions conducive to water trading (the first trade was completed in 2019). Since 2017, several major reforms to the *Water Act 1991* (NT) have been implemented, including the removal of exemptions for minerals and petroleum industries to require a water access entitlement.

Key priorities for the Northern Territory include:

- enacting legislation required to create secure, NWI-consistent water access entitlements
- introducing independent economic regulation of the Power and Water Corporation and improving the transparency of CSO payments to Indigenous Essential Services.
- publicly reporting on compliance and enforcement activities.

Australian Capital Territory

The ACT is generally progressing well. It updated its guidelines for desired environmental flow outcomes, and engaged the Aboriginal community in this process. Of the few outstanding areas of reform, the ACT should continue to work with New South Wales to enable cross-border trade.

Australian Government

The Australian Government continues to support States and Territories in progressing NWI-consistent reform. Its role in the MDB, in particular, has been important; it includes setting, monitoring and enforcing the Basin Plan; operating the River Murray system on behalf of the Basin states; managing held environmental water; and communicating information. It continues to invest in monitoring and reporting to help improve the understanding of hydrology, water-dependent ecology, and management effectiveness. It is playing an increased role in water infrastructure funding, particularly through the establishment of the National Water Grid Authority.

Key priorities for the Australian Government are to:

- ensure all current and future infrastructure funding and financing for new or refurbished water infrastructure is NWI-consistent
- ensure that decisions to invest in major water infrastructure are only made following a robust and publicly available cost–benefit analysis that demonstrates the project’s economic viability
- support the most cost-effective means of water recovery in overallocated systems.

1. Water access entitlements and planning frameworks

Table 1.1 summarises progress in achieving outcomes and objectives relating to water access entitlements and planning frameworks. The remainder of this section provides detail to support the findings in the table.

Table 1.1 Assessment summary: water access entitlements and planning

<i>NWI commitment</i>	<i>2017 assessment</i>	<i>2020 assessment^a and progress indicator^b</i>	<i>Comments — progress since 2017</i>
Water access entitlements			
Legally defined (statutory) long-term share of the consumptive pool	Largely achieved	Largely achieved 	All jurisdictions (apart from Western Australia and the Northern Territory) have enacted legislation required to create secure, NWI consistent water access entitlements.
Unbundled (into access, use, and delivery) where cost effective	Largely achieved	Largely achieved 	Apart from Western Australia and the Northern Territory.
Apply to all major consumptive water uses (to the extent practicable)	Largely achieved	Largely achieved 	In Queensland, 'associated water' regarding minerals and petroleum operations does not have volume limits and is outside of the entitlements framework. Since 2017, the Northern Territory has removed exemptions for minerals and petroleum industries.
Water plans^c			
Statutory	Largely achieved	Largely achieved 	Western Australian water allocation plans are not statutory.
Articulate trade-off decisions between economic, social and environmental considerations	Partially achieved	Partially achieved 	Areas for attention include balancing environmental and consumptive use in a changing climate.
Provide for adaptive management of surface water and groundwater systems	Partially achieved	Partially achieved 	Fit-for-purpose monitoring, reporting and review of plans are needed to support adaptive management.

(continued next page)

Table 1.1 (continued)

<i>NWI commitment</i>	<i>2017 assessment</i>	<i>2020 assessment^a and progress indicator^b</i>	<i>Comments — progress since 2017</i>
Water for environment and other public benefit outcomes			
Statutory recognition and afforded the same level of security as consumptive uses	Largely achieved	Largely achieved 	Western Australian water allocation plans are not statutory. In most systems, water planning arrangements provide environmental water at least the same level of security as consumptive uses.
Addressing overallocation and overuse			
All overallocated and overused systems returned to sustainable levels of extraction	Partially achieved	Partially achieved 	There are still a number of systems identified as overallocated and/or overused. Some areas do not have finalised plans. In addition, there are new resources that have been identified as overallocated since 2017 due to climate change, although there are efforts to address this. Areas for improvement include establishing clearer timelines for returning systems to sustainable levels of extraction and implementing water plans and/or management arrangements in areas subject to high use or acknowledged as being under stress.
Assigning risks for changes in allocation			
Clearly established (through statutory instruments)	Partially achieved	Partially achieved 	Victoria has not clearly established a specific risk assignment framework. Western Australia is contemplating a risk assignment framework, but is yet to undertake required legislative reforms.
Implementable and effective in providing certainty to entitlement holders	Partially achieved	Partially achieved 	There are still areas where risk assignment policies could improve understanding of changes in future water allocations.
Indigenous access			
Indigenous representation in water planning processes	Largely achieved	Largely achieved 	All States and Territories now engage with Aboriginal and Torres Strait Islander people in water planning processes.
Identification of objectives for Indigenous Australians and strategies for achieving them	Partially achieved	Partially achieved 	Some States and Territories have made significant progress toward identifying objectives and strategies to improve them in water planning, environmental watering and natural resource management, but more can be done.
Native title rights to water will be accounted for in water planning	Not assessed in 2017	Partially achieved 	Most States and Territories have processes to account for native title rights in water planning. Some jurisdictions are creating alternative policies to recognise native title rights in water.

(continued next page)

Table 1.1 (continued)

NWI commitment	2017 assessment	2020 assessment ^a and progress indicator ^b	Comments — progress since 2017
Interception			
Significance of water intercepting activities assessed and effectively managed	Largely achieved	Largely achieved 	While progress has been made to consider interception activities in water management and planning, jurisdictions still have not fully met the objectives and outcomes of the NWI. Jurisdictions have faced difficulties in monitoring interception activities, which make it hard to manage risks accordingly.
Integrating surface water and groundwater management			
Physical connectivity between groundwater and surface water assessed and managed	Largely achieved	Largely achieved 	While the number of water plans that fully integrate groundwater and surface water resource management remains small, the number of water plans that recognise connectivity between groundwater and surface water (including through linked groundwater and surface water plans) has increased substantially since 2004. Requires jurisdictions' continued commitment to building knowledge, funding and implementing appropriate monitoring, and adaptively managing systems where new information indicates that management is necessary.

^a **Achieved:** All requirements met, **Largely achieved:** Requirements generally met, with some exceptions, **Partially achieved:** Only some requirements met, **Not achieved:** No requirements met. ^b Progress indicators reflect an overall assessment of whether, on the whole, reforms have moved closer to consistency with the NWI in the three years since 2017. An arrow pointing upward indicates progress, a flat-line indicates no change and a downward arrow indicates poorer performance or backsliding. ^c In some jurisdictions (such as Victoria) the entitlements system provides the main statutory basis for how water is shared rather than plans.

This section assesses progress against outcomes and objectives of the NWI related to water access entitlements and planning frameworks. It uses the following headings to reflect the actions for this element in the NWI:

- water access entitlements
- water planning
- environmental and other public benefit outcomes
- addressing overallocated and overused systems
- assigning risks for changes in allocation
- Indigenous access
- interception
- integrating surface water and groundwater management.

1.1 Water access entitlements

Under the NWI, parties agreed to establish statutory-based water access entitlements for consumptive use to provide security and commercial certainty. The NWI requires that entitlements be separate from land, exclusive, mortgageable, tradeable and defined as a perpetual or open-ended right to a share of the consumptive pool in a given system.¹

Developments since 2017

In 2017, the Commission noted that most States and Territories had introduced legislative reforms to enable the implementation of NWI consistent water access entitlements. Only Western Australia and the Northern Territory had not, with entitlements remaining tied to land and limited to a fixed term (not perpetual). The Commission also found that, in some cases, minerals and petroleum operations continue to access water outside of water entitlements and planning frameworks, posing risks to other water uses and the environment.

There has been some progress towards implementing NWI consistent entitlements since 2017, particularly in the Northern Territory where several major reforms to the *Water Act 1991* (NT) have been implemented (detailed below). The NT Government is also developing reform policies for its water resource regulatory framework, including for water access entitlements (Northern Territory Government 2018, pp. 10–11).

Notwithstanding this progress, the extent to which jurisdictions have implemented NWI consistent entitlements remains varied across jurisdictions, regions and types of water source.

- As the Commission noted in 2017, water rights are separate from land in most jurisdictions. However, this largely applies to regulated surface water only. Water rights remain tied to land in many regulated groundwater systems and some unregulated surface water systems. In 2017, Victoria was investigating the merits of converting take and use licences in unregulated surface water and groundwater systems into water shares and other related products to provide flexibility and trade opportunities (similar to regulated water systems). The investigation has since been completed, with no further actions announced (DELWP (Vic) 2020a, p. 7). Where water rights are separate from land, the components of the water right may remain bundled. For example, apart from the River Murray Prescribed Watercourse and the Southern Basin and Musgrave Prescribed Wells, entitlements remain bundled in South Australia.² South Australia's approach to unbundling considers net benefits (as associated costs can be high), and occurs on a case-by-case basis, in consultation with stakeholders (Government of SA 2012, p. 2). In

¹ NWI paragraphs 25, 28 and 31.

² Although the Far North Prescribed Wells Area Allocation Plan, which is expected to be adopted by early 2021, will be unbundled. Transitional arrangements are in place in South Australia, where licensing arrangements for water allocation plans continue to operate as 'bundled' water licensing regimes until their planned dates of review.

2017, South Australia was updating its policy statement on unbundling water rights. This has not yet been completed.

- In some cases, water rights are defined for a limited term, rather than as a perpetual or open-ended share of the consumptive pool. For example, entitlements in Western Australia and the Northern Territory are commonly issued for 10 years at a time (although the Northern Territory is currently reviewing this (Northern Territory Government 2018, p. 11)). To provide some investment certainty to entitlement holders, in Western Australia, the *Rights in Water and Irrigation Act 1914* (WA) presumes that a water licence will be renewed after its term expires if the licensee has complied with the terms and conditions of the licence, retains legal access to where the water is being abstracted and water is available.
- Some major water uses, for example by minerals and petroleum industries, are not covered by entitlement frameworks in some cases. As the Commission noted in 2017, while Queensland has implemented a water access entitlements framework, separate ‘underground water rights’ exist for some minerals and petroleum activities. Tenure holders may be allowed to take or interfere with groundwater (in the tenure area) during the course of, or in carrying out, authorised activity (extracting the resource). This ‘associated water’ does not have volume limits and is outside the entitlements framework. Queensland has established the Office of Groundwater Impact Assessment to assess and manage cumulative groundwater impacts from resource development, and monitor associated water extraction (OGIA (Qld) 2019, p. 56), and the GasFields Commission which reviews the implementation of regulatory frameworks, including the management of groundwater extracted from coal seam gas operations. (Non-associated water used by mining and petroleum operations must be licensed and is included in the entitlements framework). Since 2017, the Northern Territory Government has removed exemptions for minerals and petroleum industries under the *Water Act 1992* (NT).

As the Commission noted in 2017, Western Australia and the Northern Territory, governments have a licensing policy that requires entitlement holders to trade or use their water allocation over a specified period, or have it reduced or forfeited (PC 2017, p. 340). For example, in Western Australia, the *Rights in Water and Irrigation Act 1914* (WA) includes a provision stating that water may be recouped if the licence holder has consistently not taken the water. A policy details how this provision is being implemented. These policies aim to ensure that entitlements reflect the holders’ actual need to take water. No changes have been made since 2017, however, the Northern Territory Government has developed a *Recovery of Unused Licensed Water Entitlements Policy* to guide application of the policy and to inform processes required for the recovery of unused entitlements (DENR (NT) 2020b, p. 5). These ‘use it or lose it’ policies are inconsistent with the NWI, which aims to establish secure property rights.

Since 2017, New South Wales has introduced amendments and new exemptions for water access licences that were included in the *Water Management (General) Regulations 2018* (NSW). This included exemptions for: groundwater take of 3 megalitres or less per year; and excavation dewatering taking more than 3 megalitres per year in the Botany Sands

Groundwater Source (and any other groundwater source specified by the minister) to construct a building, road or other infrastructure (DPIE (NSW) 2018).

The Commission's view

The NWI sought to promote clear property rights to water by ensuring water access entitlements are:

- legally defined (statutory-based)
- unbundled (into access, use, and delivery rights) and separate from land
- apply to all major consumptive water uses (to the extent practicable).

These features promote the integrity of water rights and are a prerequisite to trade.

Not all States and Territories have enacted legislative reforms to enable the implementation of NWI consistent entitlements and planning frameworks. For example, Western Australia and the Northern Territory have not made legislative changes to ensure entitlements are separate from land and perpetual. That said, the Northern Territory has implemented several major reforms to its legislation since 2017. As a result, water users in these jurisdictions may not have the security that the NWI intends. As the Commission noted in 2017, enacting legislation does not mean fully NWI consistent entitlements will have to apply to all areas in the jurisdiction (for example, underdeveloped water resources) (PC 2017, p. 342). However, as competition for water resources increases, so too would the costs of not having NWI consistent entitlements.

The unbundling of water rights into access, use and delivery rights, and ensuring that they are separate from land aims to promote trade efficiency, however, there can be significant costs associated with this process (as noted above regarding South Australia's approach to unbundling). For example, the establishment of legal and administrative frameworks to manage the separate specification of rights requires upfront investment from governments (ACCC 2017, p. 6). The unbundling of entitlements has progressed slowly as governments considered the cost effectiveness of the process, particularly for low-use water systems (NWC 2014, pp. 25–26). The Commission maintains the view expressed in its 2017 assessment that further unbundling of entitlements should occur where cost effective.

In some cases, minerals and petroleum industries continue to access water outside of water entitlements and planning frameworks. For example (as discussed above), in Queensland, resource tenure holders have rights to take associated water, which sit outside Queensland's entitlements and planning framework. Several participants to this inquiry raised concerns that the exclusion of minerals and petroleum industries in entitlements and planning frameworks undermines the integrity of the entitlements system, adversely affects environmental outcomes and reduces transparency (AgForce, sub. 24, p. 4; NFF, sub. 42, pp. 14–15; Lifeblood Alliance, sub. 70, p. 29). SP A *Entitlements and planning* discusses this in more detail.

Overall, the Commission is of the view that jurisdictions have largely achieved their NWI commitments regarding water access entitlements. This includes ensuring that entitlements are: legally defined; unbundled; and apply to all major consumptive water uses. Since 2017, little progress has been made across jurisdictions, with the exception of the Northern Territory, which has removed exemptions for minerals and petroleum industries.

1.2 Water planning

Under the NWI, parties agreed to prepare statutory water plans for surface water and groundwater management systems in which entitlements are issued. They agreed that it is up to each jurisdiction to determine the need for water plans for specific areas based on an assessment of the level of development of water systems, projected future consumptive demand and the risks of not having a detailed plan. Parties also agreed on characteristics and components to guide jurisdictions in preparing water plans.³

The NWI stipulates that, in implementing water plans, parties will monitor the performance of water plan objectives, outcomes and water management arrangements; factor in knowledge improvements as provided for in the plans; and provide regular public reports to help water users and governments to manage risks and provide early indications of possible changes to the consumptive pool.⁴

Developments since 2017

All jurisdictions have dedicated considerable resources and effort to water planning (table 1.2). In 2017, the Commission noted that jurisdictions had largely achieved water planning outcomes, and coverage of NWI consistent water plans was increasing (PC 2017). Despite these achievements, however, there remained opportunities to better achieve the intent of the NWI.

Since 2017, the coverage of water plans has increased in a number of jurisdictions. For example:

- In Queensland, additional regional aquifers were included in the Great Artesian Basin and Other Regional Aquifers Water Plan to improve water management arrangements in aquifers previously not managed under a water plan.
- In Western Australia several new plans are underway to improve coverage. These include plans in the groundwater and surface water areas of Serpentine, Perth South and Jandakot, Albany and hinterlands, Derby and Fitzroy Valley.
- In the Northern Territory, the Government has declared water allocation plans for the Ooloo Dolostone and Ti Tree Aquifers.

³ NWI paragraph 36 to 39, Schedule E.

⁴ NWI paragraph 40.

Table 1.2 Coverage of water plans^a in Australia, as at December 2020

<i>Jurisdiction</i>	<i>Coverage (%)</i>	<i>Change since 2017</i>	<i>Comments</i>
NSW	>99	Increase	Percentage of water entitlement volumes covered by water sharing plans. ^b
Vic	100	No change	Water management is conducted through the entitlements system, which covers all water sharing in the state. ^c
Qld	98	na	Data are not comparable to 2017. Percentage of water entitlement volumes covered by statutory plan areas. ^d
SA	100	na	Data are not comparable to 2017. Percentage of water extractions entitlement volumes covered by water sharing plans ^e
WA	35	na	Data are not comparable to 2017. Percentage of water entitlement volumes covered by non-statutory plan areas. ^f
Tas	34	Increase ^g	Percentage of water entitlement volumes covered by statutory plan areas. ^h
NT	28	na	Data are not comparable to 2017. Percentage of water entitlement volumes covered by statutory plan areas. ⁱ
ACT	100	No change	Percentage of water volumes identified in legislation.

^a Estimates of water plan coverage are indicative only. Estimates are not directly comparable across all jurisdictions due to different approaches to calculating coverage. ^b The approximately 0.2 per cent of water volume that is not covered by water sharing plans includes four coastal floodplain alluvial water sources and some legacy *Water Act 1912* licences that have not been transferred to coverage by the *Water Management Act 2000* (NSW) for various reasons. ^c Victoria allocates 6016 gigalitres (GL) of entitlements to consumptive use of an estimated 12 072 GL of available surface water, groundwater and recycled water. Thus, all consumptive water entitlements are covered by planning arrangements. ^d Queensland has 6727 GL allocated in statutory plan areas out of a total 6853 GL allocated state-wide. ^e In South Australia, 2870 GL is licensed for extraction in prescribed water resources that are managed through water allocation plans. Water extraction outside of prescribed areas is not licensed. ^f In Western Australia, 1409 GL of licensed water is covered by water allocation plans out of 3997 GL of total licensed water. In 2017, the coverage estimate was based on the count of licences within and without water allocation plans, rather than the share of licensed volumes. In 2020, 80 per cent of total licences were covered by plans, similar to the coverage in 2017. ^g Note that the volume of entitlements within and without plans has increased, but there has been no change in the water management plan arrangements in Tasmania since 2017. ^h DPIPWE (Tas) estimated approximately 455 GL (including 20 GL groundwater) is allocated in statutory plan areas and a total of 1332 GL is allocated state-wide. ⁱ The DENR (NT) advised that this measures the maximum entitlement in GL/year within planning areas relative to entitlements in the whole of the territory. There are 136 GL of entitlements within plans and 489 GL entitlements in the whole of the territory. **na** Not available.

Source: Responses to State and Territory information requests.

Jurisdictions have also made progress in undertaking scheduled reviews of water plans (table 1.3).

Table 1.3 Examples of water plan reviews since 2017

	<i>Recent plan reviews</i>	<i>Comments</i>
NSW	The Natural Resources Commission has reviewed the following water sharing plans since 2017: NSW Border Rivers Regulated River, Bellinger River Area Unregulated and Alluvial, NSW Great Artesian Basin, Barwon Darling, Central Coast Unregulated, Coffs Harbour Area Unregulated and Alluvial, Hunter Unregulated and Alluvial, Lower North Coast Unregulated and Alluvial and Peel Valley Regulated, Unregulated, Alluvial and Fractured Rock.	Following review, the Minister has extended a number of the plans for an additional two years while work is done to replace them. The Peel water sharing plan has been amended and the Unregulated, Alluvium and Fractured Rock Water Sources have been moved to other water sharing plans.
Vic	Sustainable Water Strategy (SWS) five-yearly assessments for: • Gippsland Region • Western Region • 10 year review for Central Region SWS A Statutory Management Plan was approved in Katunga Water Supply Protection Area and four Local Management Plans were approved	Water for Victoria committed to conducting five-yearly assessments for each SWS. The strategies must also be reviewed at least every 10 years. Development of a new SWS for the Central and Gippsland Regions commenced in 2019. Planning has commenced for the Northern Region SWS Review, as per the commitment under <i>Water for Victoria</i> .
Qld	Water plan reviews for: • Border Rivers and Moonie • Condamine and Balonne • Great Artesian Basin and Other Regional Aquifers	In addition to the water plan reviews, there have been 13 Ministerial performance reports on water plans since 2017 (required under the <i>Water Act 2000</i>). The Minister must report on the effectiveness of a plan in meeting its outcomes.
WA	Cockburn groundwater allocation plan 2020 replaced the previous plan. Water allocation statements were also updated for: • West Canning Basin • Wellington Reservoir • Dinner Hill • Donnelly River	In addition, reviews since mid-2017 include the Mingenew subarea allocation limit review and evaluation statements for Upper Collie, Ord River and La Grange. Additional plans are under development and review.
SA	Water allocation plan (WAP) reviews for: • Clare Valley • Marne-Saunders • Padthaway Prescribed Wells Area • Far North Prescribed Wells Area • Tatiara Prescribed Wells Area	The WAP for the River Murray Prescribed Watercourse has been amended twice since 2017: • first, to ensure consistency with the <i>Water Act 2007</i> (Cth), and to more effectively manage issues affecting the river, such as salinity • second to update the private carryover policy to provide greater flexibility to water users in dry times. The review of the Tintinara-Coonalpyn Prescribed Wells Area WAP is due to be completed in 2022. A number of amendments have also been made to plans, including for Basin Plan compliance.

(continued next page)

Source: Responses to State and Territory information requests.

Table 1.3 (continued)

	<i>Recent plan reviews</i>	<i>Comments</i>
Tas	The <i>River Clyde Catchment Water Management Plan</i> September 2017 was adopted in 2017.	A number of plans are currently being reviewed: • Great Forester Catchment Water Management Plan • Lakes Sorell and Crescent Water Management Plan • Mersey Water Management Plan. Between 2017 and 2020, DPIPWE also prepared Water Management Statements for the Duck, North Esk, Shannon and Swan Rivers.
NT	There are currently 6 Water allocation plans (WAPs) declared. The existing plans were declared between 2016 and 2020.	A further three WAPs are under development. The Western Davenport WAP was reviewed in 2016–2018.
ACT	ACT surface water and groundwater resource plans were accredited by the Commonwealth Minister for Agriculture in June 2020.	The first report card on the ACT Water Strategy was released in 2018. It showed progress in implementing the Strategy: The latest report card is forthcoming.

Source: Responses to State and Territory information requests.

Murray–Darling Basin (MDB) jurisdictions have developed water resource plans, as required under the *Water Act 2007* (Cth). Each water resource plan sets out the rules for how water is used at a local or catchment level, including new limits on how much water can be taken from the system, how much water will be made available to the environment, and how water quality standards can be met. These water resource plans reflect their jurisdictional water sharing arrangements for the relevant water systems. Water resource plans must be accredited by the Commonwealth Minister responsible for water, with the Murray–Darling Basin Authority (MDBA) assessing the plans and providing advice for accreditation.

Water resource plans have been accredited and are now operational in Victoria, Queensland, South Australia and the Australian Capital Territory. The New South Wales Government has submitted water resource plans to the MDBA for assessment.

In addition, Great Artesian Basin jurisdictions (South Australia, Northern Territory, Queensland and New South Wales), together with the Australian Government, released a new edition of the Great Artesian Basin Strategic Management Plan on 27 July 2020. The Plan is the second Basin-wide plan, and builds on the outcomes and actions of the previous plan (released in 2000). The Plan is not a statutory document but provides guidance for governments, Aboriginal and Torres Strait Islander people, water users and other stakeholders to support achievement of economic, environmental, cultural and social outcomes for the Great Artesian Basin and its users.

The Plan is intended to foster collaborative management between users to help achieve continued improvement in the management of the Basin. It will assist all parties to identify and respond to the risks, issues, challenges and opportunities associated with the use of Great Artesian Basin water. The document is based on public consultation and will be reviewed every five years during its 15 year lifespan to check progress. This release also coincides

with the disbanding of the Great Artesian Basin Coordinating Committee and the creation of a new Great Artesian Basin Stakeholder Advisory Committee.

A number of jurisdictions have sought to strengthen planning processes:

- In New South Wales, statutory responsibility for audit and review of water sharing plans under the Water Management Act 2000 has been transferred to the Natural Resources Commission (NRC). From 1 December 2018, the NRC is to audit water sharing plans (WSPs) within the first five years after they commence and undertake a formal review near the end of their 10 year term.
- In New South Wales, Monitoring, Evaluation and Reporting plans have been developed for all inland valleys as part of Water Resource Plan development (as a requirement of the Basin plan), including an overarching NSW Monitoring, Evaluation and Reporting Plan.
- In Victoria, a grid oversight function, the State Water Grid Partnership, has been established. The partnership between the Government, Victorian water corporations and key stakeholders establishes a strategic grid oversight and facilitation function to coordinate knowledge and expertise from across the industry to maximise the efficiency and effectiveness of the entire State grid. Under its auspices, the first biennial statement reported on levels of water security and the need for augmentations across the State. The statement was released in October 2018 and its purpose is to improve Victoria's current and future water grid and how it operates.
- In Queensland, information on risk assessments is included in the recently completed Water Resource Risk Register. Risks to water plan outcomes are assessed using a standardised approach and a standardised list of threats are considered. This ensures consistency in approach across the state in assessing risks and repeatability of assessments over time. The register provides a point of truth for assessment of risk to water resources to ensure future discoverability of information and ease of update. This allows for risks to be tracked over time, helping government to better understand the effectiveness of management actions and prioritise activities across the water business. The *Water Act 2000* (Qld) was also amended in 2018 to improve the protection of cultural values of water resources in water plans (discussed further in section 1.6 *Indigenous access*).
- South Australia has strengthened the requirements for reviewing water allocation plans in the *Landscape South Australia Act 2019* to be more rigorous and require reporting on the review of the principles in the plan and the success of the plan, taking into account the outcomes sought to be achieved by the plan.
- In 2018, *Water Management Planning, Guiding Principles for the Development of Statutory Water Management Plans in Tasmania* were released. The updated principles follow the first full review of them since 2005. Key outcomes from the review were:
 - a more contemporary policy document that can better communicate the statutory water management planning process with a diverse range of stakeholders

-
- an emphasis on preparing statutory Plans that are simple to use and understand, recognising the diversity in potential users of Plans
 - greater emphasis on the desired outcomes from statutory water management planning rather than a ‘one size fits all’ rules based approach.

A number of jurisdictions have also sought to enhance work on assessing economic, social and environmental considerations through developing guidelines, and in the course of preparing water plans.

- In Victoria, preparation for the new Central and Gippsland Region Sustainable Water Strategies has included:
 - environmental flows studies and modelling undertaken by scientific panels to determine what flows are needed to maintain and improve priority environmental values, and what the deficits are in water available to meet those flow recommendations
 - the Long-Term Water Resource Assessment (2020d) in the south of Victoria, which provides an overview of the water sharing arrangements in the region. This provides an evidence base that will be used for development of the Central and Gippsland Region Sustainable Water Strategy.
- In Queensland, the Department of Regional Development, Manufacturing and Water is developing a range of guidelines to guide empirical work:
 - A draft social and economic assessment framework is intended to provide a consistent state-wide approach to social and economic assessments for water planning. The framework was being trialled for the Barron water planning region and Bowen region and was expected to be completed by the end of 2020.
 - A monitoring, evaluation and reporting framework has been completed to guide the development of Monitoring, Evaluation and Reporting Strategies (MERS) for water plan areas. MERS document the social, economic, cultural and ecological data needs, monitoring strategies and evaluation questions for water plans. MERS for the Cape York, Condamine and Balonne, and Border Rivers and Moonie water plans have been developed.
 - A *Water Planning Science Plan 2020–2030* was released in November 2020 (DRDMW (Qld) and DES (Qld) 2020). This is discussed further in section 7.

Considering climate change and extreme events in water planning

Since the NWI was agreed in 2004, climate change and extreme events have emerged as key challenges and priorities for water planning and management. Reflecting this, the Australian, State and Territory Governments developed a module to the NWI policy guidelines for water planning and management titled *Considering Climate Change and Extreme Events in Water Planning and Management Module*.

States and Territories have taken steps to consider and incorporate climate change into water planning (table 1.4). Arrangements have also been put in place to deal with extreme events (table 1.5).

Table 1.4 Climate change and water planning

	<i>Description</i>
NSW	Water sharing plans are designed to account for climate variability and the ten-year review process provides an opportunity for information to be updated to reflect climate change.
Vic	In August 2018, the Minister for Water released the Pilot Water Sector Climate Change Adaptation Action Plan. Twenty actions are set out in the Pilot Plan, to assist the sector embed climate change considerations into its policies, planning, guidelines and operations, and respond to the risks posed to public health and wellbeing. The first legislated Water Sector Climate Change Adaptation Action Plan is under development and due to be completed by 31 October 2021. The Minister for Water can temporarily or permanently qualify rights to water in accordance the <i>Water Act 1989</i> (Vic). A permanent qualification is a change to the water sharing arrangements under existing entitlements. It may only occur once a long-term water resource assessment has determined that a decline in long-term water availability has had a disproportionate impact on the environmental water reserve or consumptive purposes or there has been a deterioration in waterway condition for reasons related to flow.
Qld	<i>Water Act 2000</i> (Qld) amendments in 2018 enshrined consideration of the water-related impacts of climate change in the water planning framework. The inclusion of an express consideration for the Minister in developing a draft water plan ensures climate assessments can more clearly and transparently inform water planning policy decisions. Making climate change considerations explicit also ensures that climate change forms part of stakeholder consultations during the water planning process. All Ministers Reports on water plans released from December 2018 onwards have considered climate change (12 reports to date). In addition, water modelling of the potential impacts of climate change on water plans out to 2070 has been completed using an approach peer reviewed by CSIRO. Government consideration of science and policy responses to this work are planned for the first half of 2021.
WA	The effects of climate change are central to the water allocation planning process, particularly when determining the amount of water available over the 10-year life of the plan. Recent plan evaluations and updates have changed allocation limits to reflect climate change. Once the plan is developed and implemented the on-going impact of climate change is assessed in the evaluation of the resources and the effectiveness of the management framework in the plan. Significant changes to climate and scientific understanding of a resource can trigger a review of a water plan.
SA	Water allocation plans are required to be reviewed every ten years. Monitoring of water use and water availability provides data to indicate whether resources are declining or under pressure. The <i>Landscape South Australia Act 2019</i> also requires that future needs of water users, including the environment, are considered in water allocation plans. At the time of review, climate change can be considered and policies developed around these factors.
Tas	Water allocation decisions and access rules developed through water management planning processes are evaluated using projections of future climate.
NT	Water allocation plans take into account forecast climate projections for the next 30 years based on Bureau of Meteorology advice. The five year review of plans allows adjustments to be made. A technical paper titled <i>Projected Climate Change Effects on Diffuse Recharge in the NT</i> was published in 2019 to discuss recharge modelling results and likelihood for future climate change effects on NT's groundwater systems.
ACT	Icon Water's Source Water Strategy 2018–30 includes key planning variables on climate variability and climate change. Icon Water also established an Expert Panel in May 2020 to seek independent advice to help ensure robust water security. The Expert Panel is looking at the question of the challenges of extreme weather patterns and changing climate on the delivery of sustainable water to the Territory and surrounding region.

Source: Responses to State and Territory information requests.

Table 1.5 Extreme events

	Description
NSW	The <i>Extreme Events Policy</i> was released in October 2018 to provide a framework for making decisions during extreme events for water sources within the NSW Murray Darling Basin (MDB). Incident Response Guides (developed as part of the Basin Plan's Water Resource Plan requirements for MDB river systems) outline a staged approach to managing extreme events and identify a range of measures that water managers may adopt as conditions deteriorate. The Policy also provides for the establishment of Critical Water Advisory Panels to provide cross agency and local government consultation on measures. The <i>Water Management Act 2000</i> provides for the Minister for Water to suspend the operation of a water sharing plan, either in whole or in part, if satisfied that there is a severe water shortage (or an extreme event if in the NSW Murray-Darling Basin). This decision requires concurrence from the Minister for Environment. When a suspension is in force, the order of priority when allocating available water changes from being to protect the water source and dependent ecosystems, as well as basic landholder rights, to prioritising water for domestic purposes and essential town water supplies (or critical human water needs in the NSW Murray-Darling Basin). Since 2017, the following water sharing plans have had certain rules suspended: • Peel Valley Regulated, Unregulated, Alluvium and Fractured Rock (suspended 2 September 2019 to 30 June 2020) • Macquarie and Cudgegong Regulated Rivers (suspended 4 July 2019 to 30 June 2020) • Belubula Regulated Rivers (suspended on 4 July 2019 and will remain suspended until the new water sharing plan comes into effect) • Greater Metropolitan Region Unregulated River (suspended 27 August 2020 to 30 June 2020).
Vic	The Minister for Water can temporarily qualify rights to water in accordance the <i>Water Act 1989</i> (Vic). A temporary qualification is a temporary change to water sharing arrangements in a given area to ensure critical water needs can be met in extreme circumstances. It may occur when there is a declared water shortage resulting in a failure of water sharing arrangements under existing entitlement. A temporary qualification of water shares in the declared Broken System was made on 1 January 2020 to provide access to water for critical domestic and stock supplies. The temporary qualification ended on 30 June 2020.
Qld	Water plans (and associated instruments) contain water sharing rules and/or critical water sharing arrangements that deal with instances of extreme water scarcity. Additionally, powers under the <i>Water Act 2000</i>, ensure that the Minister or Chief Executive can appropriately respond to water shortages and water supply emergencies. These special reserve powers provide for limitations on take in extreme circumstances. Amendments to the <i>Water Act 2000</i> in 2018 enable the Minister or Chief Executive to appropriately respond to a water quality issue (or potential water quality issue) where compliance with a water planning instrument would prevent the issue being dealt with urgently. These provisions have not been used and are envisaged to be issued only in exceptional circumstances.
WA	Water resources in Western Australia are dominated by groundwater systems and mostly small, unregulated surface water systems. Climate change in the southwest of Western Australia has resulted in a long-term decline in annual average rainfall and subsequent reduction in recharge to groundwater and streamflow, rather than the extreme events seen elsewhere in Australia. There are parts of the state where reduced rainfall can result in extreme water scarcity, as was experienced across the Great Southern Region of the state in 2019-20 (12 water deficiency declarations were put in place resulting in State Government carting water to meet animal welfare needs).

(continued next page)

Source: Responses to State and Territory information requests.

Table 1.5 (continued)

	Description
SA	The Water Allocation Plans for the River Murray Prescribed Watercourse and the Southern Basins and Musgrave Prescribed Wells Area are unbundled and have provisions to vary annual water allocations during times of reduced water availability. The River Murray Prescribed Watercourse Water Allocation Plan also includes greater security for water for critical human needs. Other water allocation plans that are not unbundled do not have provisions to vary water allocations during times of reduced water availability. The <i>Landscape South Australia Act 2019</i> enables the rate of water that is taken from a watercourse, lake, well or surface water area to be restricted if the quantity of water available can no longer meet demand, which may include times of extreme water scarcity.
Tas	Tasmania's Ministerial Policy 2015/1 Water Resources Management During Extreme Dry Conditions, guides the management of Tasmania's freshwater resources during extreme dry periods to ensure an appropriate balance between consumptive water needs and environmental water needs. the Minister for Primary Industries and Water makes a declaration when extreme dry conditions are prevailing. Once a declaration is made, specified management actions may be taken, that would not otherwise have been taken, including flexible implementation of restrictions and greater flexibility for water conveyance. On 17 January 2020 the Minister determined that extreme dry conditions were prevailing in Zone 3, North-East Tasmania. Implementation actions included meeting with irrigators to better understand their situation as well as consideration of what water management actions could be taken. No water management actions could be taken under the policy in 2020 due to the presence of significant water dependent environmental values within all rivers that may have been at greater risk if there were further reductions in stream flow below cease to take thresholds set out in the relevant statutory water management plans. The determination that Extreme Dry Conditions prevailed lapsed on 1 May 2020.
NT	Water allocation plans establish the way that water reductions apply across a full range of climate scenarios, in conjunction with licence conditions. The powers to grant licences and amend licence conditions sit with the Controller of Water Resources. For the Top End, it is the announced allocation condition in groundwater and surface water licences that allows the Controller of Water Resources to apply an annual reduction percentage. The Controller's general powers also include emergency powers to limit the statutory rights to take water for rural stock and domestic purposes.
ACT	As a result of undertaking infrastructure storage and operational investment from 2008 to 2012 along with community awareness on sensible water use there has not been an issue of water scarcity in the ACT since the end of the Millennium drought. Temporary water restrictions could be imposed if there was a situation of extreme scarcity.
Source: Responses to State and Territory information requests.	

The Commission's view

The NWI sought to implement water plans (or equivalent instruments) that:

- are statutory (to provide a clear and secure basis for water access entitlements and allocations)
- articulate trade-off decisions between economic, social and environmental considerations, drawing on and using the best available science, socioeconomic analysis and community input
- clearly identify the consumptive and environmental shares of the resource pool and the rules that govern system operation

-
- clearly establish how to deal with overused and/or overallocated systems (discussed separately below)
 - provide for adaptive management of surface water and groundwater systems.

Most jurisdictions have put in place broadly NWI consistent water planning arrangements for the main areas of intensive water use.

Despite this progress, there are opportunities to better achieve the intent of the NWI. Some of these opportunities relate to completing unfinished business, such as the introduction of statutory water plans in Western Australia.

Further, participants raised concerns that trade-offs made between economic, social and environmental outcomes: may inadequately reflect community values; are not always based on the best available science; and lack transparency. For example, VicWater (sub. 66, p. 3) noted that, in the MDB, the formulation of the environmentally sustainable diversion limit did not involve adequate community consultation and consideration of the trade-offs. Lifeblood Alliance (sub. 70, p. 9) noted that socioeconomic analysis undertaken is often about consumptive use rather than non-consumptive use (such as recreational and commercial fishing) and is often not based on the best available science. The National Farmers' Federation (sub. 42, p. 16) stated that water planning has failed to make transparent trade-offs between costs to farmers and environmental benefits. As a result, water users do not know the costs and benefits of the water plan for them and their community.

A number of submissions also raised concerns that jurisdictions have made inadequate progress to incorporate climate change and extreme events into water planning. For example:

It has also long been known that there has been a decided step change in climate, yet there has been a failure by all jurisdictions of any ongoing adaptation in water planning and management so that Australia can continue to make the best use of its limited water resources in light of population growth, and a changing climate scenario. (Jan Beer, sub. 8, p. 2)

Recent drought and extreme events experienced across the Basin demonstrate the need for better planning across jurisdictions, and more formalised and coordinated processes to manage the on-ground impacts of climate change on critical human and environmental water needs. (MDBA, sub. 23, p. 8)

NSW has been slow to take account of the reality of a changing climate in any meaningful way in its water plans and policies. Despite a series of drought conditions currently, and during, the last 15 years NSW persists in using pre 2004 drought as a baseline in its water allocations. (Inland Rivers Network, sub. 86, p. 4)

Recent examples of rare events have highlighted the need to plan for more extreme conditions than may have been typical previously. (Engineers Australia, sub. 63, p. 6)

... the extensive and devastating drought that occurred in between its [The Commission's] inaugural review of the NWI and this review has exposed serious shortcomings in drought preparedness, response and resilience that has posed a serious threat to communities including those who have never experienced drought conditions before. ... much more urgent action is

required to plan for and forecast the negative impacts of climate change on water resources and related infrastructure than has previously been the case (LGNSW, sub. 75, p. 4)

The NRC (in New South Wales) has also highlighted concerns about the adequacy of water plans to deal with drought. For example, in its review of the Barwon-Darling, it found that the water plan contributed to poor outcomes during the recent drought:

An intense drought, significant upstream water extraction, an apparent climate shift and the rules in the Water Sharing Plan for the Barwon-Darling Unregulated and Alluvial Water Sources 2012 (the Plan) have all contributed to poor ecological, social and cultural outcomes. (NRC (NSW) 2019, p. 1)

The NRC raised similar concerns in other reviews. For example, in the review for the Peel Valley Regulated, Unregulated, Alluvium and Fractured Rock Water Sources:

The Commission has concerns about the current Plan's ability to manage severe drought and to secure Tamworth's water supply. The Peel Valley is currently experiencing the worst drought on record. ... The current drought has had a significant impact on communities, the environment and water users, and has highlighted a range of issues with the Plan. (NRC (NSW) 2020e, p. 1)

Some changes have been made as plans are reviewed, however more progress is needed.

Overall, jurisdictions have largely achieved their NWI commitments regarding statutory water planning, having put in place broadly NWI consistent arrangements for the main areas of intensive water use. However, there are a number of areas where further progress is needed to address the weaknesses identified above and ensure that water plans are sufficient and fit for purpose. In particular, the Commission considers that the requirement to articulate trade-off decisions between economic, social and environmental considerations, including balancing environmental and consumptive use in a changing climate has only been partially achieved. This is an area where a renewed NWI could be improved to provide more direction.

These challenges are discussed further in SP A *Entitlements and planning*, along with other emerging priorities for water entitlements and planning.

The following sections consider progress in addressing specific aspects of water planning.

1.3 Water for environmental and other public benefit outcomes

Water for environmental and other public benefit outcomes under the NWI is intended to:

- have statutory recognition
- be afforded the same level of security as consumptive uses
- be tradeable on the temporary market (where held as an entitlement).

This section describes developments in the implementation of the first two points. The tradability of water entitlements for the environment is addressed in section 4.⁵

Developments since 2017

A number of jurisdictions have adjusted their water management arrangements required to secure environmental outcomes in water plans based on new information. These arrangements include: changes to extraction limits reflecting new scientific knowledge (particularly in groundwater systems); more clearly defining environmental water provisions and requirements under a range of water availability scenarios; and adjusting minimum flows and other rules to more efficiently provide non-consumptive water. A number of plans, as discussed in section 4, have improved both the specification of environmental and other public benefit outcomes and management arrangements to achieve these.

Water plans, or equivalent instruments, generally provide statutory protection to rules-based water, except in Western Australia where water allocation plans and extraction limits remain non-statutory (as discussed above). While most states and territories explicitly plan for sharing under a range of water availability scenarios (section 4), during extremely dry periods, some jurisdictions may apply alternative water sharing arrangements to what is specified in water plans to protect critical human needs.

Certain water-dependent ecosystems in drought-affected regions — for example, the Barwon–Darling — have come under extreme pressure since 2017 (SP C *Environment*). These ‘crisis’ situations have been driven by a combination of drought, significant consumptive extractions and, in some cases, inadequate water plan rules and management arrangements (NRC (NSW) 2019). The Review of the Water Sharing Plan for the Barwon–Darling Unregulated and Alluvial Water Sources 2012 found that the system required immediate cessations to pumping activity and recommended a new plan be developed by 2023 (NRC (NSW) 2019). Of nine reviews that the NRC has conducted since 2017, three have found that planned environmental water in New South Wales has not been adequately prioritised relative to consumptive uses (NRC (NSW) 2019, p. 1, 2020e, p. 2, 2020c, p. 1). Two of the plans, were found to have achieved some environmental outcomes, suggesting an adequate protection of environmental water (NRC (NSW) 2018a, p. 1, 2018b, p. 1). In the other four, a lack of information and outcome definition meant that definitive assessments of the security of environmental water could not be made (NRC (NSW) 2018c, p. 3, 2020a, p. 2, 2020d, p. 2, 2020b, p. 2). Since these reviews, two plans — *Bellinger River Area Unregulated and Alluvial Water Sources 2008* and *NSW Great Artesian Basin Groundwater Sources 2008* — have been replaced.

Planning arrangements contained in the Basin Plan Water Resource Plans (WRPs) are designed to provide security to planned environmental water in the MDB, among other planning objectives. Their accreditation had been delayed and there were risks to the effectiveness of the process (PC 2018a). WRPs for Victoria, Queensland, South Australia

⁵ NWI paragraph 35.

and the ACT have since been accredited and are now operational. WRPs for New South Wales are still being assessed and are yet to be accredited. This puts the security of environmental water in the NSW MDB systems at risk.

The Commission's view

The commitment by jurisdictions to provide statutory recognition of water for environmental and public benefit outcomes has largely been achieved. Western Australia remains the exception, although it is currently considering draft legislation which would provide these statutory protections.

Inquiry participants have raised concerns that water for the environment is not afforded the same level of security as water for consumptive use. Wentworth Group of Concerned Scientists (sub. 68, p. 3) notes that despite statutory protections, in practice, planned environmental water has been poorly defined and can lack legal protection. The NSW water sharing plans, in particular, have been criticised for failing to protect environmental water (Inland Rivers Network, sub. 86, p. 12). These views are supported by the findings of three of the NRC reviews of NSW water plans (NRC (NSW) 2019, p. 1, 2020e, p. 2, 2020c, pp. 4–5).

The Commission notes that in two revised New South Wales water sharing plans, changes have been made to provide greater security to environmental water (section 4). This demonstrates some progress on matters of environmental water security. In jurisdictions other than New South Wales, there has been similar incremental improvements in the protection of environmental water as planning instruments have been established, reviewed and replaced (section 3.1). In addition to planning arrangements, assuring the security of environmental water also requires effective monitoring, compliance and accounting (section 5).

Alongside jurisdictional arrangements, the security of environmental water arrangements in the Basin will be influenced by the effectiveness of the Basin Plan. In 2018, the Commission found significant issues with the WRP accreditation process, both from the capacity of the MDBA to effectively review WRPs as well as the content of WRPs being proposed (2018a). While all jurisdictions other than New South Wales have since had their WRPs accredited, there have been delays in the accreditation of the NSW WRPs.

Managers in fully or over allocated systems supplement planned environmental water provisions with environmental water entitlements to provide water to meet environmental outcomes. Compared to planned environmental water, held environmental water generally has the same security as consumptive entitlements. The tradability of held environmental water is discussed in section 4.

Overall, the Commission is of the view that jurisdictions have largely achieved their NWI commitments regarding water for environmental and public benefit outcomes. The statutory recognition of environmental water is in place in all jurisdictions other than Western

Australia. The Commission considers that jurisdictions have made progress in affording environmental water at least the same level of security as water for consumptive uses. While New South Wales has implemented reforms since 2017, there remain risks to the security of environmental water in some systems.

1.4 Addressing overallocated and overused systems

Under the NWI, parties agreed to provide a better balance in water resource use in systems that had been overallocated or deemed to be stressed and identified in National Competition Council endorsed implementation programs. They were to substantially complete this action by 2005. Parties further agreed — for any other systems found to be overallocated or overused through the water planning process (box 1.1) — to determine the precise pathway by which any of those systems would be adjusted to address the overallocation or overuse, and meet the environmental and other public benefit outcomes.

Box 1.1 What do overuse and overallocation mean?

The National Water Initiative defines overallocation as situations where, with full development of water access entitlements in a particular system, the total volume of water able to be extracted by entitlement holders at a given time exceeds the environmentally sustainable level of extraction for that system. It defines overuse as situations where the total volume of water actually extracted for consumptive use in a particular system at a given time exceeds the environmentally sustainable level of extraction for that system. Overuse may arise in systems that are overallocated, or it may arise in systems where the planned allocation is exceeded due to inadequate monitoring and accounting.

Source: NWI Schedule B(i).

Developments since 2017

In 2017, the Commission noted that this NWI commitment was not fully achieved, although significant progress had been made.

Since 2017, jurisdictions have continued to establish and implement pathways to recover water in systems identified as overallocated or overused, advising that:

- In the MDB, the Basin Plan sets sustainable levels of extraction and (where required) the intended timeframes for achieving reductions in water use, for all catchments in the Basin as well as for the Basin overall. Enforceable Sustainable Diversion Limits came into effect in 2019. The Australian Government has thus far recovered water in all Basin States through entitlement purchases and water saving investments. In addition, the MDBA has developed a Sustainable Diversion Limit Reporting and Compliance Framework. The framework sets out the approach the MDBA will take when reporting and assessing compliance with sustainable diversion limits (MDBA 2018c).

-
- In Victoria, planning instruments generally do not enable overuse (NWC 2014c). However, activities are underway through relevant Sustainable Water Strategy and Long-Term Water Resource Assessment processes to determine whether climate change, and other factors, have changed how water is shared. The Long-Term Water Resource Assessment for Southern Victoria (endorsed by the Minister for Water in February 2020) found that long-term surface water availability across southern Victoria has declined in recent decades, mainly due to a drying climate. Based on the findings of the Long-Term Water Resource Assessment, the Minister has determined that a review of water sharing arrangements is required for seven river basins: Barwon, Moorabool, Werribee, Maribyrnong, Yarra, Latrobe and Thomson. The Minister has directed that opportunities to restore the balance in how water is shared in these river basins be explored through the new Central and Gippsland Region Sustainable Water Strategy, as part of broader planning to improve water security and support environment, economic, recreational and Traditional Owner values now and into the future. The Department of Environment, Land, Water and Planning has commenced the development of a new Central and Gippsland Region Sustainable Water Strategy.
 - In Queensland, overallocation is managed through announced entitlement and allocation processes in areas where water sharing rules are in place. Water plans that address overuse, either through a reduction of entitlement volumes or water sharing rules, include: Pioneer Valley; Fitzroy; and Border Rivers and Moonie and Condamine and Balonne. For the Central Condamine Alluvium groundwater system, a reduction in the volume of water entitlement of roughly fifty per cent was required to meet the sustainable diversion limit identified in the Murray-Darling Basin Plan. The Queensland Government worked with the Commonwealth, irrigators, and the peak irrigation body for the area to facilitate an approach whereby all entitlement holders would participate equally in the Commonwealth water recovery program. The outcome was near one hundred per cent participation and compliance with the identified sustainable diversion limit without the need to impose additional restrictions on access.
 - In Western Australia, there has been an increase in the number of resources that are overallocated since 2017 due to climate change. Resources that recently became overallocated were the result of deliberate adjustments to extraction limits in line with reduced rainfall recharge. The following active plans contain pathways to reduce overallocation: Cockburn, Gingin groundwater, Gingin surface water, Peel coastal and South West groundwater areas. Water allocation plans developed for overallocated systems include provisions to return those systems to a sustainable extraction regime, including reducing unused water entitlements, water efficiency measures, land use change and increased licence compliance. The volumes of water recouped are now being tracked through the Department of Water and Environmental Regulation's Water Online licensing and accounting system. A number of plans in development (both replacement plans and new plans) will also contain pathways to reduce overallocation or overuse as a result of ongoing climate change. In particular, significant science and planning work has progressed in the Gnangara groundwater system since 2017. Work is being done to address overallocation due to climate change and to optimise groundwater for potable and non-potable supplies. The *Our Groundwater Future in Perth: Securing Gnangara*

Groundwater and Adapting to Climate Change strategic document was released in May 2018 to provide background to water management considerations in the region. A Gngangara groundwater allocation plan and associated transition strategy is in development.

- In South Australia, recovery pathways are set out in water allocation plans (where relevant). For example, the current groundwater allocation plans in the South East address overallocation through stepped reductions in both irrigation and commercial forest water entitlements in overallocated management areas, where resource conditions are showing signs of degradation or the potential full extraction of entitlements is considered to pose a high risk. Water allocations are reduced to an environmentally sustainable level identified through the use of groundwater models or as a percentage of annual average recharge. In addition, in some areas water allocations are managed through an adaptive approach in order to avoid overallocation. For example, although the water resources of the Eyre Peninsula are not over allocated, they are at high risk of becoming over allocated if the allocations for the consumptive pools are issued at a consistent rate each year, due to the high variability of the resource (due to rainfall variability). The allocations per consumptive pool are therefore issued in relation to the resource condition. When the resource is in a good condition, allocations are issued at a higher value than when the resource is deemed to be stressed. This is based on a trigger approach which can result in zero allocations.
- In the Northern Territory, the Katherine Tindall Limestone Aquifer system has been identified as overallocated. The Water Allocation Plan recommends no new or returned water will be licensed until overallocation is resolved. Several groundwater resources in the Darwin Rural area are also significantly over allocated due to a long period (1992–2016) during which water resources were not regulated through a licensing regime and the expansion of rural residential development and other water uses.

No systems in Tasmania or the ACT are identified in water plans as overallocated or overused.

The Commission's view

The intent of the NWI was to rebalance the allocation of water between consumptive users and the environment in some systems, recognising that the legacy of historical allocation policies (which provided water licences to consumptive users without due regard to the effects on the environment) was adversely affecting environmental and other public benefit outcomes. In practice, the process of setting 'environmentally sustainable levels of extraction' and identifying overused systems through water planning has proven highly contentious, as stakeholders have clarified and debated the economic and social trade-offs associated with reallocating water to the environment. This is becoming more challenging with climate change potentially increasing the number of over-allocated systems and making rebalancing an ongoing requirement.

Notwithstanding these challenges, realising the objectives of the NWI requires returning all overallocated and/or overused systems to environmentally sustainable levels of extraction. Although significant progress continues to be made, this has not yet occurred and therefore this NWI commitment has only been partially achieved and will remain a major challenge given the likely impacts of climate change in many systems. A renewed NWI should deal with these issues for addressing overallocated and overused systems (SP A *Entitlements and planning*).

1.5 Assigning risks for changes in allocation

Under the NWI, parties agreed to clearly assign risk arising from future changes in the availability of water for the consumptive pool. Jurisdictions could adopt the risk assignment framework specified in the NWI or an alternative risk sharing formula where the affected parties agree to this on a voluntary basis. The NWI framework assigns risk between users and the government for reductions in water availability for consumptive use arising from circumstances such as climate change and variability, bushfire, new knowledge and policy change.

Developments since 2017

There have been no material changes in risk assignment provisions since 2017.

In Western Australia, the risk assignment framework was reviewed as part of the State's water reform agenda.

The Commission's view

To meet the outcomes and objectives of the NWI, risk assignment policies should be:

- clearly established (through statutory instruments)
- implementable and effective in providing certainty to entitlement holders and in underpinning planning, investment and adjustment decisions
- clearly articulated and well understood (NWC 2014).

This commitment under the NWI has not been fully achieved. Only New South Wales and Queensland have adopted the risk sharing framework specified in the NWI. Other jurisdictions have adopted alternative arrangements to deal with reduced water availability. Although these arrangements are different to those specified in NWI, the NWC found that they were largely delivering the intended outcome for irrigators (NWC 2014).

Nonetheless, the Commission noted in 2017 that Victoria had not clearly established a specific risk assignment framework. There have been no recent changes made to Victoria's risk assignment framework, and this position has not changed. The Commission also noted

that the Tasmanian Government intended to implement risk assignment arrangements that specified the risk sharing provision between licence holders and government, based on the NWI risk assignment framework. However, no work has been undertaken on this since 2017.

Overall, the requirements for risk assignment policies to be clearly established and implementable, and effective in providing certainty to entitlement holders have been partially achieved, with no material changes made since 2017.

As discussed in SP A *Entitlements and planning*, there may be a need for jurisdictions to provide additional information for entitlement holders that clearly sets out how its approach to risk assignment will apply to any changes in the balance between environmental and consumptive use due to climate change.

1.6 Indigenous access

Under the NWI, jurisdictions agreed that water access entitlements and planning frameworks would recognise the needs of Aboriginal and Torres Strait Islander people in relation to water access and management. Specifically, the NWI parties committed to:

- including Indigenous representation in water planning, wherever possible
- incorporating Indigenous social, spiritual and customary objectives — and strategies for achieving them — in water plans, wherever they can be developed
- providing for the possible existence of native title rights to water in water planning processes
- accounting for water allocated to native title holders for traditional cultural purposes.⁶

Developments since 2017

Indigenous representation in water planning

In 2017, the Commission found that most States and Territories had maintained or improved arrangements for engaging Aboriginal and Torres Strait Islander people in water planning. Since 2017, most States and Territories have progressed further and developed partnerships with Aboriginal and Torres Strait Islander people.

Engagement with Aboriginal communities is a requirement under the Basin Plan. As part of the accreditation process, Northern Basin Aboriginal Nations and Murray Lower Darling Indigenous Nations (MLDRIN) assess the quality of Traditional Owner engagement and provide advice (MDBA 2018d). This was a key driver for MDB jurisdictions to improve their engagement with Traditional Owners.

⁶ NWI paragraphs 52–54.

Jurisdictions have reported a number of developments.

- The New South Wales Government is engaging with peak Aboriginal organisations (NSW Aboriginal Land Council, NSW native title corporations, MLDRIN and the Northern Basin Aboriginal Nations) to develop an Aboriginal Water Strategy. As part of the Basin Plan, the New South Wales Government also undertook Nation-by-Nation consultation, which will inform the development of ongoing water sharing plan review processes. (To date, consultation with 28 Nations has been completed, with two Nations remaining).
- In Victoria, developments have included the establishment of the Aboriginal Water Program and the Birrarung Council, and increased employment.
 - The Victorian Government has built on its Aboriginal Reference Group in Water for Victoria by establishing a separate Aboriginal Water Program (2016–2020). The Aboriginal Water Program works with Traditional Owners and Aboriginal people in Victoria to recognise and embed Aboriginal values into water planning, and support Aboriginal access to water for economic, spiritual and social purposes.
 - Water corporations and catchment authorities have also been developing traineeship and employment opportunities for Traditional Owners and Aboriginal people.
 - Following the passage of the *Yarra River Protection (Wilip-gin Birrarung murron) Act 2017* (Vic), the Birrarung Council was established in September 2018 to advise the Victorian Government on the ongoing protection of the river and implementation of the legislation. Three Wurundjeri Woi Wurrung Elders are members of the Council.
- In 2019, the Queensland Government held meetings with Aboriginal and Torres Strait Islander people (living both on and away from Country) to inform the development of cultural outcomes, as well as measures and strategies to achieve them, for three water plans.⁷ It has also developed a guide on cultural engagement in water planning to support a state-wide approach to ensuring Aboriginal and Torres Strait Islander participation in water planning processes.
- Western Australia’s *Water allocation planning in Western Australia: A guide to our process* (DOW (WA) 2011) defines Traditional Owner engagement based on the NWI module *Engaging Indigenous Peoples in Water Planning and Management*. Since 2017, the Western Australian Government has engaged Traditional Owners during the development of water allocation plans and scientific investigations that inform water plans in a number of locations.⁸ It has also established the Aboriginal Water and Environmental Advisory Group in 2018 to advise the Western Australian Government

⁷ The three water plans developed in 2019 were for the Cape York, Condamine and Balonne, and Border Rivers and Moonie areas.

⁸ Western Australian water allocation plans that engaged Traditional Owners included Gngangara, Derby, Fitzroy, Myalup, Albany and hinterlands and Esperance. The Western Australian Government engaged Traditional Owners in scientific investigations in La Grange, Fitzroy, Esperance, Peel Coastal, Cockburn and Myalup.

on matters of water and environmental policy, legislation and programs, including consultation for water allocation plans.

- As water allocation plans have been reviewed and amended, the South Australian Government has engaged with local Aboriginal communities to include Aboriginal needs, values and outcomes in water allocation plans.⁹ The South Australian Government has engaged with Aboriginal representatives of registered native title bodies corporate in the development of water allocation plans. All three water resource plans under the Basin Plan involved engagement with Aboriginal Nations.
- The Tasmanian Government continues to engage with the Tasmanian Aboriginal community as water management plans are reviewed as per the *Tasmanian Management Planning Guiding Principles for the Development of Statutory Water Management Plans in Tasmania*.
- Since 2017, the Northern Territory Government has established water advisory committees which contribute to the development of water allocation plans and include Aboriginal participants. The relevant Aboriginal land council and the Aboriginal Areas Protection Authority advise on Traditional Owners to invite to each committee. In addition to the water advisory committees, the Northern Territory Government undertakes engagement on Country to seek advice on environmental and cultural values and their water management requirements for water plans. Aboriginal engagement in water allocation planning is guided by the *Northern Territory Government Remote Engagement and Coordination Strategy*, the publication *Effective methods of engagement between water planners* and the *Centrefarm Indigenous Engagement Framework (2012)* (Centrefarm 2020).
- The Australian Capital Territory Government's Aboriginal officers in the Healthy Country and Caring for Country teams have facilitated over 50 workshops, fieldtrips and meetings with the Ngannawal Nation to prepare the water resource plans for the Basin Plan since 2017. The Aboriginal community will also be consulted on the environmental flow guidelines process. The Australian Capital Territory now has two Ngannawal representatives within MLDRIN and an Aboriginal representative within the ACT and Region Catchment Management Group.

Identification of Indigenous objectives and strategies for achieving them

In 2017, the Commission found that a number of jurisdictions had amended water plans or planning processes to more explicitly provide for the achievement of Aboriginal and Torres Strait Islander cultural objectives (PC 2017, p. 361). Since 2017, most States and Territories report that they have adapted their water planning process to account for Aboriginal and Torres Strait Islander objectives.

⁹ South Australian water allocation plans reviewed in collaboration with Traditional Owners include the Draft Far North Prescribed Wells Area Water Allocation Plan, Tatiara Prescribed Area Water Allocation Plan and Padthaway Prescribed Wells Area Water Allocation Plan.

-
- In New South Wales, water sharing plans include revised Aboriginal cultural objectives, strategies and performance indicators. Further work within the Aboriginal Water Strategy will develop additional processes for reflecting cultural outcomes and objectives in the water sharing plans.
 - In Victoria, the *Water Act 1989* (Vic) was amended in 2019 to recognise Aboriginal cultural values in the planning and operations of water resource managers and environmental water managers. This provided greater recognition and involvement of Traditional Owners and Aboriginal people in Victoria in the management and planning of waterways and catchments. In addition, the Department of Environment, Land, Water and Planning's strategy *Pupangarli Marnmarnepu* includes an outcome indicator to recognise and implement decisions by Traditional Owners about the sustainable management of water resources. Other measures include increased representation in decision making and appointment to water entity boards and advisory councils, and the development of the Central and Gippsland Sustainable Water Strategy and a Traditional Owner partnership to focus on the strategy.
 - Since 2018, all new, amended and replaced water plans in Queensland have been required to explicitly recognise the importance of water resources to Aboriginal and Torres Strait Islander people. New water plans are required to specifically state cultural water outcomes separately from social, environmental and economic outcomes. Water plans developed since 2018 have included strong engagement with Aboriginal and Torres Strait Islander people, strategies for achieving cultural outcomes, as well as monitoring, evaluation and reporting strategies. These water plans also set aside specific unallocated water reserves to advance the cultural outcomes and support water-related aspirations of Aboriginal and Torres Strait Islander people. In 2019, three water plans were finalised to include cultural outcomes: the Cape York Water Plan, the Condamine and Balonne Water Plan, and the Border Rivers and Moonie Water Plan.
 - Western Australian water resource management applies the National Cultural Flows Research Project principles, with some adjustments for the prevalence of groundwater and the low levels of water allocations. If passed, Western Australia's *Water Resources Management Bill* will provide for an explicit power to incorporate cultural objectives into water allocation plans. The Western Australian Government worked closely with Bindjareb Noongar Elders to shape the Bindjareb Djilba – Peel–Harvey Estuary Protection Plan and the Peel–Harvey Water Quality Improvement Plan. The Elders developed their Yaakan (turtle) model for the plan based on cultural knowledge. Together, Bindjareb Elders and the Department have shared and threaded knowledge systems to bring together cultural knowledge and western ways.
 - In 2019, South Australia enacted the *Landscape South Australia Act (2019)*. The Act requires Landscape Boards to recognise spiritual, social, customary and economic significance of landscapes and natural resources to Aboriginal people, and indicates that decision-making should be informed by traditional Aboriginal knowledges. This new approach was applied to the development of the draft Water Allocation Plan for the Far North Prescribed Wells Area. Several of the South Australian Landscape Boards have Aboriginal engagement officers.

-
- During the review of the Great Forester River Catchment Water Management Plan in 2019, the Tasmanian Government met with Dr Patsy Cameron from the malythina tiakana warrana Aboriginal Corporation, to discuss and learn about the importance of the Great Forester River catchment to Tasmanian Aboriginal people.
 - In the Northern Territory, recent water allocation plans have identified Aboriginal cultural values and their water requirements. For example, in the Western Davenport Water Control District, work has been undertaken to identify the relationship between Groundwater Dependent Ecosystems (GDE), cultural sites and traditional use. The Northern Territory Government has developed a GDE monitoring program that recognises Aboriginal cultural values and traditional use, identifies culturally important plants in GDEs and manages licence entitlements to limit changes to GDEs. Similar work has commenced in the Daly River catchment under the Katherine Tindall Limestone Aquifer Water Allocation Plan and the Ooloo Dolostone Aquifer Water Allocation Plan. However, implementation activities have been delayed in 2020 due to COVID-19 travel and engagement restrictions.
 - In the Australian Capital Territory, the Ngunnawal community identified a number of objectives and outcomes for the development of water resource plans (as part of the Basin Plan), in particular through the Aboriginal Waterways Assessment process. Based on these developments, site management plans have been created. As a result, Aboriginal values and uses have been identified in the water resource plans and where they relate to meeting ecological objectives they will be considered in future environmental flow guidelines.

Accounting for native title rights

Native title, on its own, does not provide access to water in the form of entitlements. Native title determinations typically allow for non-exclusive access to water on native title land for non-commercial use.

The NWI requires signatories to take account of native title rights, and to account for water allocated to native title holders. Native title rights to access water for personal, domestic, social and cultural purposes are commonly recognised in native title determinations (Robison et al. 2017). The right to use water for commercial purposes has not, to date, been expressly recognised in native title legislation (Macpherson 2017).

In 2017, the Commission found that the existence of native title rights in water are generally considered during the consultation phase of water planning, and the module *Engaging Indigenous Peoples In Water Planning and Management* (DAWR 2017a, p. iii) provides further guidance on how to account for native title and other Aboriginal and Torres Strait Islander land rights in water planning (PC 2017, p. 363). While most jurisdictions have policies in place to consider native title rights and interests in water planning processes, some commentators have raised concerns about the implementation of those policies.

In addition to accounting for native title rights in water planning processes, some States and Territories are creating alternative ways for Traditional Owners to access water based on recognised native title rights.

- In New South Wales, Barkandji native title rights have been recognised in the relevant amended or remade water sharing plans, including the Barwon Darling Water Sharing Plan. This was achieved through the inclusion of a clause that automatically recognised native title rights in all inland water sharing plans (rather than requiring an amendment to the relevant water sharing plans when determinations of native title determinations are made). Similarly, coastal water sharing plans are expected to be updated to include this clause.
- The Victorian Government enacted the *Traditional Owner Settlement Act 2010*, which provides for an out-of-court settlement of native title in exchange for withdrawing all current and future native title claims. The Commission understands that this process significantly speeds up access to land. There is currently a strong focus on the ownership of water by Traditional Owners or Aboriginal organisations in Victoria. The Victorian Government is partnering with Traditional Owners and Aboriginal Victorians to provide opportunities to access and invest in water for economic development and other self-determined purposes in the heavily regulated Murray–Darling Basin.
- In Queensland, s. 95 of the *Water Act 2000* (Qld) provides the right to water for cultural purposes and traditional activities. Water plans must also consider the interests of Aboriginal or Torres Strait Islander parties in relation to the water resources of the area. Queensland notifies the relevant native title representative bodies about proposals to grant any new entitlements to take water and considers any implications for native title holders before granting that entitlement (NWC 2011, p. 251). The Queensland Government’s Cape York Water Plan (2019) also established a ‘Cape York Peninsula Heritage Area’ unallocated water reserve and provided for the granting of water licences to eligible persons to support Aboriginal and Torres Strait Islander people to achieve their economic and social aspirations. Over 485 gigalitres of water per year has been provided for this purpose. This policy is specific to the Cape York Water Plan to recognise the native title and Traditional Owner interests in this land in the plan area. Water licences will be granted to an eligible person at zero cost per megalitre and will not be subject to water licence fees and charges.
- In Western Australia, the outcomes of native title determinations are considered when assessing a water licence application under the *Rights in Water and Irrigation Act 1914*, and when developing a water allocation plan. Native title determinations and Indigenous land use agreements (ILUA) made since 2017 have informed Traditional Owner engagement in water allocation plans that are being developed or finalised (such as the water allocation plans in Derby, Fitzroy, Myalup, Arrowsmith and Esperance). Relevant agreements and determinations include the recent *South West Native Title Settlement*, the *Yamatji Nation Indigenous Land Use Agreement* (which includes a Strategic Aboriginal Water Reserve) and future native title determinations or state government commitments in an agreement.

-
- In South Australia, native title rights are recognised under the *Landscape South Australia Act 2019* (and previously through the *Natural Resources Management Act 2004*). In 2020, the River Murray and Crown Lands ILUA was in place between the River Murray and Mallee Aboriginal Corporation (RMMAC) and the South Australian Government. In developing the water resource plans (as part of the Basin plan), the River Murray, Peake Roby Sherlock and Mallee water allocation plans were updated to refer to the ILUA, and the RMMAC's desired outcomes for management of water resources. The South Australian Government engages with the RMMAC on these water allocation plans within the ILUA area, and processes under the ILUA must be followed for a permit to be granted.
 - Native title has had little or no practical impact in Tasmania. In 2011, the National Water Commission found no provisions for the possible of recognition of native title to water in Tasmania (NWC 2011, p. 280).
 - In the Northern Territory, the Strategic Aboriginal Water Reserve Policy sets aside a percentage of water in the water allocation plan for eligible Aboriginal rights holders.¹⁰ This percentage is based on the percentage of eligible Aboriginal land with direct access to the water resource in the plan (which is typically groundwater). These listed land tenure types are on par with a freehold title, which engenders the right to access water and conduct water-dependent developments on land under the *Water Act 1992*. Licensing under the beneficial use category of Aboriginal economic development cannot occur until changes to the *Water Regulations 1992* have been made.
 - The ACT's *Native Title Act 1994* extinguishes any native title claims (NWC 2011, p. 211). To improve water rights, the ACT Government has supported the Ngannawal people to identify cultural water flow opportunities and access entitlements as under the Basin Plan. In 2020, the ACT Government also amended the *Fisheries Act 2000* to include the development of a Cultural Resource Management Plan to support the Ngannawal people to undertake cultural resource collection and cultural practices.

The Commission's view

Indigenous representation in water planning

Culturally appropriate engagement with Aboriginal and Torres Strait Islander people as water plans are developed can help ensure that resultant decisions and outcomes take account of Aboriginal and Torres Strait Islander people's interests. Relying on standard consultation processes is generally regarded as inadequate given the unique water needs and values of Aboriginal and Torres Strait Islander people.

States and Territories have made sustained progress against the Indigenous representation provisions of the NWI. Requirements under the Basin Plan have been key in the Basin states.

¹⁰ Eligible Aboriginal rights holders are defined as those who have rights under Aboriginal land schedule under *Aboriginal Land Rights (Northern Territory) Act 1976* (Cth), Northern Territory enhanced freehold or exclusive possession native title determination areas.

Engagement with Traditional Owners is required in the development of water resource plans, and the level of engagement is assessed by Aboriginal peak bodies before plans can be accredited. All States and Territories have now established specific mechanisms for engaging with Aboriginal and Torres Strait Islander people in the development of water plans. And jurisdictions in the Basin and the Northern Territory have made significant progress in engaging Aboriginal and Torres Strait Islander people in water planning processes. For example, the Murray Lower Darling River Indigenous Nations (sub. 105, p. 3) noted that:

Water Sharing Plans (WSPs) in NSW, Water Allocation Plans (WAPs) in South Australia and Sustainable Water Strategies (SWSs) in Victoria are some key statutory plans. In some cases there has been active engagement of First Nations in the review and development of these plans.¹¹

However, study participants have indicated that engagement has not always been meaningful. In particular, the NSW Aboriginal Land Council (sub. 96, p. 2) stated that ‘there are limited opportunities for Aboriginal people to influence water management’. The Council similarly observed in a submission to the Commission’s 2018 assessment of the Basin Plan that land councils in NSW had not been properly engaged in processes to develop water resource plans, and that engagement generally occurred ‘at very short notice and not on the basis of free, prior and informed consent’ (PC 2018a, pp. 207–8).

In 2017, the Commission noted significant change in New South Wales with the cessation of the Aboriginal Water Initiative and engagement with Aboriginal Elders shifting to Stakeholder Advisory Panels (PC 2017, p. 103). Further adjustments to the approach to engagement have been made. New South Wales is undertaking Nation-by-Nation consultation for water resource plans and is in the process of developing an Aboriginal Water Strategy.

On the basis of the evidence, the Commission considers that jurisdictions have made progress in establishing processes to increase representation of Aboriginal and Torres Strait Islander people in water planning activities, but further improvements should be made to ensure engagement is effective and meaningful.

Identification of Indigenous objectives and strategies for achieving them

All jurisdictions have processes in place to identify cultural objectives in water plans. The Northern Basin Aboriginal Nations (sub. 17, p. 3) praised the Australian Government approach to including First Nations in identifying priorities for environmental watering.

However, inquiry participants questioned the effectiveness of objectives and strategies in water plans, noting for example a lack of rules to protect cultural values (MLDRIN, sub. 105, p. 3), and deficiencies in the processes of including Aboriginal and Torres Strait Islander

¹¹ For example, The South Australian Government engaged with Traditional Owners through a recent review of Water Allocation Plans (as part of the Water Resource Plans preparation process) and the Victorian Government is committed to engage with Traditional Owner in review of Sustainable Water Strategies.

people in decision making about the provision of water for the environment and cultural outcomes.

In New South Wales, while there have been some recent movements towards improving inclusion, there is no formal strategy or mechanism for incorporating First Nations views into the environmental water planning framework. Most importantly, NSW has not, to date, actively supported the development of pathways to allow First Nations to inform objective setting at a local level, and ensure their interests are reflected through various stages of the planning and decision-making framework. Consistent feedback from MLDRIN delegates and First Nations participants indicates that the Environmental Watering Advisory Groups (EWAGs) have not provided an effective mechanism for First Nations input into water planning in NSW in most cases. While individual Traditional Owners have participated on a number of valleyscale EWAG, these forums have not provided a culturally safe, empowering and inclusive way for First Nations to be involved, nor do they account for the status and significance of First Nations rights and custodial responsibilities. (MLDRIN, sub. 105, p. 4)

While cultural outcomes have been identified across all jurisdictions, there is still considerable scope for jurisdictions to better protect cultural sites and accommodate Aboriginal and Torres Strait Islander people's water needs by ensuring that:

- cultural objectives are explicitly identified and provided for in water plans
- progress in achieving cultural objectives is regularly monitored and reported publicly.

Accounting for native title rights

While most jurisdictions have policies in place to consider native title rights and interests in water planning processes, some commentators have raised concerns about the implementation of those policies. For example, the MLDRIN (sub. 105, p. 8) claimed that:

In NSW the absence of volumetric allocations to satisfy Native title rights in WSPs remains despite a strong recommendation from the Natural Resources Commission in a 2019 review of the Barwon–Darling plan that the NSW should ‘identify Aboriginal water-related values, objectives and outcomes, and develop final agreed flow allocation in consultation with all relevant Aboriginal organizations, including traditional owners and Aboriginal Land Councils.’¹²

Similarly, the draft report to the assessment of the management of the 2020 northern Murray–Darling Basin first flush event conceded that there were no objectives, principles or targets relating to Native Title of cultural water rights guiding management of the significant ‘first flush’ event that occurred on the Barwon–Darling in February 2020. The assessment panel noted that integration of management rules for first flush events into WSPs would ‘require quantifying native title / cultural rights and developing reasonable use guidelines’¹³. There is no program in place to address this requirement.

¹² NSW Natural Resources Commission (2019), *Final report: Review of the Water Sharing Plan for the Barwon–Darling Unregulated and Alluvial Water Sources 2012*. p. 12.

¹³ Draft Report, Independent Panel Assessment of the Management of the 2020 Northern Basin First Flush Event, 2020. www.industry.nsw.gov.au/_data/assets/pdf_file/0020/314543/draft-report-iap.pdf

Although native title has not led to water access directly, many States and Territories have used native title as a basis for policies that provide access to water. For example, Strategic Aboriginal Water Reserves in the Northern Territory, Queensland and Western Australia are built on existing native title determinations in water planning areas.

The Commission considers that most States and Territories are making progress and should continue to adapt their policies to overcome the limitations of native title legislation in giving Aboriginal and Torres Strait Islander people access to water.

1.7 Interception

Land use change activities have the potential to intercept significant volumes of surface and/or groundwater. Under the NWI, parties agreed to assess the significance of water intercepting activities (such as farm dams and bores, intercepting and storing of overland flows — or floodplain harvesting — and large scale plantation forestry), and apply appropriate planning, management and regulatory measures where necessary to protect the integrity of the entitlements system and achieve environmental objectives.¹⁴

Under the Basin Plan, water resource plans are required to consider interception risks. Where interception activities are identified to be of a medium to high risk to water resources (in terms of potential impacts), water resource plans must set out processes for monitoring and managing the interception activity to ensure they meet sustainable diversion limits (DOI (NSW) 2018c; MDBA 2017a, pp. 1–2). Water resource plans must then be accredited.

The process for reviewing interception activities and their associated risks to water systems varies across jurisdictions (box 1.2).

Developments since 2017

In 2017, the Commission noted that jurisdictions had, for the most part, adopted broad coverage of most potential intercepting activities. However, the Commission also noted that more could have been done to meet the objectives and outcomes of the NWI.

Since then, some jurisdictions have introduced or announced measures relating to the management of interception and other water use that occurs outside of entitlements and planning frameworks. Several developments were required to meet Basin Plan obligations and for water resource plans to be accredited. Reported measures include:

- In New South Wales, the Healthy Floodplains project plans to have floodplain management plans in five valleys (Border Rivers, Gwydir, Namoi, Barwon-Darling and Macquarie) by September 2020 to meet Basin Plan obligations. (All plans have commenced, except for Macquarie, which is currently being prepared for commencement (DPIE (NSW) 2020h)). Floodplain harvesting licence and water supply work approvals

¹⁴ NWI paragraphs 55-57.

are it to be in place for the five valleys by June 2021. Since 2017, the *Floodplain Harvesting Policy* (which sets out the process for bringing floodplain harvesting into the entitlements framework) has been amended, in response to consultation (DOI (NSW) 2018b, pp. 1–2). In 2019, the *Floodplain Harvesting Action Plan* was released to reiterate the processes and timeframes for the implementation of the policy (and to respond to a review report’s recommendations) (DPIE (NSW) 2019b, p. 1). New South Wales is also working on a plantation forestry policy.

Box 1.2 Jurisdictions have different processes for updating estimates of interception activities

- In New South Wales, estimates for major interception activities are developed based on the Basin Plan estimates and are not updated unless there is a requirement to (except for floodplain harvesting). For coastal draining catchments, New South Wales is currently reviewing the harvestable rights setting, which includes estimates of total harvestable rights dam capacity. Volumes of harvestable rights will be included in water sharing plans.
- In Victoria, information on interception activities is updated annually and made available in the annual Victorian State Water accounts. Although the accounts do not report on interception by large-scale plantation forestry.
- In Queensland, estimates of water take by interception activities are updated on the basis of a 10-year risk assessment cycle that informs the water planning process. More frequent updates may be required if a review of a water plan is triggered.
- In South Australia, interception activities are managed through water affecting activity permits, well construction permits (for groundwater extractions) or forestry water licences that are administered by the landscape boards, or the Department for Environment and Water. As records of these activities are updated, so too are interception estimates and any associated risks.
- In Western Australia, estimates of interception activities are updated when an allocation limit is reviewed and as part of the water allocation planning process.
- In Tasmania, interception activity estimates are not updated regularly, but are used to inform water planning processes. While interception activities are acknowledged in plans, some are generally not quantified (such as interception by groundwater bores).
- In the Northern Territory, estimates of interception activities are included in surface water models and are updated as part of annual water allocation processes. This informs individual surface water extraction licence assessments as well as water allocation planning.
- In the ACT, there is ongoing monitoring of water resources (including the number of farm dams which intercept water), and risk assessments are undertaken each time the water resource plan is reviewed.

Source: Responses from State and Territory information requests.

- In Queensland, where required by the water plan, there has been progressive certification of overland flow water harvesting works to allow for the issue of overland flow water licences. The overland flow measurement program has been established to improve measurement of overland flow water take across the Queensland MDB — a draft interim standard for measurement was completed in June 2020 (DNRME (Qld) 2020d, p. 6). The

Cape York water plan included provisions for the management of overland flow take. Reviews of the Condamine and Balonne, and the Border Rivers and Moonie water plans (completed in 2019) included assessments and estimation of likely interception activities (as required under the Basin Plan). The Border Rivers and Moonie water plan commits to measuring the relevant take of overland flow water by 31 December 2022 (DNRME (Qld) 2020c).

- In Western Australia, plantations have been a large consideration in the development of the Gngangara groundwater plan. Improvements have been made to local models used in water planning to incorporate plantation interception (including the Perth Regional Aquifer Modelling System that was used to inform the new Gngangara groundwater plan).
- In the ACT, the Government has set out controls on interception activities in the ACT Water Resource Plan (as identified in the Basin Plan), although, given the size and nature of land use activities in the ACT, extensive controls are not needed. Interception activities are not expected to increase over the life the ACT Water Resource Plan.

The Commission's view

Key requirements for meeting the objectives and outcomes of the NWI include:

- water planners having adequate understanding of the significance of water intercepting activities to manage any risks to the integrity of the entitlements system and the achievement of environmental objectives
- States and Territories considering the associated risks, evidence and net benefits in alternative approaches to managing interception activities.

While progress has been made to consider interception activities in water management and planning since 2017, there are concerns that some are not licensed or are inadequately recorded (despite having considerable impacts on water availability for other users and the environment). For example, in the MDB, there are concerns that reduced inflows from the Darling into the Murray are primarily due to mismanagement, and that floodplain harvesting was one factor contributing to this (IIGMDB 2020, p. 13). However, the review was unable to confirm this due to inadequate information and recommended that further analysis be undertaken.

Jurisdictions have faced difficulties in monitoring interception activities, which in turn, have made it difficult to understand the significance of their impacts and effectively manage risks. Several inquiry participants noted that interception activities are not properly accounted for or measured (for example, EDO, sub. 54, p. 5; Lifeblood Alliance, sub. 70, p. 4; IRN, sub. 86, p. 4; VFF, sub. 99, p. 10). Accurate measurement of interception activities supports water planners to understand the risks associated with them (including determining if such activities should be included in licensing or entitlement arrangements) and as a result, better manage any risks.

Overall, jurisdictions have largely achieved their NWI commitment in regards to assessing and managing interception. Progress has been made since 2017 (particularly in MDB jurisdictions, where obligations related to interception are set out in the Basin Plan). However, there is scope to improve management of interception. The Commission considers that interception activities should be incorporated in entitlement frameworks through a risk-based approach (SP A *Entitlements and planning*). And that measurement and accounting of interception activities must be improved (SP E *Integrity*) to support the implementation of entitlements arrangements. In particular, measurement regimes and accounting practices must be fit-for-purpose and interim measures may need to be established to better manage interception (SP A *Entitlements and planning*). This is important for both the integrity of the entitlement system and effective water management and planning (NIC, sub. 13, p. 7; IWF, sub. 30, p. 9; NFF, sub. 42, p. 15).

1.8 Integrating surface water and groundwater management

An objective of the NWI is ‘recognition of the connectivity between surface and groundwater resources and connected systems managed as a single resource’. Jurisdictions agreed, in preparing water plans, to assess of the level of connectivity between surface water (including overland flow) and groundwater systems.

In the MDB, the Basin Plan requires MDB jurisdictions to assess the nature of connections between surface water and groundwater resources in their water resource plans.

Developments since 2017

In 2017, the Commission noted that jurisdictions had largely achieved this commitment, but that a more detailed assessment (beyond the scope of the study) would be required to provide a definitive conclusion.

Since 2017, several jurisdictions have progressed measures to facilitate integrated management of connected surface water and groundwater sources. For example:

- Victoria completed a Long-Term Water Resource Assessment for Southern Victoria. This assesses whether long-term water availability has declined since the last sustainable water strategy and if there have been changes in how water has been shared between the environment and consumptive uses, including groundwater. This included assessment of how groundwater pumping contributed to declines in flows in waterways.
- In Queensland, the development of Water Plans for Border Rivers and Moonie and Condamine and Balonne included new information (from modelling and investigative drilling) to ensure interaction between groundwater and surface water was reflected in management rules. Particular consideration was given to the persistence of surface water assets (such as springs and wetlands) that are reliant on base-flow from interacting groundwater resources. Another key consideration was the calibration of groundwater models to ensure that groundwater was not over allocated due to low utilisation of surface

water resources in the same area, during the calibration period. These considerations were incorporated into the *Water Plan (Cape York) 2019*. The *Water Plan (Great Artesian Basin and Other Regional Aquifers) 2017*, and applied to the Great Artesian Basin water resources, as well as other significant regional aquifers underlying parts of regional Queensland.

- In Western Australia, State Government investigations in the Fitzroy River catchment focused on groundwater investigations and assessment to complement CSIRO's *Northern Australia Water Resource Assessment* for which rainfall/runoff and floodplain models were developed. Drilling, geophysical surveys and geochemical sampling were undertaken to identify areas of connection between local and regional scale aquifers and the river. A water allocation plan for groundwater and surface water resources in the Fitzroy River Catchment is currently being developed.
- In Tasmania, a change has been made to the Water Management Regulations 2019 regarding the keeping of records of groundwater use. This will better enable the collection of groundwater use information as and when required, to inform groundwater management responses.
- In the Northern Territory, as new information becomes available, models are updated to improve the understanding of the relationship between surface water and groundwater. Since 2017 a connected model has been developed for the Western Davenport region. In addition, the Katherine Tindall Limestone Aquifer Water Allocation Plan 2019–2024 and the Ooloo Dolostone Aquifer Water Allocation Plan 2019–2029 manage groundwater and groundwater discharge to surface water as a single connected water resource. A similar approach is being developed in the draft Mataranka Tindall Limestone Aquifer Water Allocation Plan. The plans do not manage surface water run-off.

The Commission's view

To achieve the objectives of the NWI, water planning must include:

- an assessment of physical connectivity between groundwater and surface water in the relevant planning area
- where physical connectivity exists, arrangements that cost effectively manage associated supply risks to entitlement holders and the environment (either through integrated water management plans covering both groundwater and surface water or through linked groundwater and surface water plans).

Past assessments of water plans and recent developments in water planning suggest States and Territories have made substantial progress since 2004 in recognising physically connected systems that display groundwater and surface water connectivity (NWC 2014b). Further work is being undertaken as part of the Basin Plan. While the number of water plans that fully integrate groundwater and surface water resource management remains small, the number of water plans that recognise connectivity between groundwater and surface water is increasing. In the Commission's view, the choice between fully integrated plans and linked

plans should be made on a case by case basis, given the additional benefits of fully integrating plans will not necessarily be significant enough to justify the additional cost.

Given that progress has been made since 2017, the Commission considers that jurisdictions continue to be broadly meeting their commitments in this area. However, a more detailed assessment (beyond the scope of this study) would be required to provide a definitive conclusion.

2. Water markets and trading

Table 2.1 summarises progress in achieving outcomes and objectives relating to water markets and trading. The remainder of this section provides detail to support the findings in the table.

Table 2.1 Assessment summary: water markets and trading

NWI commitment	2017 assessment	2020 assessment ^a and progress indicator ^b	Comments — progress since 2017
Removing unwarranted trade barriers	Largely achieved	Largely achieved 	Unwarranted trade barriers have been almost entirely removed or significantly reduced. Notably, trade has emerged in a number of systems where it did not occur previously (for example, in the Northern Territory). There are some remaining policy bans and other barriers to trade between the irrigation, urban and environment sectors. In some jurisdictions, progress has been slow in implementing NWI-consistent trading frameworks.
Publicly accessible and reliable water registers	Largely achieved	Largely achieved 	Most jurisdictions have publicly accessible and reliable water registers and invest in improvements according to user needs. While Queensland has made some progress in improving accessibility, limitations remain. The Bureau of Meteorology water market information function has improved the accessibility of trade data in jurisdictions with smaller trade volumes.
Reducing transactions costs by improving water market information	Largely achieved	Largely achieved 	Jurisdictions continue to invest in improvements in water market information in addition to the provision of water registers. Stakeholders continue to note that a lack of information on water markets remains a barrier to trade, suggesting that these investments are not proving effective or have not been sufficient. The private sector continues to perform a valuable role in providing information alongside public sector efforts.
Compliance with trade approval service standards	Achieved	Achieved 	Basin States have consistently met the standards for processing times for trade approvals. Some non-Basin jurisdictions have monitored their approval standards, but these are not necessarily formalised or statutory.

^a **Achieved:** All requirements met, **Largely achieved:** Requirements generally met, with some exceptions, **Partially achieved:** Only some requirements met, **Not achieved:** No requirements met. ^b Progress indicators reflect an overall assessment of whether, on the whole, reforms have moved closer to consistency with the NWI in the three years since 2017. An arrow pointing upward indicates progress, a flat-line indicates no change and a downward arrow indicates poorer performance or backsliding.

The NWI sought to achieve open and efficient water trading markets. It envisaged market arrangements that:

- allow water to be traded where hydrological connections permit, including across state and territory borders

-
- minimise transaction costs, including through good information flows and compatible arrangements across jurisdictions
 - enable the appropriate mix of water products to develop
 - provide appropriate protection of third party interests and the needs of the environment.¹

Many of the requirements for water markets are established through the NWI commitments for water access entitlements and planning frameworks. The ‘Water markets and trading’ element of the NWI includes further actions to remove barriers to trade (including specific actions regarding the southern MDB) and establish water registers. And in 2008, COAG agreed to additional measures to support water trading, including:

- developing a national water market system to support timely and low-cost water transfers across irrigation area boundaries and state borders
- adopting service standards (and a reporting framework) for processing allocation and entitlement trades within the MDB (COAG 2008).

In the assessment of 2017, the Commission found that there had been good progress in implementing trade-enabling reforms under the NWI. Some areas requiring improvement were identified.

The need for further improvements to the functioning of established water markets in the Murray–Darling Basin is now being considered in-depth by the ACCC with reform options being put forward. Significant changes in water market conditions and trends since 2012 (the establishment of the Basin Plan), exacerbated by drought more recently, has motivated the commissioning of the first water markets-specific inquiry in the MDB in almost 30 years. The findings and recommendations from this inquiry will go beyond the scope of the NWI and, therefore, of this assessment.

In this assessment, the Commission considers progress against NWI commitments made by jurisdictions since 2017 in:

- removing or better targeting remaining restrictions on trade
- improving provision of market information, including through water registers
- minimising approvals delays.

2.1 Trade barriers

The NWI committed jurisdictions to establishing compatible institutional and regulatory arrangements that facilitate intra and interstate trade. Principles for trading rules were agreed that specify that restrictions can only be used to manage environmental, hydrological, water delivery and related issues — and by implication that they not be used to protect production, water infrastructure use or employment in particular locations or industries. The NWI also

¹ NWI paragraph 58.

required the immediate removal of institutional barriers to temporary trade, removal of barriers to permanent trade by 2014 and that no new barriers be imposed.

Developments since 2017

The most significant reforms of water trade barriers occurred before 2017. In particular, the Basin Plan water trading arrangements were introduced in July 2014 and now govern over 80 per cent of all water trade in Australia. The arrangements are consistent with the NWI and have facilitated a broadening and deepening of the water market in the MDB (PC 2017).²

Further developments since 2017, under the Basin Plan and other initiatives, are summarised here.

Murray–Darling Basin

- The MDBA continues to work with MDB jurisdictions to:
 - identify and rectify inconsistencies between the Basin Plan trading rules and State trading rules
 - facilitate (New South Wales–ACT) and improve (New South Wales–Victoria) interstate water trading.
- The MDBA Water Trade Restriction Assessment Framework has been developed and is currently being piloted. It has identified over 1500 surface water trade restrictions that may need to be reviewed to ensure they meet the Basin Plan requirements (MDBA 2020a, p. 3).
- The water resource plan accreditation process (2015–21) in the MDB is aligning state-based barriers to trade (through adjustment or removal) to the Basin Plan market rules (DAWE 2020f, p. 19).
- The MDB jurisdictions continue to collaborate on interstate water trading issues. MDBA and Basin states are engaging in trials to improve bulk water trade adjustments, which, if successful, should mitigate interstate trade disruptions, particularly between New South Wales and Victoria (MDBA 2019d).
- The rules governing charges levied by water infrastructure operators (including exit fees)³ have been reformed to ensure that they do not act as a barrier to trade. The Water Charge Rules came into effect on 1 July 2020 and build on the water market and charge rules introduced for the MDB under the *Water Act 2007* (Cth) (ACCC 2019). Under the new Water Charge Rules, an irrigation infrastructure operator (IIO) must now give the customer a ‘termination information statement’ when a customer notifies an IIO of their intention to terminate. These information statements aim to provide greater termination fee transparency.

² NWI paragraph 23(v).

³ NWI paragraph 62.

-
- Inter-valley transfer (IVT) limits in the MDB have been more frequently reached (ACCC 2020a, p. 129).
 - The Australian Government has committed to end the buyback of water entitlements for the environment as part of the implementation of the Basin Plan.

New South Wales

- New South Wales has allowed temporary trade of domestic and stock licence allocations in response to the drought, where this was prohibited previously (DPIE (NSW) 2020c). This provided users greater flexibility to trade access under a period of extreme scarcity. The temporary amendment order was repealed on 1 July 2020.
- Negotiations between New South Wales and the ACT on an interstate trade agreement are underway. Although there is high-level agreement between New South Wales and the ACT that trade should be enabled between the two jurisdictions along the Murrumbidgee, it has not yet occurred. Discussions about these trade arrangements have been ongoing for over a decade.
- Interstate trade arrangements with Queensland on intersecting streams are not currently compliant with Basin Plan trading rules. However, both states recognise that insufficient demand has meant that the development of an interstate trading framework at this time is not warranted (DAWE 2020f, p. 9). The situation is nevertheless being monitored via an agreed reporting framework.
- The establishment of the Natural Resources Access Regulator aims to improve compliance — strengthening property rights and supporting trade.

Victoria

- Ongoing implementation of the *Water for Victoria* plan is reducing barriers to water trading. An example is the trial of the South Central market, to exploring opportunities for inter-sectoral trade. The possible South Central market covers the Macalister, Werribee and Bacchus Marsh irrigation systems, major urban supply areas for Melbourne and regional areas proximate to Melbourne (Aither and DG Consulting 2018, p. 14). The trial aims to better understand the physical and regulatory opportunities and limits to trading between urban and rural markets in this system.
- In May 2019, a review of Goulburn to Murray trade and operating rules was announced to ensure water trades can be delivered within ecological tolerances and without impacts on the entitlements of third parties (DAWE 2020f, p. 36).
 - A number of stakeholder perspectives have been incorporated into the review, including the Goulburn–Broken Catchment Management Authority, Goulburn–Murray Water, the MDBA and a panel of environmental scientists.
 - A regulatory impact assessment has been conducted, with associated community consultation, on the options for change and the associated economic, environmental and social impacts.

-
- Actions completed to date, as part of this review, include:
 - ... implementing restrictions on the movement of tagged accounts in line with IVT rules (DAWE 2020f, p. 36). This change will ensure that water does not continue to move between valleys once the limit has been reached, better managing the environmental impacts of trade
 - ... implementing interim operating regimes for the lower Goulburn River in 2019-20 and 2020-21 to reduce the risk of environmental damage from the delivery of traded water. Monitoring of this interim operation regime for 2019-20 has shown that environmental impacts were significantly reduced as a result of this action.
 - In April 2018, Victoria published the *Victorian Water Market Effectiveness* report (Aither and DG Consulting 2018). This assessed the preconditions for water trading and markets and scoped improvements to the effectiveness of water markets (Aither and DG Consulting 2018, p. 22).

Queensland

- The MDBA has noted that there remain some potential trade rule inconsistencies between Queensland arrangements and the Basin Plan. Queensland is in discussions with the MDBA to resolve these issues. The accreditation of Queensland's water resource plans has resolved a number of issues around trade rule inconsistencies (DAWE 2020f, p. 20).
- In 2018, the Department of Natural Resources, Mines and Energy (DNRME) convened the Underutilised Water Partnership Project with the Queensland Farmers Federation, Agforce, the Queensland Resources Council and the Local Government Association of Queensland (DNRME (Qld) 2019b, p. 9). This initiative gave rise to the *Water Markets and Trading Optimisation Strategy*, which is planned for implementation from 2021 and aims to improve processes and information to support water trading.
- The Central Lockyer Valley water supply scheme, in the Moreton plan area, was managed under interim arrangements. These interim water allocations (that previously attached to land) have been converted to water allocations proper (separate from land). Temporary access to unallocated water held as strategic water infrastructure reserves has been able to be purchased from the State since 2018.
- The water plans for Cape York, Moreton, Burdekin Basin, Border Rivers and Moonie, and Great Artesian and Other Regional Aquifers were amended to remove barriers to trade, including through unbundling of water from area- to volumetric-based licences and the addition of trading rules and frameworks for different (temporary and permanent) products.

Western Australia

- The proposed Water Resource Management Bill, currently being drafted, intends to establish a risk-based approach to assessing applications for trades and approvals, reducing transaction costs. A review of the 2010 policy *Water Entitlement Transactions*

for Western Australia will further aim to streamline and simplify processes at an operational level.

- Under the *Measuring the Taking of Water* policy, introduced in 2016 and being implemented in stages until 2020, all water licences (other than statutory exemptions) in Western Australia will be subject to metering requirements, upon the completion of implementation (DWER (WA) 2019b). This will strengthen user entitlements and enhance trade possibilities.

Tasmania

- All barriers to trade (other than those that are hydrologically or environmentally justified) have been removed (Wheeler et al. 2017), so there have been no new developments in trade barriers since 2017. Tasmania is currently monitoring its water systems to determine whether further trade-enabling reforms will be required (DPIPWE (Tas) 2020b).

Northern Territory

- In 2019, following a process of stakeholder consultation on trade barriers and subsequent policy reform, the Northern Territory recorded its first water trade. There have been a total of seven trades as at August 2020 (DENR (NT) 2020e).
- The legislative requirement of the approval authority to publish a ‘Notice of intention’ (NoI) to process trades in a newspaper has been removed to lower advertising costs. NoIs are also now more accessible through an online water licensing portal (DENR (NT) 2020d).
- In July 2020, the Northern Territory Government released the *Trading Licensed Water Entitlements (Trading Policy)* document which implements a number of trade-enabling reforms (DENR (NT) 2020c).

ACT

- See New South Wales for discussion of progress towards interstate trading arrangements.

The Commission’s view

Since 2017, there has been continued progress in a number of jurisdictions in removing trade restrictions and other barriers to trade. Progress has been made in:

- establishing trade in water systems where none previously occurred
- removing restrictions and other barriers that had been introduced to protect production, water infrastructure use or employment in particular locations or industries
- facilitating interstate trading

-
- introducing water entitlement and planning arrangements that are more supportive of trading.

The fundamental objective of the NWI — to remove barriers to trade — has not been achieved in all cases. However, remaining barriers to trade are long-running, with no state or territory introducing new trade restrictions that were inconsistent with the NWI, Basin Plan or other water trading agreements. Remaining barriers include the lack of interstate trade between New South Wales and the ACT, limits on intersectoral trade and non-NWI compliant entitlement regimes (such as ‘use it or lose it policies’). Jurisdictions continue to monitor their water systems for trade demand and the need for trade-enabling reforms.

Some water trade rules, while being a barrier to trade, are necessary to manage hydrological constraints or environmental impacts. Such rules have costs and benefits, as well as equity implications. The costs arise because rules can prevent trades that would be beneficial to buyers and sellers. The benefits come from avoiding adverse effects on third parties. These rules should seek to maximise net benefits and achieve equitable outcomes.

While many existing trade rules have the legitimate purpose of protecting third parties, it is not always clear that they do this in a way that maximises net benefits. The current settings of IVT limits in the MDB is an example that stakeholders have raised, expressing concerns that the limits may not be consistent with NWI principles. SP B *Trading* explores opportunities for improvement.

Finally, removing formal trade barriers is not always sufficient to realise the potential gains from trade. Governments can prevent trades and other transfers of water from occurring in other ways. Of particular concern is:

- a lack of market transparency (TasWater, sub. 11, p. 6) and integrity around water availability, ownership, use and trade reduce public confidence (Leeton Shire Council, sub. 29, p. 1; MVPD, sub. 101, p. 2), which has the potential to reduce market participation and, ultimately, efficiency (Wheeler et al. 2020)
- implicit or explicit direction from state governments to water utilities not to purchase or transfer water for urban use (effectively placing a policy ban on this supply option). These directions have been used in the past in South Australia and Western Australia (PC 2017, p. 127) and persist in Victoria (Carey 2018), imposing high costs on the community. The South Central trial of an inter-sectoral water market in Victoria will provide useful lessons to other parts of Australia on the prerequisites and conditions for successful inter-sectoral trade
- the Northern Territory continuing to institute a ‘use it or lose it’ policy, which acts as a trade barrier. Despite the establishment of a new trading policy, unused licenses continue to be prohibited from being traded (DENR (NT) 2020b, p. 8). This is inconsistent with NWI principles (PC 2017, p. 342).

Overall, the Commission is of the view that jurisdictions have largely achieved their NWI commitments regarding the removal of trade barriers and progress continues to be made.

Notably, trade has emerged in a number of systems where it did not occur previously (for example, in the Northern Territory). There are some remaining policy bans and other barriers to trade between the irrigation, urban and environment sectors. In some jurisdictions, progress has been slow in implementing NWI-consistent trading frameworks.

2.2 Water registers

Under the NWI, States and Territories agreed to implement compatible, publicly accessible and reliable registers of all water entitlements and trades (both permanent and temporary). It was also agreed that registers would be consistent with a set of guidelines, including that: they be of a sufficient standard to promote secure entitlements; provide accessible information (including on the prices of trades); and be administered in a way that seeks to minimise transaction costs for market participants. It was also agreed by the Parties that water registers be administered pursuant to certain procedures and protocols, based on land title office manuals and guidelines that exist in various States and Territories.

Developments since 2017

Most states have continued implementation of water register changes to align with NWI commitments, however accessibility and reliability varies (table 2.2).

A number of States and Territories have launched initiatives aimed at improving the effectiveness of water registers.

- The Victorian Water Register 10-Year Strategy (2019–2028) has been developed (DELWP (Vic) 2019e). In delivering against the outcomes of this strategy, Victoria recently completed its stakeholder consultations on water register transparency, with the release of the *Closing the Loop* report. It found that most respondents do not support full transparency, including the publishing of identifying information (DELWP (Vic) 2019a). The two most important pieces of information for users were ‘how much water is available to buy’ and a ‘real time market price’.
- South Australia and the Australian Government are jointly investing \$14.7 million into the Water Management Solutions Program, which includes a new water register system for South Australia by late 2021 (SA Government 2020c).
- New South Wales and Victoria have revised their trade application forms to improve the capture of market-relevant information in their water registers. This initiative will improve the recording of non-commercial trades as well as price disclosure and discovery for emerging water market products. Changes include the:
 - introduction of ‘trade purpose’ classifications including reasons for \$0 trades (South Australia has also adopted the \$0 trade change).
 - request for trade agreement dates (between buyers and sellers), to differentiate from the trade approval date.

-
- Tasmania has published its Water Register in an interactive map format, which is updated daily.
 - The Northern Territory has started publishing an online register of water trades (in addition to its register on water entitlements) in 2020.

Before undertaking more significant reforms to their water registers, Queensland has undertaken consultations to ensure that prospective changes are fit-for-purpose. New South Wales has made minor usability and accessibility improvements to its water register (for example, text amendments and linking to the Water Insights Portal). New South Wales is currently undertaking a stakeholder consultation on their water registers and possible reforms to increase transparency (DPIE (NSW) 2020e).

Table 2.2 describes water registers of each jurisdiction. All states and territories have publicly accessible information on water entitlements, except for Queensland which requires information to be requested. New South Wales, Victoria and South Australia make trade data, including prices, available online. The Northern Territory lists individual trades online, but does not publish price information. The Bureau of Metrology publishes trade data for all states and territories except the Northern Territory. However, Queensland does not provide the Bureau with price data for allocation trades. Of those jurisdictions that have a reasonably high volume of trade, Queensland stands out as having less accessibility to timely trade information through registers.

While Queensland's water registers are not yet in line with the guidance of the NWI, it has made progress in improving the information published through its water registers and access to the information within these registers.

- The Water Entitlement Viewer is an interactive mapping tool displaying information relating to water licences, water allocations and unallocated water reserve volumes. However, DNRME 'does not guarantee nor give any warranty as to the accuracy, relevance, reliability, completeness or currency of the information' (Queensland Government 2019b). Instead, where users seek an 'accurate and secure register that records water allocation ownership and other attributes of water allocations', this can only be accessed for a fee (Queensland Government 2018c).
- In 2018, amendments to the *Water Act 2000* (Qld) enabled the publishing of temporary trade sale prices.

Table 2.2 State and Territory Government water registers

	<i>Publicly accessible information on water entitlements?^a</i>	<i>Publicly accessible information on water trades?^b</i>	<i>Volume of entitlement trade (GL)^c</i>	<i>Volume of allocation trade (GL)^c</i>
NSW	Yes, lists entitlements by water source and licence category	Yes, lists trades (with prices) and has summaries of number and volume of allocation and entitlement trades (but not prices)	952	2,377
Vic	Yes, lists entitlements by water source, trading zone and reliability	Yes, lists all trades and generates summary reports and charts that identify commercial, environmental and water corporation trades (all with prices)	398	3,139
Qld	Entitlement register is not available online. Information can be requested on individual water entitlements for a fee.	Water trade data are not available online, but registers are administered based on land title office manuals and guidelines. ^d Monthly summary reports of entitlement trades are published (with weighted average prices).	383	37
SA	Yes, however, it only has facility to search for specific licences and accounts	Yes, lists trades (with prices) and has summary of number and volume of trades and prices	128	489
WA	Yes, can extract lists of licences by water resource via online map tool	Individual trades, locations, volumes and prices available through BOM	52	10
Tas	Yes, lists water entitlements by region or stream name. Tasmanian Irrigation provides an irrigator-specific register with business identifiers, securities, entitlements and allocations.	Trading overviews with numbers, total and average volume and price distributions (min, median and max) are provided by Tasmanian Irrigation, which only includes irrigation districts	47	14
NT	Yes, can extract lists of all licences categorised by water source, business name of licence holder and type via online map tool	Yes, lists individual trades, the (searchable) licence numbers of buyers and sellers, volumes, security and duration of licence (proxy for temporary or permanent). Prices are not published	0.02 ^e	0.7 ^e
ACT	Yes, lists licences by type	Individual trades, locations, volumes and prices available through BOM	Included in NSW total	Included in NSW total

^a Consistent with NWI paragraphs on secure water access entitlements and Schedule F. ^b The NWI specifies registers should include both permanent and temporary trades. ^c 2019-20 trade volumes according to BOM Water Markets dashboard (except for the NT). These values are presented as one-way trade volumes, from the perspective of the seller's location, to prevent double counting. ^d NWI Schedule F(4). ^e Northern Territory trade volume data sourced from its water register. These data are not yet available through BOM.

Sources: BOM (2020a); DELWP (Vic) (2020g); DENR (NT) (2020e, 2020d); DPI (NSW) (2020k); DPIPW (Tas) (2020d); DWER (WA) (2020c); Access Canberra (2020); Queensland Government (2018c, 2020a); South Australian Government (2020b, 2020d); Tasmanian Irrigation (2020d, 2020b).

The Commission's view

All jurisdictions have met the NWI commitment to establish water registers. These registers help underpin the integrity of water access entitlements. Registers have been progressively improved, but there is considerable variation in their functionality and the access they provide to trade data. This variation largely reflects the level of trade observed in each jurisdiction. Jurisdictions with greater trade volumes generally have (or are investing in having) more sophisticated water registers.

Across jurisdictions, the recording and publication of certain basic trade data could be improved. Although it is not an explicit item in NWI guidelines⁴, water trade dates are not consistently recorded or published across jurisdictions, limiting the reliability of the register information. Neither Victoria nor New South Wales currently publish both the trade contract date and registration date. However, in conjunction with the trade application form initiative, New South Wales and Victoria now require the agreed date that the price for the trade was reached to be provided for all allocation trades. Queensland records the date where the access right transfers between parties. South Australia's register does include two dates — a registration date and date transferred. The Northern Territory lists the trade start and end date, which effectively describes the licence access duration. This does not provide an indication of the trade contract and registration date. Tasmanian Irrigation publishes trades by date of effect.

There are other deficiencies in recording trades across most of the water registers that are available online. Other than Victoria, none of the other online registers identify trade between related parties or environmental transfers. And very few registers list individual trade prices or identify entitlement holders, which is inconsistent with NWI Guidelines. Jurisdictions and water register users hold a range of views on the appropriate extent of price transparency and entitlement holder identification.

Either due to data collection requirements or publication processes, the availability of transparent price data outside of the MDB remains low, though these are areas where markets are less active (BOM 2020, p. 45). There is no statutory requirement to report the price for a water entitlement trade in Tasmania (Tasmanian Irrigation Pty Limited 2020b). Water sold as part of land sales are often listed as zeros. The Northern Territory also does not publish trade prices on its register.

Inquiry participants are divided on whether water registers are 'compatible, publicly-accessible and reliable'. In the view of NSW Irrigators' Council, 'the National Water Initiative requirements are largely satisfied' given the current information available on NSW water registers (sub. 27, p 19). The Southern Riverina Irrigators, in contrast, argue that water registers are currently 'grossly inadequate' (sub. 77, p. 9).

Jurisdictions have been responding to user requests for water register improvements. New South Wales is currently undertaking a stakeholder consultation on their water registers and

⁴ NWI Schedule F(5).

possible reforms to increase transparency (DPIE (NSW) 2020e). Victoria has recently completed its stakeholder consultations on water register transparency, with the release of the Closing the Loop report and is continuing to implement its 10 year water register strategy.

On the issue of identifying entitlement holders, there remains opposition from irrigators in Victoria and New South Wales to making personal information available and/or searchable (DELWP (Vic) 2019a; NSW Irrigators' Council, sub. 27, p. 19).

Given that the volume and value of trade varies greatly across jurisdictions it is not desirable for each jurisdiction's register to be of the same standard, including in the access to trade information provided. The Bureau of Meteorology (BOM), in its role of compiling and disseminating comprehensive water information, has improved access to water trade information for jurisdictions with smaller trade volumes (where the cost of improving water registers may not be justified). When improving water registers, jurisdictions could take account of approaches used in other states and explicitly consider synergies and cost savings of coordinated approaches.

Overall, the Commission is of the view that jurisdictions have largely achieved their NWI commitments regarding the establishment of water registers. Most jurisdictions have publicly accessible and reliable water registers of entitlements and trades, and invest in improvements according to user needs. Of the jurisdictions with reasonably large volumes of trade, Queensland's registers have some remaining limitations, despite making some progress in improving accessibility. The BOM water market information function has improved the accessibility of trade data in jurisdictions with smaller trade volumes.

2.3 Water market information

The NWI recognises the role of good information flows in minimising transaction costs. The establishment of water registers was a key NWI action in improving market information (discussed above). Other than water registers, relevant market information includes the content and interpretation of trade rules, historical trends and drivers of water trade and information on water resource quality and accessibility. In addition to the content of information, the mode of communication and organisation of information can lower transaction costs.

Developments since 2017

Information is delivered at multiple scales. At a national level, the Water Act gave BOM the responsibility for compiling and disseminating comprehensive water information, including on trading and markets. BOM's water markets dashboard and *Australian Water Markets* reports provide the most centralised and comprehensive set of market information. Water market information, including at more local levels, is also available from a wide range of public and private sources (PC 2017, p. 383).

Progress on improving information flows and thus lowering transaction costs is described below.

- Public–private partnerships have supported innovative service delivery:
 - The Business Research and Innovation Initiative, funded by the Australian Department of Industry, Innovation and Science, granted \$1.1 million to Marsden Jacob Associates to develop the Waterflow water market information solution (Australian Government 2020a). Waterflow consists of mobile apps and a web-based application whose primary function is to aggregate buy and sell listings from normally disparate market intermediaries and facilitate access to these intermediaries through the platform.
- The Australian Government commissioned a number of inquiries and reports into water trading and markets including:
 - the ACCC Murray–Darling Basin water markets inquiry
 - the Independent Assessment of Social and Economic Conditions in the Basin — commissioned in 2019 with the final report published in April 2020 — in response to drought combined with complex flow-on impacts of water markets on irrigation-dependent communities
 - several ABARES research reports, which covered:
 - ... trends and drivers in Murray–Darling Basin water markets 2002-03 to 2018-19 (Goesch, Legg and Donoghoe 2020)
 - ... water trade data processing and reporting to support consistency in reporting across governments (Gupta et al. 2020; Sanders, Hughes and Gupta 2019)
 - ... the economic impacts of water recovery in the Basin (Whittle et al. 2020).
- In July 2020, WaterNSW launched a ‘Water Insights Portal’, bringing together a wide range of information on storage levels, allocation announcements and water usage rules, including 30 years of historical data. The incorporation of trade data is still under development as is a mobile application for greater accessibility of the platform.
- The New South Wales Department of Planning, Industry and Environment has also developed an online trade dashboard, which publishes the number, volume and price of trades for each licence category in each NSW valley.
- Victoria has continued to invest in improving the availability and accessibility of water market information, in addition to its water register reforms.
 - The Water Market Effectiveness report series aims to support market development and guide policy-making (Aither and DG Consulting 2018).
 - In 2018, an updated report on Water Market Trends in northern Victoria was released.
 - In 2019, the Department of Environment, Land, Water and Planning launched a Water Market Watch app, helping users and people interested in Victoria’s water market stay up-to-date with water market information, delivering notifications

covering market prices, seasonal determinations, trade limits and spill declarations (DELWP (Vic) 2019f).

- A real-time schematic of ‘Where can I trade?’ in northern Victoria has been released, displaying trade limit information and historical trade limit data to help water users in northern Victoria to understand how the trade rules work (Victorian Water Register 2020). It is accompanied by an explanatory video.
- Trade approval authority communication with water market intermediaries on the status of trade authorisations, the trade limits that trades are subject to and the reasons for any trade refusals has been improved through changes to the Broker Portal, and client notifications.
- Data on all water share and allocation trades in Victoria back to 2009-10 can now be freely downloaded, including data on all approved and refused trades and characteristics of the sellers and buyers including whether the trade is commercial, non-commercial or environmental.
- Three dashboards were launched in 2020 covering:
 - ... how allocation is being traded and water market prices (DELWP (Vic) 2020b)
 - ... how much water is available to private owners, environmental water holders and water corporations, in each trading zone and each region (DELWP (Vic) 2020c)
 - ... how inter-valley trade limits work and available trading opportunities including historic trade limit and opportunity data (DELWP (Vic) 2020f).
- South Australia has developed allocation and entitlement dashboards to summarise trading data for users of South Australian River Murray water.
- Queensland has improved access to water market information.
 - The Water Investor Hotline was established to provide a dedicated water market information call centre, responsible for facilitating trade through up-to-date water availability, compliance needs and broker information.
 - The Rural Water Futures Program is a three-year program aimed at improving water data and building community trust in the management of Queensland’s water resources. Initially, the focus of the program will be on improving processes and data collection. Later stages will investigate technology and digital solutions to provide better access to accurate and timely water information.

The Commission’s view

A key function of water market information is to reduce transaction costs. To assess progress against the NWI, there are two important considerations:

- the cost to government of providing information compared with the expected benefits — for example, investing large sums of money to improve access to market information is

unlikely to be warranted in systems that have only a small volume of trade due to lower transaction costs

- private sector organisations (such as water brokers) can play a role in information provision — governments should take this into account when determining the scope of their own initiatives and determining where their intervention might address a market failure.

Taking these points and the developments since 2017 into account, the Commission's view is that jurisdictions have been responding to calls for improved water market information with a range of initiatives. In many cases, these initiatives will have reduced transaction costs for market participants, although it is not possible to directly measure this.

The ACCC has found that MDB water markets require significant improvement in the transparency and accessibility of information (2020a, p. 28). In the MDB, further reform and investment may be required to improve water market information, beyond the developments since 2017 highlighted above.

As discussed in *SP B Trading*, there are further gains to be made by focusing government market information initiatives on ensuring that basic trade data recorded in water registers, as well as information about water resources and market rules, are not compromised by unnecessary errors and are freely available in a timely manner. There may also be a role for government to provide information services that improve water literacy (IIGMDB 2020) (*SP B Trading*). Governments should also continue to monitor the demand for water trade in their jurisdictions to understand where the costs of further, targeted information provision might be justified by the benefits of trade.

The greater role that the Australian Government has taken on in providing water market information has resulted in the availability of more comprehensive trade data through the BOM website. Whether this has been worth the cost is unclear. In 2017, the Commission noted that the involvement of the Australian Government in trying to improve water market information through the Business Research and Innovation Initiative challenge went beyond the role that governments should be playing (PC, 2017). Once again, it is beyond the scope of this assessment to review the benefits and costs that this investment has generated.

Finally, water brokers and other (private) intermediary organisations also play a valuable role in providing tailored information to water users and therefore lowering transaction costs. The primarily private benefits of tailored market information weakens the case for government intervention in such service provision.

Overall, the Commission is of the view that jurisdictions have largely achieved their NWI commitments regarding improving information flows to reduce transaction costs. In many cases jurisdictions have been investing in improvements in water market information in addition to the provision of water registers. The private sector also performs a valuable role in providing information alongside public sector efforts. Stakeholders continue to note that a lack of information on water markets remains a barrier to trade, suggesting that these investments are not proving effective or have not been sufficient.

2.4 Trade approval service standards

Following agreement by COAG, the Natural Resources Management Ministerial Council set service standards for the MDB jurisdictions in 2009. These standards require at least 90 per cent of water allocation trade applications to be processed within 5–20 business days, depending on the complexity of the trade. This initiative was intended to promote faster processing of trades and is aligned with the NWI outcome of minimising transaction costs.

Developments since 2017

The Basin States continue to exceed the service standards by some margin, as they have done since they were introduced. Victoria stands out as having improved its processing standards to the point that almost all allocation trades are completed online on the same day, including developing new functionality with the MDBA to be able to automatically approve online trades subject to the Barmah Choke trade limit (Victorian Water Register 2018). New South Wales, Queensland and South Australia exceed the COAG service standards, but are generally not able to complete same-day processing (ACCC 2020a, p. 314; Business Queensland 2020a).⁵

While the COAG service standards apply only to the MDB (in 2014 the Interim National Water Reform Committee decided not to develop standards for non-MDB jurisdictions (NWC 2014)), there has been some reporting against self-imposed targets by Western Australia. Tasmania and the Northern Territory have not adopted service standards, but are cognisant of the need to process trades efficiently.

- Western Australia sets risk-based targets for agreement (allocation) and trade (entitlement) approvals of 65, 75 and 95 days for low, medium and high-risk transfers respectively. Although these processing times are longer than in the MDB, the majority of water trade occurs in groundwater systems, which require more complicated assessments than the surface water trade approvals which are most common in the MDB. Average processing durations have recently met and exceeded targets, with average times for assessments decreasing to 32, 46 and 81 days for low, medium and high risk water licence applications respectively, including for applications for trades and agreements.
- The Northern Territory has a very low number of trades, but currently processes trades where a new licence is not required within four days.
- Tasmania does not monitor or target particular approval times, but has administrative arrangements to shorten approvals for time-sensitive short-term trades.

The Commission's view

The timely approval (or rejection) of water trades is important to the efficient functioning of water markets and it is a positive outcome that jurisdictions are meeting the agreed service

⁵ The ACT does not have sufficient trade numbers to warrant service standard monitoring.

standards. It is also a matter of good governance that Western Australia and the Northern Territory are aware of their processing times, even if targets are not statutory. As discussed in 2017, the same standards have been in place since 2009 and they warrant review and consideration to tightening them (PC 2017).

3. Best practice water pricing and institutional arrangements

Under the NWI, jurisdictions agreed to adopt best practice pricing and institutional arrangements for the provision of water services for urban uses in metropolitan and regional areas, and for irrigated agriculture. In particular, jurisdictions agreed to implement arrangements which:¹

- promote economically efficient and sustainable use of water resources, water infrastructure assets and government resources devoted to the management of water
- ensure sufficient revenue streams to fund the ongoing and efficient delivery of services
- facilitate the efficient functioning of water markets, including inter-jurisdictional water markets, and in both rural and urban settings
- give effect to the principles of user-pays and achieve pricing transparency in respect of water storage and delivery in irrigation systems and cost recovery for water planning and management
- avoid perverse or unintended outcomes
- provide appropriate mechanisms for the release of unallocated water.

In broad terms, the NWI sought to achieve these outcomes through:

- best practice pricing and regulation
- institutional arrangements to deliver prudent water infrastructure investment
- the implementation of charges to recover the costs of water planning and management from users
- using regulation and, where feasible, markets and/or pricing to manage environmental externalities
- the use of market based mechanisms for the release of unallocated water
- the institutional separation of water resource management from regulation
- transparency measures, such as public reporting of:
 - subsidies paid to service providers, including community service obligations (CSOs)
 - the cost of water planning and management activities
 - the extent to which those costs are recovered from users.

Progress against these actions is assessed below, and table 3.1 summarises the collective progress of all jurisdictions.

¹ NWI paragraph 64.

Table 3.1 Assessment summary: best practice water pricing and institutional arrangements

NWI commitment	2017 assessment	2020 assessment ^a and progress indicator ^b	Comments – progress since 2017
Best practice pricing and economic regulation			
Urban water: Regulated	Not applicable ^c	Largely achieved 	Pricing processes and economic regulation generally meet NWI requirements. Independent economic regulation in Queensland (bulk water) and Western Australia could be made more robust.
Urban water: Unregulated	Not applicable ^c	Partially achieved 	Queensland has expanded reporting to apply to utilities of all sizes, but underpricing likely remains for some small utilities. Some subsidies provided in New South Wales and Queensland are not structured as CSOs. Independent economic regulation is not in place for retailer-distributors in south-east Queensland or the Northern Territory's main provider.
Rural water: government owned	Not applicable ^c	Partially achieved 	Pricing processes generally meet NWI requirements. However pricing outcomes are only clearly being met in New South Wales and Victoria. The transition to full cost recovery in Queensland has slowed and there is a risk of back sliding. Independent economic regulation is not in place in Western Australia and Tasmania.
Rural water: user-owned	Not applicable ^c	Not assessed ^d 	Pricing outcomes not directly considered. Changes made to the <i>Water Charge Rules</i> strengthen incentives to price efficiently within the Murray–Darling Basin. No issues have been identified outside of the Murray–Darling Basin.
Rural water: cross-jurisdictional	Not applicable ^c	Partially achieved 	Governments directly provide funding for cross-jurisdictional providers with varying degrees of cost pass-through to irrigators. Regulators could play a more direct role in scrutinising pass-through costs.
Investment in new or refurbished infrastructure			
Urban	Partially achieved	Partially achieved 	Jurisdictions are formalising supply planning arrangements, but some major developments are not subject to independent scrutiny.
Rural	Partially achieved	Partially achieved 	Some government funded rural projects are not economically viable. Project assessment is not transparent in many cases.

(continued next page)

Table 3.1 (continued)

NWI commitment	2017 assessment	2020 assessment ^a and progress indicator ^b	Comments – progress since 2017
Other pricing and institutional arrangements			
Cost recovery for planning and management	Partially achieved	Partially achieved 	Some jurisdictions have widened the scope of cost recovery, but public reporting in most jurisdictions falls short of that required by the NWI.
Environmental externalities of water use	Achieved	Achieved 	No substantial changes have been observed since 2017.
Release of unallocated water	Largely achieved	Largely achieved 	Legislation in Western Australia and the Northern Territory precludes market mechanisms for release of unallocated water
Separation of functions	Achieved	Achieved 	Jurisdictions have maintained formal separation between policy making and service delivery.
Performance benchmarking			
Urban	Achieved	Achieved 	The ongoing <i>National Performance Report Indicator Review</i> is well-placed to improve outcomes from benchmarking.
Rural	Terminated	Terminated 	Rural benchmarking was discontinued in 2014.

^a **Achieved:** All requirements met, **Largely achieved:** Requirements generally met, with some exceptions, **Partially achieved:** Only some requirements met, **Not achieved:** No requirements met. ^b Progress indicators reflect an overall assessment of whether, on the whole, reforms have moved closer to consistency with the NWI in the three years since 2017. An arrow pointing upward indicates progress, a flat-line indicates no change and a downward arrow indicates poorer performance or backsliding. ^c In 2017 the Commission published separate assessments for 'best practice pricing' and 'economic regulation', and so the 2017 assessment is not directly comparable with the 2020 assessment. ^d Pricing outcomes for user-owned distribution networks have not been directly considered as it is generally accepted that there are sufficient incentives to operate and price efficiently. Economic regulation provisions of the NWI are not applicable to user owned networks. However networks within the MDB are subject to Water Charge Rules (section 3.1).

3.1 Best practice pricing and economic regulation

Under the NWI, jurisdictions agreed to:

... bring into effect pricing policies for water storage and delivery in rural and urban systems that facilitate efficient water use and trade in water entitlements, including through the use of:

- consumption based pricing;
- full cost recovery for water services to ensure business viability and avoid monopoly rents, including recovery of environmental externalities, where feasible and practical; and
- consistency in pricing policies across sectors and jurisdictions where entitlements are able to be traded.²

Furthermore, jurisdictions agreed to use independent pricing regulators to ‘set or review prices, or price setting processes, for water storage and delivery by government water service providers on a case by case basis’.³ And all providers, regardless of ownership are required to publicly review and report on pricing⁴ and to report subsidies.⁵

This section assesses implementation of the full cost recovery provisions of the NWI, including how pricing policies — as well as independent economic regulation — support full cost recovery. Details of the approach taken are outlined below.

Meeting the full cost recovery provisions of the NWI requires that prices are set to ensure business viability and avoid monopoly rents. The NWI defined two pricing outcomes (upper and lower bound pricing) that align with these requirements (box 3.1). Both require providers to at least generate enough revenue to cover operating costs and provide for efficient asset renewal.

There were differing requirements for ‘metropolitan’ urban providers (defined as urban water providers with more than 50 000 customers) and all other ‘rural and regional’ providers (box 3.2). While the NWI required metropolitan providers to achieve ‘continued movement towards upper bound pricing’, it only required ‘rural and regional’ services to achieve lower bound pricing outcomes, with continued movement towards upper bound pricing ‘where practicable’. In cases where full cost recovery is unlikely to be achievable in the long term, and a Community Service Obligation (CSO) is deemed necessary, the NWI requires that the size of any CSO is reported publicly and that, where practicable, jurisdictions consider alternative management arrangements aimed at removing the need for an ongoing subsidy.⁶

² NWI paragraph 65.

³ NWI paragraph 77(i).

⁴ NWI paragraph 77(ii).

⁵ NWI paragraph 66(v)(c).

⁶ NWI paragraph 66(v)(c).

Box 3.1 Upper and lower bound pricing

Upper and lower bound pricing were defined in the National Water Initiative as follows:

- *Upper bound pricing* — the level at which, to avoid monopoly rents, a water business should not recover more than the operational, maintenance and administrative costs, externalities, taxes or tax equivalent regimes (TERs), provision for the cost of asset consumption and cost of capital, the latter being calculated using a weighted average cost of capital (WACC).
- *Lower bound pricing* — the level at which to be viable, a water business should recover, at least, the operational, maintenance and administrative costs, externalities, taxes or TERs (not including income tax), the interest cost on debt, dividends (if any) and make provision for future asset refurbishment/replacement. Dividends should be set at a level that reflects commercial realities and stimulates a competitive market outcome.

Both upper bound and lower bound pricing include a provision for asset refurbishment and replacement, but upper bound pricing also requires the water service provider to earn a commercial rate of return on capital to reflect competitive neutrality. Pricing at the lower bound is necessary but not sufficient to achieve upper bound pricing.

Box 3.2 NWI classifications

The National Water Initiative defined:

- metropolitan as ‘water and wastewater services provided in metropolitan urban areas having in excess of 50,000 connections’ (p. 29)
- rural and regional as ‘water and wastewater services provided for rural irrigation and industrial users and in regional urban areas with less than 50,000 connections’ (p. 30).

These distinctions do not reflect more commonly used meanings of ‘metropolitan’ (that is, in a metropolitan area) and ‘regional’ (that is, in a regional area). For example, many larger regional providers, particularly in Victoria, have more than 50 000 connections. Jurisdiction wide providers further complicate matters because they provide services to rural and regional water users but also serve major cities.

To further clarify the outcomes to be achieved under the NWI, the Natural Resource Management Ministerial Council endorsed the NWI Pricing Principles in 2010. These requirements apply regardless of whether prices or revenue requirements are set to align with the upper or lower bound pricing requirements of the NWI.

Importantly, the *NWI Pricing Principles* clearly distinguished between investment decisions made prior to a ‘legacy date’ (no later than 1 January 2007) and decisions made after that date (new capital expenditure). For the ‘recovery of legacy capital expenditure’:

... on the assumption that assets are to be retained, charges will achieve cost recovery by way of a depreciation charge or annuity charge and a positive return on an asset value used for price setting purposes as at the legacy date. (p. 7)

And for ‘cost recovery for new capital expenditure’:

... charges will be set to achieve full cost recovery of capital expenditures (net of transparent deductions/offsets for contributed assets and developer charges ... and transparent community service obligations) through either:

- a return of capital (depreciation of the RAB [regulated asset base]) and return on capital (generally calculated as rate of return on the depreciated RAB); or
- a renewals annuity and a return on capital (calculated as a rate of return on an undepreciated asset base (ORC) [optimised replacement cost]). (p. 6)

The assessment that follows focuses on whether the available evidence suggests that water service providers are receiving (from customers or transparent CSOs) at least enough revenue to cover operating costs and provide for efficient asset renewal (effectively cost recovery for new capital expenditure). While the value of legacy assets can significantly affect prices (as a return will be made on the legacy asset base), legacy costs are sunk costs so should not influence future investment decisions.

The Commission's approach

All water service providers are required to meet the applicable NWI cost recovery provisions. Under the NWI, urban water services in regional areas with more than 50 000 customers must meet the ‘metropolitan’ requirements of the NWI. This includes larger service providers that are commonly referred to as ‘regional’ service providers.⁷ All urban water services provided by jurisdiction-wide entities are also assessed against the ‘metropolitan’ criteria, unless information is separately provided for regional or rural services.

Rural water refers to water provided mainly for irrigated agriculture which is delivered via a mix of bulk water services and distribution services (box 3.3). Bulk water services are government owned and mainly provide water for irrigation, although also supply bulk water to urban water service providers in some jurisdictions (such as WaterNSW). Distribution services are a mix of government owned and private operations (often member corporations or trusts), and almost exclusively supply irrigation services to agriculture.

There is significant variation in the data available on pricing practices across the types of services offered (for example, potable water and sewage services versus untreated rural water), and the level of regulation and ownership arrangements.

In 2017, the Commission used financial data in assessing jurisdictions’ progress towards implementing full cost recovery for water services. Although that work highlighted areas of potential over- and under-pricing, the lack of consistent and credible data ultimately limited the strength of the Commission’s findings (PC 2017, p. 393). The Commission noted that,

⁷ The key examples are Central Coast (NSW), Cairns, Toowoomba and Townsville (Qld) and Barwon, Central Highlands, Coliban Water, Gippsland Water, Goulburn Valley Water and Western Water (Vic).

‘[p]ublication of a ... metric that excludes developer charges and contributed assets would more effectively highlight cases where pricing is not consistent with the NWI’ (PC 2017, p. 219). Fit-for-purpose financial data are still not available in 2020 (SP F *Urban*). The Commission has, therefore, not updated the detailed financial analysis from 2017.

Box 3.3 Rural water services

Bulk water services

Bulk water services entail the harvesting and storage of water using infrastructure (such as dams), and the transport of that water to users (primarily through natural watercourses) often over large distances. Bulk water infrastructure and service providers are owned by State Governments.

Distribution services

Distribution services transport water via a network of pipes and/or channels to properties located away from a natural watercourse or bulk water extraction point. Depending on the jurisdiction, distribution infrastructure is owned by government and/or irrigators.

Instead, in determining whether prices for service providers are consistent with the NWI and the NWI pricing principles, the Commission has instead investigated:

- pricing processes and regulation
- pricing outcomes and subsidies
- changes in ownership arrangements (for rural water only).

Pricing processes and regulation provide an important source of information for assessing whether prices are being set in a manner that is consistent with the cost recovery requirements of the NWI. In assessing the efficiency of pricing for regulated water service providers, independent regulators follow guidelines, terms of references or referrals which outline how prices should be set or recommended. This includes how to treat legacy assets, new infrastructure investments and contributed or ‘gifted’ assets, all of which require specific treatment under the *NWI Pricing Principles*. For utilities not subject to formal regulation, publicly stated pricing processes can be assessed for NWI compliance. For example, an unregulated water provider may state on their website that prices are set to recover operating costs and provide for asset renewal. And State government pricing guidelines can help demonstrate commitment to full cost recovery. Furthermore, regulators also regularly evaluate the ‘prudence and efficiency’ of investment decisions made by water service providers and adjust allowable revenues or prices to only cover the cost of efficient investment decisions (this does not apply to assets gifted by governments which are excluded from the asset base under the *NWI Pricing Principles* — see section 3.2 below).

In term of the available data, for water services providers subject to independent economic regulation, it is possible to assess whether pricing outcomes reflect pricing intentions using detailed regulatory accounts or reports. Regulatory accounts are typically tailored specifically to assessing whether water services providers are appropriately recovering costs

and providing for efficient assets renewal (as per the NWI and the *NWI Pricing Principles*). This makes them a reliable and accurate source of information for assessing progress to achieving full cost recovery.

Financial data on profit and rates of return are also available for most water services providers in Australia. Almost all water service providers publish financial reports which provide some insight into whether they are recovering costs. Basic financial profitability metrics are available for all government-owned urban providers through either the Bureau of Meteorology's *National Performance Report* for urban water, or more recently in publicly accessible state-specific databases.

For providers not subject to formal economic regulation, it is not possible to use available financial data (whether from annual reports or government databases) to assess whether a provider is generating enough revenue to allow for efficient asset renewal (as well as operating costs). This is because it is not possible to determine whether published financial data align with the NWI pricing principles. Formal financial accounts are prepared in line with Australian accounting standards which do not account for the differences between legacy and new assets defined in the NWI pricing principles. And there is also no way to be confident that revenues presented in government databases are being set to ensure new investments receive a commercial rate of return in line with the NWI pricing principles. However, there is value in assessing whether revenues exceed operating costs. Although this does not allow a definitive assessment against the NWI's cost recovery requirements, a provider with a negative operating margin is certainly failing to achieve full cost recovery.

Finally, the presence of subsidies can also provide evidence of the degree to which cost recovery is being achieved. If jurisdictions use transparent CSOs to cover revenue shortfalls for specific customer types, this ensures total revenue is cost reflective, and so is sufficient at least for efficient asset renewal. Again, the availability of data on transparent and targeted CSOs depends on the level of regulation and pricing processes.

Reflecting differences in data availability, assessments below are presented for:

- Urban water service providers that are formally regulated. This includes most metropolitan water providers, larger regional urban water providers, and the urban water operations of most jurisdiction-wide water service providers.
- Urban water services providers that are not formally regulated. For the purpose of the assessment, 'light touch' regulation such as price and service monitoring is not considered to be formal regulation. This group includes urban water services provided by councils or council-owned corporations in New South Wales and Queensland (metropolitan retail providers in Queensland and regional providers in both states), and the urban water operations of the jurisdiction-wide water service provider in the Northern Territory.
- Rural water services provided by jurisdictional governments. This includes all services regardless of whether they are subject to economic regulation as there are only a small number of large providers in this category.

-
- User-owned irrigation distribution networks. These networks are not subject to formal regulation.
 - Cross-jurisdictional government-owned rural water providers. This includes River Murray operations and the Border Rivers Commission.

Urban water services providers that are formally regulated

The pricing assessment of formally regulated utilities investigates the extent of economic regulation, the processes for determining prices and the pricing outcomes for utilities.

Regulation and pricing processes

The current economic regulation arrangements for metropolitan and regional urban water service providers are summarised below and detailed in table 3.2.

- Victoria, South Australia, Tasmania and the ACT have independent economic regulation including price setting powers for all utilities.
- New South Wales has independent economic regulation including price setting powers for Sydney Water, Hunter Water, Central Coast Council and Essential Energy, as well as WaterNSW's bulk water services, but no regulation for most regional utilities (covered in a separate section on providers that are not formally regulated).
- Queensland has independent economic regulation for the bulk water provider in south-east Queensland, Seqwater, but the regulator does not have price setting power and must be asked by the State Government to perform a review of prices.⁸ There is currently no regulation for Queensland's metropolitan retail utilities or its regional utilities (covered in a separate section on providers that are not formally regulated).
- Western Australia has independent economic regulation, but the regulator does not have price setting power and must be asked by the State Government to perform a review of prices.
- The independent economic regulator in the Northern Territory administers licensing of water supply and sewerage services, but does not have any price-setting power over Power and Water Corporation. Outcomes for Power and Water Corporation are covered in a separate section on providers that are not formally regulated.

⁸ Queensland retailer-distributors are declared monopoly businesses under the *Queensland Competition Authority Act 1997* (Part 3, s. 20) (Queensland Government 2018a, p. 2). The relevant Minister can refer them for a pricing investigation at any time.

Table 3.2 Economic regulation of metropolitan and regional urban services

	Arrangements in 2017		Arrangements in 2020
	Metropolitan	Regional urban	
NSW	The Independent Pricing and Regulatory Tribunal (IPART) sets maximum prices for Sydney Water, Hunter Water and WaterNSW.	Providers set their own prices in accordance with <i>the NSW Best Practice Management of Water Supply and Sewerage Framework</i> . ^a The New South Wales Government monitors financial outcomes through annual performance reporting.	No change
Vic	The Essential Services Commission (ESC) sets maximum prices for Melbourne Water, City West Water, South East Water and Yarra Valley Water.	The ESC sets maximum prices for Victoria's regional utilities.	No change
Qld	The Queensland Competition Authority (QCA) recommends maximum prices for Seqwater. The QCA does not review prices for south east Queensland retailer distributors, but may be directed to by the Queensland Government. The Queensland Government is considering QCA advice on a long term approach to economic regulation in south east Queensland. All urban water service providers are required to undertake financial reporting, publish an annual report on their website and submit the report to the department.	Providers set their own prices. The industry and the Queensland Government both undertake performance reporting, though financial reporting is limited to larger providers. All urban water service providers are required to undertake financial reporting, publish an annual report on their website and submit the report to the department.	No change
WA	The Government can request the Economic Regulation Authority to make price recommendations for the Water Corporation.	The Government can request the Economic Regulation Authority to make price recommendations for the Water Corporation, Aqwest and Busselton Water.	No change
SA	ESCOSA sets maximum revenues for SA Water.		No change
Tas	OTTER sets maximum prices for TasWater		No change
NT	The NT Government sets prices for the Power and Water Corporation.		No change
ACT	The Independent Competition and Regulatory Commission sets maximum prices for Icon Water		No change

^a Essential Water, which serves Broken Hill, is regulated by IPART.

Sources: DNRME (2018); ESC (2018a, 2018b, 2018c); ESCOSA (2020); ICRC (2018); IPART (2020b, 2020a, 2020c); OTTER (2018); PC (2017, p. 415); QCA (2018); Queensland Government (2020b); Utilities Commission of the Northern Territory (2020).

To ensure that full cost recovery will be achieved, formal regulators build a notional revenue requirement consisting of major costs to the utility including:

- operating expenditure allowance
- return of capital
- return on capital
- tax allowance.

Regulators set maximum prices in New South Wales, Victoria, Tasmania and the ACT, and maximum revenues in South Australia. The price-setting and revenue-setting *processes* taken by independent economic regulators for their associated utilities are consistent with full cost recovery under the NWI (table 3.3). Among these jurisdictions, the only notable change since 2017 has been the adoption of the ‘PREMO’ model for establishing rates of return for all Victorian government owned water services providers from 1 July 2018 (ESC 2018a, 2018b, 2018c).

Table 3.3 Components of regulated utility water prices

Revenue components for utilities subject to price-setting or revenue-setting economic regulation

Provider		Operating expenditure allowance	Return on capital	Return of capital	Tax allowance
Sydney Water	NSW	✓	✓	✓	✓
Hunter Water	NSW	✓	✓	✓	✓
WaterNSW	NSW	✓	✓	✓	✓
Melbourne Water	Vic	✓	✓	✓	✓
City West Water	Vic	✓	✓	✓	✓
South East Water	Vic	✓	✓	✓	✓
Yarra Valley Water	Vic	✓	✓	✓	✓
SA Water	SA	✓	✓	✓	✓
TasWater	TAS	✓	✓	✓	✓
Icon Water	ACT	✓	✓	✓	✓
Regional Victoria ^a	Vic	✓	✓	✓	✓

^a The Essential Services Commission (ESC) regulates 13 regional utilities in Victoria.

Sources: ESC (2016, 2018a, 2018b, 2018c); ESCOSA (2020); ICRC (2018); IPART (2020b, 2020a, 2020c); OTTER (2018).

However, Queensland and Western Australia do not provide economic regulators with price-setting powers. In Queensland, Seqwater’s prices are set by the State Government, and pricing recommendations are provided to the State Government by the Queensland Competition Authority (QCA) on request. Similarly, in Western Australia, Water Corporation’s prices are set by the State Government, and pricing recommendations are provided to the State Government by the Economic Regulatory Authority (ERA) on request. The prices recommended by the regulators incorporate the necessary cost components to

form the notional revenue requirement that would facilitate full cost recovery (ERA (WA) 2017, pp. 22–44; QCA 2018, p. 74).

In Tasmania, the price-setting process of the Office of the Tasmanian Economic Regulator (OTTER) is in line with full cost recovery, but legislation has prevented it from being achieved. Statutory obligations under section 68(1A) of the *Water and Sewerage Industry Act 2008* (Tas) require that assets transferred to previously regulated entities before 1 July 2011 (existing assets⁹) incorporate a 3 per cent return on equity rather than a commercially reflective return. New assets — assets purchased or constructed by the previously regulated entities and now TasWater after 1 July 2009 — can earn a commercially reflective return (OTTER 2018, p. 161).

Pricing outcomes and subsidies

Metropolitan utilities are required to earn a commercially reflective return on capital to achieve full cost recovery, while regional utilities are required to make a provision for asset renewal. When calculating the notional revenue requirement, regulators determine the rate of return on capital for utilities by determining the appropriate weighted average cost of capital (WACC).¹⁰ Figure 3.1 shows the rate of return set for all utilities with a maximum price-setting or revenue-setting regulator.¹¹ There is no ‘correct’ rate of return; regulators consider the financial circumstances of each utility they regulate to determine the appropriate rate of return for achieving full cost recovery.

Seqwater is also included; while the QCA only recommends prices, the Queensland Government did set prices in line with the QCA recommendations, and adopt the recommended rate of return (Queensland Government 2018b).

In Western Australia, an ERA review highlighted cross-subsidies between water services and wastewater services, as well as cross-subsidies between metropolitan and regional customers.

Although the ERA advised a real post-tax WACC of 4.93 per cent consistent with full cost recovery, the review highlighted prices that were inconsistent with full cost recovery for Perth water supply, drainage and wastewater services. The review found that in the 2018-19 financial year, Perth customers would be charged \$365.2 million more than the estimated efficient cost of supply for wastewater services, \$3.6 million more than the estimated efficient cost of supply for drainage services and \$30.4 million less than the estimated efficient cost of supply for water services (ERA (WA) 2017, pp. 70–71). This results in an

⁹ Existing assets are distinct from legacy assets, in that the existing asset base for TasWater comprises legacy assets and new assets as defined under the *NWI Pricing Principles*. Existing assets and new assets, as defined by OTTER, are distinguished by the cost of equity calculation for determining the return on capital.

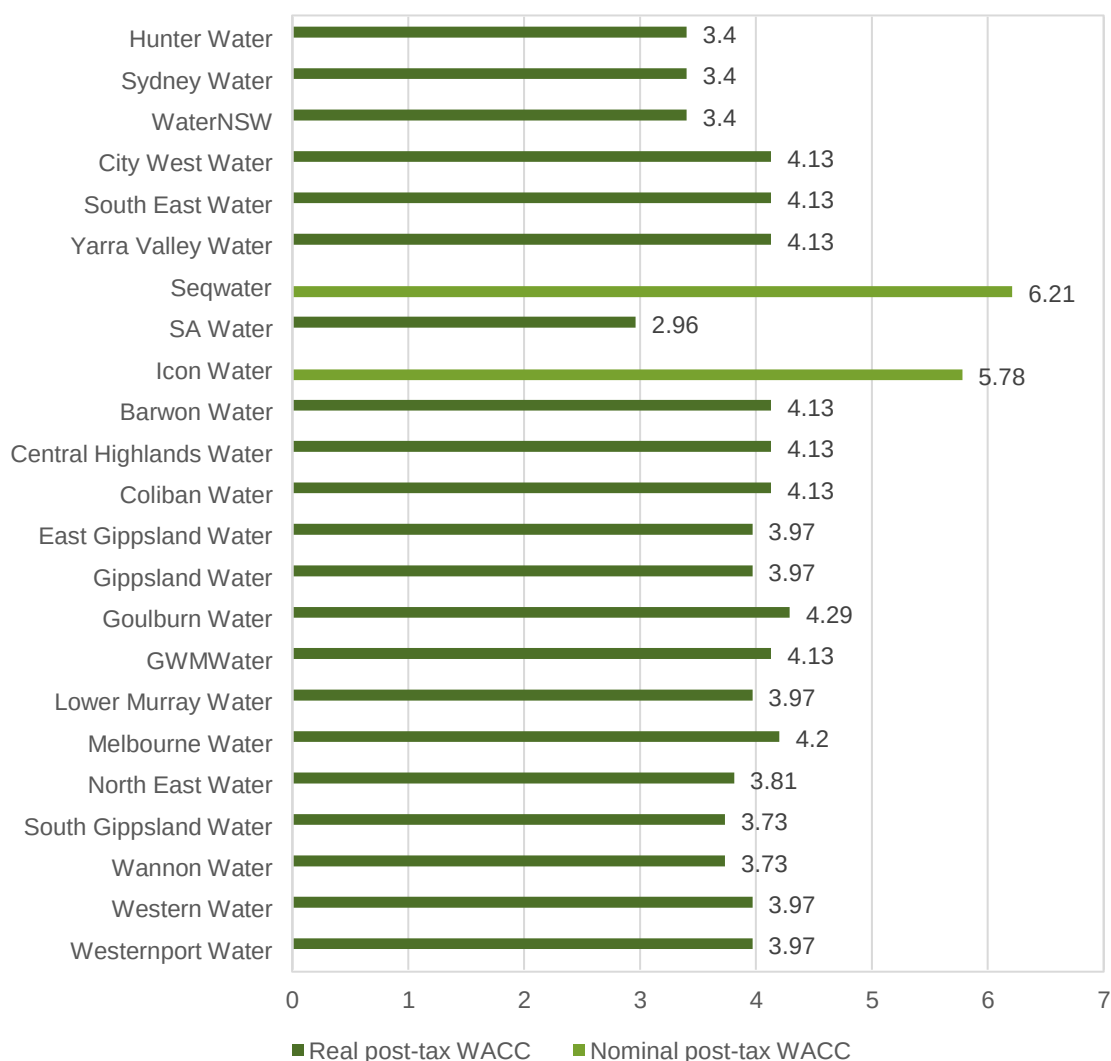
¹⁰ The WACC includes the required rate of return to be earned by debt and equity providers.

¹¹ OTTER sets maximum prices for TasWater, but the appropriate WACC only applies to new assets (and not existing assets).

net over-recovery of \$338.4 million from Perth customers. Based on the number of properties serviced by Water Corporation in the Perth region in 2018-19 (Water Corporation 2019a, p. 38), this would mean that the average annual bill for wastewater would be about \$407 higher than the efficient estimate, and the average annual bill for water supply would be about \$28 lower.

Figure 3.1 Regulated utilities receive a return on capital

Regulated utilities' weighted average cost of capital (per cent) on the regulated asset base^{a,b}



^a Based on latest available determinations as at December 2020 ^b TasWater has been excluded because the rate of return set by OTTER only applies to new assets. Water Corporation has been excluded because the regulatory rate of return does not apply if the government does not implement the pricing proposal.

Sources: ESC (2016, 2018a, 2018b, 2018c); ESCOSA (2020); ICRC (2018); IPART (2020b, 2020a, 2020c); QCA (2018).

Further, the ERA also estimated the degree of under-recovery from regional customers which is, in part, due to the State Government's uniform tariff policy. The ERA estimated that, in the 2018-19 financial year, regional customers of the Water Corporation would be charged \$428.8 million less than the ERA's estimated efficient cost of supply of \$954.1 million for water, wastewater and drainage services (ERA (WA) 2017, pp. 70–71). For water supply, regional customers pay about 44 per cent of the estimated efficient cost of supply. This shortfall is addressed through an operating subsidy from the Western Australian Government.

The Essential Services Commission of South Australia has price-setting powers for SA Water. However, under the *Water Industry Act 2012* (SA), the South Australian Treasurer issued a pricing order in May 2020 that affected SA Water's Regulated Asset Base (RAB). The value of SA Water's drinking water assets was reduced from \$7.77 billion to \$7.25 billion (as at 1 July 2013, in December 2012 dollars) (ESCOSA 2020, p. 21). The notional revenue requirement calculated by the regulator is based on a return of and on the asset base value, and the change to the asset base value has therefore reduced SA Water's drinking water revenues by approximately \$30 million a year.

In Tasmania, the pricing outcomes do not reflect full cost recovery. The economic regulator, OTTER, has incorporated an appropriate nominal post-tax WACC of 5.82 per cent for new assets, but not for existing assets (OTTER 2018, p. 182). Given that the WACC does not allow for a commercially reflective rate of return on existing assets, prices set in line with this WACC would result in a slight shortfall of full cost recovery. As noted in TasWater's submission (sub. 11, pp. 6-7), under the last *Price and Service Plan* created in 2018 by TasWater, water and sewerage prices would need to be increased by 8 per cent a year to achieve full cost recovery (TasWater 2018). But due to the Memorandum of Understanding between the Tasmanian Government, local governments and TasWater, price increases are capped at no more than 3.5 per cent a year, and have been frozen for the 2019-20 and 2020-21 financial periods (TasWater 2020b).

Victoria's regional utilities receive small and occasional grants from the Government. These include CSO payments for pensioner rebates, and grants for specific projects (BW 2020, p. 128; CW 2020, p. 115). An analysis of the financial statements of Victoria's regional utilities shows that the Victorian Government provided grants only worth up to 1.55 per cent of revenue to its regional utilities in the 2018-19 financial year, with the highest grant received by Coliban Water (CW 2019). As was the case in the Commission's 2017 inquiry, while this suggests some degree of inconsistency with the NWI, this level of grant funding is immaterial to the assessment (PC 2017, p. 400).

The Western Australia Government pays CSOs to three water corporations — Water Corporation, Aqwest and Bussleton Water. The operating subsidy provided to Water Corporation in 2018-19 was \$420 million (Water Corporation 2020a, p. 32). Subsidies are provided for pensioners and seniors and some high cost services in country towns. However, the subsidies provided by the Western Australian government do not specifically go toward

achieving full cost recovery in the long-term as required by the NWI.¹² The subsidy is provided for both rural (irrigation) and regional urban services, making it unclear whether the subsidy is enabling full cost recovery for regional services or going toward other uses.

The South Australian Government provides SA Water with a CSO for high-cost regional services that is compliant with the NWI. The Tasmanian and ACT Governments do not provide CSOs for their regional services.

The Commission's view

Progress against the NWI commitment to achieving full cost recovery for urban water utilities that are formally regulated has been mixed.

The pricing *processes* taken by independent economic regulators in New South Wales, Victoria, South Australia and the ACT are conducive to full cost recovery. In Tasmania, the process taken by the economic regulator has been conducive to full cost recovery, but statutory limitations and the regulator's power to only set maximum prices prohibit full cost recovery. In Queensland and Western Australia, the processes taken by the independent economic regulators have also been conducive to full cost recovery, but the regulators do not have price-setting powers. In Queensland, the Government has accepted the prices recommended by the QCA (Queensland Government 2018b). But in Western Australia, the Government has not accepted the prices recommended by the ERA, leading to prices that do not reflect full cost recovery (as discussed below) .

The pricing *outcomes* align with the institutional arrangements in jurisdictions. In New South Wales, Victoria, Queensland, South Australia and the ACT, the return on capital that utilities can receive is determined using an appropriate risk-based financial calculation of the WACC.

The pricing outcomes in Western Australia and Tasmania show that full cost recovery has not been achieved. In Perth, the Water Corporation is charging above full cost recovery for wastewater services, a service with inelastic demand (prices do not change consumer behaviour). And they are charging below full cost recovery for water services, a service with volumetric pricing that does change consumer behaviour. Metropolitan services are also partly subsidising regional services, while the subsidy paid by the State Government does not distinguish between regional urban services and rural (irrigation) services. In Tasmania, the State Government's ability to set prices below efficient levels has prohibited full cost recovery. Prices were planned to incrementally move toward full cost recovery over time, but price freezes have slowed progress.

In summary, utilities owned by Governments that give the independent economic regulator maximum price-setting or revenue-setting powers, or accept the prices recommended by the regulator, are generally achieving full cost recovery. However, in Tasmania, where

¹² NWI Paragraph 66(v)(c).

maximum prices are set by the regulator, progress toward full cost recovery has slowed. And in Western Australia, where the Government has not accepted the prices recommended by the regulator, neither water nor wastewater service prices in metropolitan and regional communities reflect the efficient cost of supply. In Queensland and Western Australia, pricing reviews should be performed regularly by the economic regulator, rather than when requested by Government. And in Queensland and Western Australia, State Governments should introduce maximum price-setting powers for economic regulators. Further, Western Australia should make its CSO payments more transparent, distinguishing between provisions for regional services and provisions for rural services.

The revaluation of the SA Water RAB by way of a pricing order from South Australian Treasurer raises some concerns, but the Commission sees the decision as justified. Using a rigorous process, an economic regulator determines the value of the RAB, and the value of the RAB determines the revenue (and therefore prices) necessary to achieve full cost recovery. Reducing the RAB arbitrarily can therefore reduce the revenue required to achieve full cost recovery, where that amount of revenue may not be sufficient for future asset refurbishment and renewal. However, the South Australian Government requested an independent inquiry into the initial determination and subsequent treatment of the RAB, and the inquiry found that the adjustment was necessary (Owens 2019).

Overall, New South Wales, Victoria, South Australia and the ACT have met the pricing requirements of the NWI for regulated entities. The Commission has, therefore, assessed progress against this facet of the NWI as largely achieved. However, in Queensland and Western Australia, the State Government should introduce regular price reviews and price-setting powers for the QCA and ERA. Similarly, in Tasmania, the State Government should introduce full price-setting powers for the OTTER. Changes to institutional arrangements would facilitate these jurisdictions to achieve the pricing requirements of the NWI for regulated entities.

Urban water services providers that are not formally regulated

The only jurisdictions with utilities lacking formal economic regulation are New South Wales, Queensland and the Northern Territory. The utilities without regulation in New South Wales are regional council-owned providers. In Queensland, water retailers are not subject to economic regulation. In the Northern Territory, the state-wide provider, the Power and Water Corporation, is not subject to independent price regulation.

Pricing processes and regulation

The NSW Government's *Best Practice Management of Water Supply and Sewerage Guidelines* includes an allowance for operating expenditure and for asset refurbishment and replacement (DWE 2007).

The NSW Government has also changed their definition of full cost recovery since 2017. Prior to 2017, a local water utility (LWU) in NSW was classified as achieving full cost

recovery when improved financial performance was expected. This definition has been discontinued, and full cost recovery is achieved when LWUs have a positive rate of return. Council-owned LWUs are also subject to state government auditing and compliance measures for local councils. The water supply and sewerage financial statements are audited under the local government auditing framework to ensure that the financial data are a true reflection of the business.

In Queensland, the *Local Government Act 2012* sets out required pricing arrangements for urban water service providers outside of south-east Queensland. Specific to water utilities, local councils are responsible for setting water and sewerage prices and must report an array of key performance indicators to the State Government (DNRME (Qld) 2018). The Act also requires these councils to achieve full cost recovery but provides limited guidance on doing so, and there are no separate guidelines. Some councils are declared monopolies under the *Queensland Competition Authority Act 1997* and the Minister can direct the QCA to review these councils. (Queensland Government 2018a, p. 2). More generally, the Queensland Audit Office reviews the financial performance of Queensland's local councils, inclusive of water utility operations (QAO 2020, pp. 32–40). While there is not direct oversight of pricing or guidance for moving toward achieving full cost recovery, the reporting does provide public accountability and therefore an incentive to move towards achieving it.

Pricing outcomes and subsidies

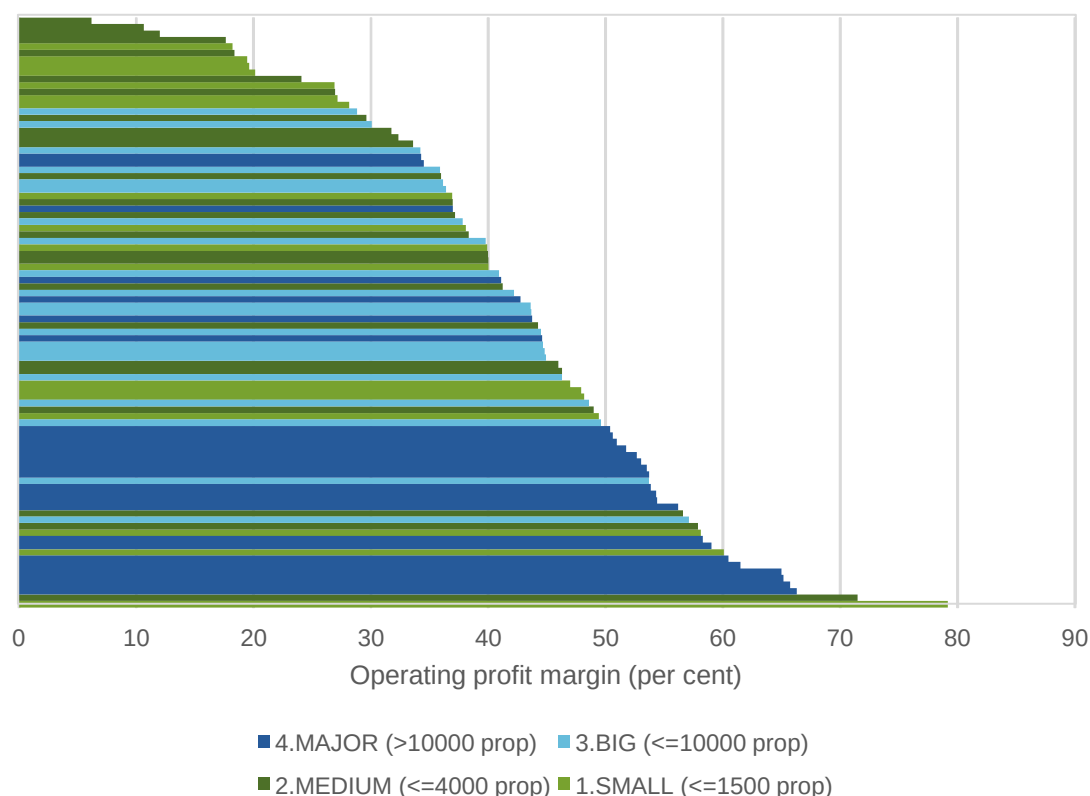
In NSW, no utilities have a negative operating margin (figure 3.2). However, several utilities are achieving only very small margins, and there is a likelihood that including depreciation in the calculation would cause the positive operating margins to become negative.

Based on the economic real rate of return (ERRR), the NSW Government has stated that 80 of 92 utilities have recovered full cost for their combined water and sewerage businesses. However, because the economic real rate of return measure is determined using financial data reported by utilities, the measure does not align with the *NWI Pricing Principles*. Therefore, the outcomes in relation to full cost recovery under the NWI are still unclear.

The NSW Government has committed more than \$440 million in grants to local water utilities in regional NSW since 2017 under the *Safe and Secure Water Program* and as a part of the NSW Government's Drought Response. However, changes made to the *Safe and Secure Water Program* in 2018 mean that non-capital funding can be provided, and funding is allocated on the basis of risk to particular water systems, rather than a grant application process.

Figure 3.2 New South Wales utilities cover their operating costs, but margins increase with scale

NSW local water utilities^{a,b} operating margins (percentage of revenue)^c for water services and sewerage



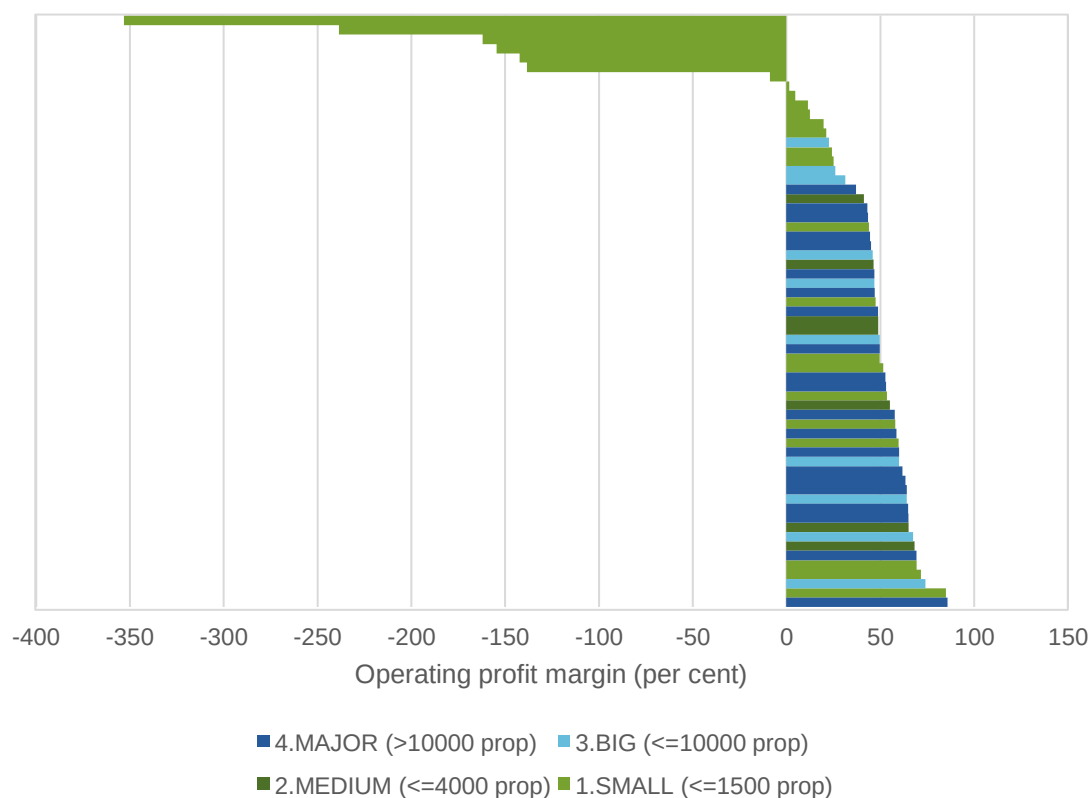
^a Water services data only: Central Tablelands Water Council, Cobar Water Board, Goldenfields Water County Council, Riverina Water County Council, Rous County Council. ^b Sewerage data only: Bland Shire Council, Blayney Shire Council, Coolamon, Hawkesbury City Council, Lockhart Shire Council, Temora Shire Council, Wagga Wagga City Council and Weddin Shire Council. ^c Total operating margin for water and sewerage divided by total revenue (excluding grants and developer contributions). Total operating margin is total revenue (excluding grants and developer contributions) minus operating and maintenance costs.

Source: DPIE (NSW) (2020g).

In Queensland, eleven utilities are not recovering their operating costs (figure 3.3). This includes eight Aboriginal Shire councils (four excluded from the figure due to zero revenue or a very large negative operating margin), two councils located in the Torres Strait and one council (Bulloo Shire) with a low population density (325 people over 73 723 square kilometres) (ABS 2019b).

Figure 3.3 Some Queensland providers are not covering operating costs

Queensland local water providers^{abc} operating margins (percentage of revenue)^d for water services and sewerage



^a The following councils have been removed due to a lack of data: Barcoo Shire Council, Croydon Shire Council, Etheridge Shire Council, Gladstone Area Water Board, Mapoon Aboriginal Shire Council, Mt Isa City Council. ^b The following councils have been removed due to having zero revenue: Lockhart River Aboriginal Shire Council, Napranum Aboriginal Shire Council, Palm Island Aboriginal Shire Council. ^c Woorabinda Aboriginal Council has been excluded due to the scale of its negative operating margin. ^d Total operating margin for water and sewerage divided by total revenue (excluding grants). Total operating margin is total revenue (excluding grants) minus operating, maintenance and administration costs.

Source: Queensland Government (2019a).

The Queensland Government has provided funding to regional utilities in the form of capital grants, without a clear explanation for how the funding was distributed. The then-Department of Natural Resources, Mines and Energy (DNRME) facilitated funding commitments for the Townsville Haughton Pipeline Duplication Project Stages 1 and 2 (discussed in section 3.2), as well as a \$15 million grant to Southern Downs Regional Council to enable emergency water carting to Stanthorpe in 2019.

Outside of the jurisdiction of DNRME, the Queensland Government also provided 218 subsidies worth \$161 million for the four years from 2016-17 to 2019-20 for

water-related projects. The funding was under several programs that fund a wide range of infrastructure projects including:

- Works for Queensland
- Local Government Grants and Subsidies Program
- Indigenous Councils Critical Infrastructure Program.

Some of the funding has been provided to higher-need communities, including small remote councils, but larger communities (including Townsville) also received water infrastructure grants.

In the Northern Territory, water and sewerage prices are set by the Territory Government through a pricing order issued by the Minister in accordance with the *Water Supply and Sewerage Services Act 2000* (NT). The pricing order sets the retail prices that customers may be charged for water supply and sewerage, and compliance with the pricing order is enforced by the Utilities Commission of the Northern Territory. The Northern Territory Government provides the Power and Water Corporation with CSO payments for high-cost regional and remote services, and operational and capital grants to Indigenous Essential Services for services to remote Indigenous communities. However, these CSO payments and grants are provided for both electricity and water services, so the payments are not fully transparent.

The Commission's view

The state of full cost recovery for regional utilities in New South Wales and Queensland that are not formally regulated is somewhat unclear. In New South Wales, an analysis of the financial data suggests that there is a likelihood that at least several utilities are failing to achieve full cost recovery, especially considering that the \$440 million worth of capital grants provided by the State Government would not be required if full cost recovery was being achieved. (Under full cost recovery, utilities earn sufficient revenue for all required asset refurbishment and renewal, rather than requiring grants). But due to differences between financial measures and the *NWI Pricing Principles*, the Commission cannot definitively draw a conclusion. In Queensland, six utilities have either zero revenue or negative operating margins and are failing to achieve full cost recovery. There are likely to be more utilities failing to achieve full cost recovery, but like New South Wales, the Commission cannot definitively draw a conclusion. Guidelines for regional utilities on full cost recovery in Queensland, similar to the *NSW Best Practice Management of Water Supply and Sewerage* guidelines in New South Wales, could help these utilities achieve full cost recovery as required under the *Local Government Act 2012* (NSW). Further, as discussed in *SP F Urban*, both a measure of full cost recovery and an asset valuation method that are consistent with the *NWI Pricing Principles* would allow an effective assessment of full cost recovery for unregulated utilities.

Subsidies and grants that are not fully compliant with the requirements of the NWI are provided to unregulated utilities in New South Wales, Queensland and the Northern

Territory. Under the NWI, CSOs should be provided to utilities with the intention of the utilities achieving full cost recovery. The CSO should be transparent — this makes it clear how much funding was required to achieve full cost recovery (and that it was indeed for achieving full cost recovery). However, New South Wales and Queensland have provided capital grants instead of CSOs (although changes to funding arrangements under the New South Wales *Safe and Secure Water Program* are closer to an NWI-compliant CSO).

And although the Northern Territory provides CSOs to Power and Water Corporation and Indigenous Essential Services, those subsidies are not transparent.

In the Northern Territory, the utility that services metropolitan and regional areas is not regulated. As discussed previously in the assessment, utilities with prices that are not set by an independent economic regulator (directly or indirectly through recommendations to Government that are then implemented) can prevent full cost recovery and can even enable the cross-subsidisation of services. The outcomes could be much worse in the case of no regulation, and any poor decisions made by governments and utilities are ultimately borne by customers in the form of higher long-term prices or lower service outcomes. But the dearth of information due to the lack of economic regulation makes it difficult to say definitively.

It is difficult to assess whether jurisdictions are meeting their commitment to the NWI for unregulated utilities — there are issues, but the extent of them is unclear. A clearer assessment of pricing outcomes could be derived if a consistent measurement and reporting guideline compliant with the NWI was applied to all unregulated utilities. Further, any subsidies should be structured as CSOs and be transparently reported. And State Governments should seriously consider independent economic regulation for metropolitan utilities that are not currently regulated. Given the evidence against this facet of the NWI, the Commission has assessed progress as only partially achieved.

Government owned rural water providers

Pricing processes and regulation

In New South Wales, Victoria and Queensland, independent economic regulators are regularly involved in the price setting or review processes for government-owned rural water service providers (bulk and/or distribution networks).

- In New South Wales and Victoria, IPART and the ESC (respectively) determine allowable revenue or prices, independent of the State governments.
- In Queensland, the QCA recommends prices to the Queensland government, which then makes the final decision.

In all three jurisdictions, the prices determined or recommended by the relevant regulators exclude a return on capital for ‘legacy assets’.¹³ For new investments (excluding assets gifted by governments), each regulator targets a commercial rate of return. All three regulators also have processes to review the efficiency of recent investment decisions and adjust allowable revenues or prices to only cover the cost of efficient investment decisions (as noted above, this does not apply to assets gifted by governments which are excluded from the asset base under the 2010 *NWI Pricing Principles* — see section 3.2 below).

As of July 2020, under the new Water Charge Rules, certain on-river bulk water suppliers will either be regulated by State regulators under State law where new ‘prudence and efficiency’ requirements are to be met; or alternatively by the Australian Competition and Consumer Commission (ACCC) under the new Water Charge Rules. Within the Murray–Darling Basin, as of July 2020, all operators that meet the definition of an infrastructure operator under the *Water Act 2007* (Cth) (whether user- or government-owned) are subject to schedule of charges requirements under the new *Water Charge Rules* administered by the ACCC, and these rules take precedence over the NWI pricing principles. These new rules consolidated arrangements spread across the *Water Charge (Termination Fee) Rules 2009* and *Water Charge (Infrastructure) Rules 2010*. According to the ACCC, the new rules:

... provide charging transparency for customers of monopoly water infrastructure operators in the Murray–Darling Basin. This transparency is achieved by requiring monopoly water infrastructure operators to include most charges on their schedule of charges. The Water Charge Rules also set limits on termination fees that may apply where an infrastructure operator’s customer chooses to terminate their access to the operator’s water service infrastructure. (ACCC 2019)

In Western Australia and Tasmania prices for irrigation services from government-owned rural water providers are not directly reviewed by economic regulators.

- In Western Australia prices for bulk water supplies from Water Corporation to irrigation distribution networks are contractually negotiated. Pricing objectives include recovering operating costs and an allowance for infrastructure replacement. The Western Australia Government can request the Economic Regulation Authority to review prices for bulk water services and distribution networks. It last did so in 2013, where it requested the ERA to review dam safety cost sharing arrangements for the Harvey Water distribution network.
- In Tasmania, prices for irrigation are set directly by Tasmanian Irrigation. According to Tasmanian Irrigation, charges are set to recover the costs of operating, maintaining and administering irrigation districts and that ongoing operating costs, including provision for asset renewal, will not be subsidised and will be met by annual charges levied on water entitlement holders (TI 2020a, 2020c).

In South Australia, user-owned irrigation services source water directly from River Murray operations (cross-jurisdictional government providers are discussed below). While SA

¹³ Defined by the respective jurisdictions as expenditure on assets prior to: 1 July 1997 for New South Wales, 1 July 2004 for Victoria and 1 July 2000 for Queensland.

Water provides services on behalf of River Murray operations in South Australia (as the ‘State Constructing Authority’), it does not set bulk water prices for distribution networks.

In 2019-20, SA Water started supplying recycled wastewater to irrigation customers from the Northern Adelaide Irrigation Scheme. For this scheme, efficient capital and operating expenditures are added to the general cost base for SA Water. Revenue from sales of wastewater to irrigators offsets allowable revenue from urban sewerage customers.

Changes in ownership arrangements

The only notable change in ownership arrangements since 2017 is in Queensland, where Sunwater transferred four of eight irrigation distribution networks into local ownership (St George in June 2018, Theodore in October 2018, Emerald in June 2019, and Eton in March 2020).

Pricing outcomes and subsidies

In New South Wales and Victoria cost recovery has largely been achieved (taking the value of legacy assets as given). Victorian rural water providers have achieved cost recovery on their relevant asset bases, and NSW has achieved cost recovery, except for two out of 14 supply areas where IPART considers it would price customers out of the market to do so. In the North Coast and South Coast valley areas, prices are set to between customer’s ‘capacity to pay’ and the cost that WaterNSW would avoid if it did not have to supply those services to that customer.¹⁴

Prices for irrigation services in Queensland, which are set by the government on the recommendation of the QCA, have been transitioning towards cost recovery. However there is still significant progress to be made. As at the 2021 financial year, less than 50 per cent of allocations were charged at cost recovery levels for Sunwater and Seqwater. The Commission notes the Queensland Government’s response to the QCAs *Irrigation Price Investigation 2020–24*:

- The QCA recommended that some irrigation prices should increase for the 2021 financial year. To support Queensland farmers during the COVID-19 pandemic, the Queensland government decided to maintain irrigation prices at 2020 levels except if the QCA had recommended price decreases.
- The QCA investigated the potential longer-term impacts of dam safety upgrades on the share of costs recovered from irrigators and recommended that, although dam safety upgrade costs should be considered a normal cost of operating a water supply scheme, the costs of dam safety upgrades should be shared with the broader community in those cases where dams provide a formal flood mitigation service.

¹⁴ IPART define a customer’s capacity to pay as the dollar amount above which that customer would not purchase water.

-
- The Queensland Government accepted the QCA’s recommendation but, due to customer affordability concerns, rejected the pricing proposal and instead agreed to fund all dam safety upgrade costs through a transparent government CSO, rather than recover any share of costs from irrigators. Previously, the water supply businesses were required to absorb dam safety upgrade costs without a transparent CSO.

The Commission also notes that the recently re-elected Queensland government has a policy commitment to reduce irrigation charges from state-owned irrigation schemes by 50 per cent for fruit and vegetable growers and 15 per cent for all other users from 1 July 2021 (Queensland Labor 2020).

In Western Australia and Tasmania, there is limited information publicly available for assessing irrigation pricing outcomes as prices are not subject to regular review by an economic regulator. The Commission notes that:

- In Western Australia the ERA’s latest pricing inquiry¹⁵ estimated that irrigation customers contribute less than 30 per cent towards the estimated efficient cost of supply. The Western Australian government pays a CSO to the Water Corporation for regional services which includes, but is not limited to, irrigation.
- Tasmanian Irrigation receives grants for operational funding to support operations that give rise to capital expenditure. While it is not possible to verify from publicly available data sources how this funding is spent, the Tasmanian Government stated to this inquiry that all scheme operating, maintenance and renewal costs are met through charges levied on irrigation scheme participants. The Tasmanian Government has also made significant contributions directly for new capital since 2017 (section 3.2).

It is not possible at this stage to assess the degree to which South Australia’s Northern Adelaide Irrigation Scheme is recovering costs. The Commission notes that as of December 2020, there were unsold water entitlements.

Where prices are below cost recovery, transparent subsidies should be paid to ensure total revenue is cost reflective. Across the jurisdictions, there is significant variation in how operating subsidies are reported (table 3.4).

The Commission’s view

New South Wales and Victoria have made the most progress towards efficient cost recovery for government-owned rural water service providers. In these jurisdictions, independent economic regulators have the power to set or determine water prices at levels that reflect efficient cost recovery.

¹⁵ 2016 Inquiry into the Efficient Costs and Tariffs of the Water Corporation, Aqwest and Busselton Water (final report published November 2017) (ERA (WA) 2017).

Queensland water service providers have, until recently, been transitioning towards cost recovery. However, decisions in 2020 by the Queensland Government to not increase prices and not charge irrigators for dam safety costs have slowed the transition towards cost-reflective pricing. The use of transparent CSOs at least ensures that non-irrigator customers are not cross-subsidising irrigators in circumstance such as these.

Table 3.4 Reported operating subsidies for irrigation services

Jurisdiction	Comments
New South Wales	Explicit operating subsidies are paid to WaterNSW to ensure full cost recovery for irrigation services in the North Coast and South Coast valleys. Government grants are paid for public benefit services (cost shares are determined by IPART).
Victoria	Prices are determined as cost reflective by the ESC so there is no need for operating subsidies for irrigation services. However operating grants are paid by the Victorian government for contracted services.
Queensland	Explicit community service obligation payments are made for irrigation services to ensure cost recovery.
South Australia	No explicit operating subsidies are paid for the new Northern Adelaide Irrigation Scheme.
Western Australia	A community service payment is paid to Water Corporation for 'Country Water, Sewerage and Drainage Operations' which includes bulk water services to irrigation distribution networks.
Tasmania	No explicit operating subsidies are paid for Tasmanian Irrigation's irrigation services. Tasmanian Irrigation receives grants for operational funding to support operations that give rise to capital expenditure.

Commitments made during the 2020 Queensland state election campaign (to reduce water prices for irrigation customers, where reductions are based on the type of agricultural activity undertaken) are of potential concern. The returning Labor government committed to a 50 per cent price cut for fruit and vegetable growers and a 15 per cent reduction for other users within the same network. Not only does this policy imply a degree of cross-subsidisation, but charging differential prices based on end use (where different end uses do not affect the cost of supply) would represent a clear deviation from the NWI principle of cost-reflective pricing.

It is not yet clear if and how these pricing reductions will be implemented, and how this will affect the efficient provision of irrigation infrastructure in Queensland in the long term. If price reductions do not differentiate between users, and are solely a result of changing water pricing methodologies from the current renewals annuity approach to an RAB approach (as examined by the QCA in its rural irrigation price review 2020–24 (QCA 2020a, pp. 79–83, 2020b, pp. 22–25)), then these reductions could still be consistent with the *NWI Pricing Principles*, and would align pricing methodologies with government-owned rural water providers in New South Wales, Victoria and Queensland. Stylised analysis undertaken by the QCA for Sunwater in its 2020 price review shows that such a transition could result in a 50 per cent reduction in Sunwater revenue requirements for 2021–22 (QCA 2020a, p. 81), although, in the longer term, prices would need to be higher under an RAB approach to fund an equivalent level of asset renewal and expected costs.

More transparent information is needed on prices and costs for irrigation services in Western Australia or Tasmania to assess whether actual revenues are sufficient to fund efficient asset renewal. In 2017 the Commission noted that the costs of implementing a formal, ongoing price setting or review function for irrigation services in Western Australia or Tasmania may exceed any efficiency gains due to the modest size of those operations. Putting aside the appropriate level of regulation in these jurisdictions, increased transparency is needed to assess whether pricing (with appropriate subsidies) covers operating costs and allows for efficient infrastructure renewal.

Transparency of price and cost information, as well as any subsidies paid, should also be a priority for the new Northern Adelaide Irrigation Scheme in South Australia. This includes reporting on unsold water entitlements from new infrastructure, as these can amount to an implicit subsidy (PC 2017, p. 257).

Jurisdictions with independent economic regulators (New South Wales, Victoria and Queensland) set or recommend prices or revenues include provisions for new assets or asset renewal commensurate with a commercial rate of return (in line with the requirements for full cost recovery of ‘new capital expenditure’ in the 2010 *NWI Pricing Principles* which excludes assets contributed by governments).¹⁶ Regulators in all three jurisdictions also usually review the prudence and efficiency of recent investments, which is important for ensuring that service providers, rather than irrigators, bear the brunt of poor investment decisions (see section 3.2 below).

While economic regulation brings a number of benefits, such as transparency of investment decisions, the ‘depoliticisation’ of pricing decisions and improved efficiency, it will not deliver the objectives and outcomes sought under the NWI on its own. For example, the benefits of independent scrutiny of capital expenditure are undermined when governments make poor decisions on grant funding for infrastructure (SP I *Infrastructure*).

The Commission notes concerns of the National Irrigators Council (sub. 13, p. 4) and New South Wales Irrigators Council (sub. 27, p. 20) about the potential for cross-subsidisation between governments and private irrigators for public good services provided by bulk water suppliers. The Commission is generally supportive of the ‘impactor pays’ approach taken by IPART (PC 2017: section 8.2), and supports regular reviews of costs as part of water pricing determination processes.

The Commission supports transitioning distribution networks to local ownership if it is advanced on the initiative of irrigators, and is expected to improve outcomes. The viability of any transition to local ownership and management is dependent upon whether irrigators can demonstrate a collective ability to manage their network. Further, as long-term users of a distribution network, irrigators are often best placed to make a judgment on whether their management of the network would be beneficial. However if current economic regulation regimes are well-functioning and support efficient prices, prudent capital expenditure

¹⁶ See Principle 1: Cost recovery for new capital expenditure.

decisions and incentivise operational efficiency, then transferring distribution networks to local ownership and management may not bring material gains.

In summary, jurisdictions have partially achieved the relevant NWI outcomes. All jurisdictions have stated policies to achieve or transition to prices that cover operating costs and provided for asset renewal. However, more transparent information is needed from those jurisdictions that do not have an economic regulator involved in price-setting processes. While it is clear that providers in New South Wales and Victoria have largely achieved full cost recovery, the transition to full cost recovery in Queensland has slowed and is at risk of backsliding. A lack of data in other jurisdictions means it is not possible to assess whether actual revenues are sufficient to fund efficient asset renewal. Independent economic regulation should be reconsidered if the benefits (including increased transparency) outweigh the costs. Transitioning distribution networks to local ownership may also support improved outcomes.

User-owned irrigation distribution networks

Pricing processes and regulation

There are no requirements for economic regulation of user-owned irrigation networks under the NWI and there are no user-owned irrigation networks subject to formal price regulation. However for networks within the Murray–Darling Basin, as of July 2020, operators are subject to ‘light handed regulation’ under the *Water Charge Rules 2020* which are administered by the ACCC (see the assessment for government owned rural water providers above for further information). Networks outside the Murray–Darling Basin are generally unregulated. In Western Australia, the State Government can request the ERA to review prices.

The Commission’s view

Under the NWI, user-owned networks are (like government owned networks) required to achieve full cost recovery. While it is important that user-owned networks set prices and operate efficiently, the Commission has not directly considered the pricing outcomes where distribution networks are user-owned. This is because it is generally accepted that there are sufficient incentives for user-owned distribution networks to operate efficiently, reflect the associated costs in prices and maintain the infrastructure network (ACCC 2016).

The Commission’s 2017 inquiry highlighted the benefits of local ownership (PC 2017: section 7.5) including:

- improvements in productivity, accountability and responsiveness to users, and long-term planning within networks
- more efficient allocation of risks (including the potential for, and costs of, a distribution network’s financial failure) among those parties best placed to manage them.

For user-owned networks, there is no specific requirement for economic regulation under the NWI. However, these networks do have a degree of market power and it can still be in the interest of networks to engage in discriminatory behaviour against selected customers, such as those seeking to permanently trade water out of a network. (This incentive can also exist for government owned networks).

Regulations are in place within the MDB to limit the exercise of that market power in price setting and have recently been subject to extensive review by the ACCC (2019). Although these arrangements do not apply outside the MDB, the Commission has not been made aware in the course of this inquiry of concerns about privately-owned irrigation networks outside the MDB exercising market power.

In conclusion, the pricing outcomes for user-owned networks have not been directly considered. However, these networks have incentives to price efficiently to ensure financial viability. And while the economic regulation provisions of the NWI are not directly applicable to these networks, many networks (largely in the MDB) are nonetheless subject to a degree of economic oversight which should further limit the exercise of market power.

On that basis, the Commission has not made a judgement on whether the best practice pricing and economic regulation outcomes under the NWI have been achieved for user-owned networks, but does not see a material risk of adverse outcomes under existing arrangements.

Cross-jurisdictional service providers

Pricing processes and regulation

River Murray operations comprise the collective activities of the Murray–Darling Basin Authority (MDBA) and ‘State Constructing Authorities’ to deliver River Murray water shares to New South Wales, Victoria and South Australia. These activities include renewing and maintaining the suite of River Murray water storage and delivery assets, operating these assets to deliver water shares and environmental outcomes, accounting for interstate water trade, and the operation of Salt Interception Schemes. The budget for River Murray operations is determined by the MDB Ministerial Council. Operating and maintenance costs are shared by the River Murray jurisdictions (New South Wales, Victoria and South Australia) and are calculated under cost sharing rules established in the MDB Agreement (Aither 2017). The Australian Government generally covers 25 per cent of both the cost to investigate the need for infrastructure works and the cost of any works, with the remaining cost shared by the states in proportion to their water entitlements and use.

The Dumaresq–Barwon Border Rivers Commission (BRC) was established by an agreement between the New South Wales and Queensland governments. It is responsible for controlling the operation and maintenance of bulk water infrastructure within the Border Rivers which straddle the New South Wales and Queensland border (including Glenlyon Dam and Boggabilla Weir). The BRC has arrangements with Sunwater to provide asset facility management services and with WaterNSW to provide river management services on its

behalf (BRC 2019, p. 10). The BRC is funded through equal contributions from the New South Wales and Queensland Governments.

There is no independent oversight of the efficiency and prudence of costs for River Murray operations or the BRC (although Basin State Governments, as owners, provide a degree of scrutiny over River Murray operations). However, those costs are not automatically passed on to water entitlement holders, with cost sharing approaches differing by jurisdiction (table 3.5). In New South Wales and Victoria, independent economic regulators provide some indirect oversight.

Table 3.5 Pass through costs from cross-jurisdictional providers

Jurisdiction	Comments
New South Wales	IPART determines what proportion of costs are passed in WaterNSW infrastructure charges (with remaining costs being met by the NSW Government).
Victoria	The Essential Services Commission (ESC) provides for the recovery of River Murray operations costs from Victorian irrigators (and other entitlement holders) through infrastructure charges.
Queensland	Water charges for Border Rivers water supply scheme customers are specified under schedule 14 of the Water Regulation 2016 (Qld). The substantive basis of these charges and the extent to which they reflect recovery of costs for BRC activities is unclear.
South Australia	There is no mechanism for direct recovery of River Murray Operating costs. To support water-related expenditure, including for River Murray operations, the South Australian Government relies upon a combination of cost recovery from SA Water and cost recovery from the Murraylands and Riverland Landscape Board.

The Commission's view

Current arrangements mean that governments directly provide funding for cross-jurisdictional services providers, with varying degrees of cost pass through to irrigators. To be assured of the ongoing delivery of River Murray operations at an acceptable service standard, irrigators (along with other entitlement holders) should fund those activities.

More transparency is needed in how and which costs are passed through to irrigators, particularly in Queensland and South Australia. Existing state-based regulators have the expertise to take a leading role in scrutinising pass-through costs from cross-jurisdictional providers. Economic regulators are best placed to review the prudence and efficiency of costs passed on to entitlement holders, and already provide some indirect scrutiny through existing price setting processes in New South Wales and Victoria. Coordination between jurisdictional regulators is important to support the consistent pass through of costs to entitlement holders regardless of where those entitlements are held.

In summary, jurisdictions have partially achieved the relevant NWI outcomes. The transparency of cost pass-through arrangements for cross-jurisdictional service providers can

be improved. Existing economic regulators are well placed to ensure that only efficient costs are passed through to water users.

3.2 Investment in new or refurbished infrastructure

Jurisdictions agreed under the NWI that investment in new or refurbished water infrastructure would only proceed where assessed as economically viable and ecologically sustainable prior to the investment occurring.¹⁷ The NWI did not prescribe any additional actions to support the delivery of these outcomes.

The Commission has considered this action separately for the urban and rural water sectors — noting that, although some rural infrastructure provides water for regional towns and cities, most projects are primarily designed to supply water for agriculture.

Urban water

A range of institutional elements can support investment in economically viable and ecologically sustainable urban water infrastructure. These include:

- governance arrangements that promote robust decision making by service providers
- clear institutional responsibilities around investment planning processes
- rigorous independent review of investment decisions to ensure economic viability, including in cases of government investment
- independent assessments to ensure ecological sustainability (including environmental impact assessments)
- government subsidy programs that do not distort investment decisions.

In 2017, given the multiplicity of elements that affect investment decisions, the Commission elected not to provide a definitive judgment on whether the NWI action relating to economically viable and ecologically sustainable infrastructure investment was being achieved in the urban water sector.

Although large corporatised service providers (where subject to oversight from economic regulators) were likely to be making prudent decisions and recovering costs from users, the Commission noted some shortcomings in decision-making frameworks and their encompassing governance frameworks, and recommended that decision making for new urban water infrastructure could be made more robust by:

- extending economic regulation to retailer–distributors in south-east Queensland and the main provider in the Northern Territory to improve scrutiny of major investment decisions

¹⁷ NWI paragraph 69.

-
- enhancing regulatory process for bulk water in south-east Queensland and urban water in Western Australia
 - clarifying supply augmentation arrangements in many places, including metropolitan New South Wales, South Australia, Western Australia, Tasmania, the Northern Territory and the ACT
 - reforming capital grants to local government-owned service providers in regional New South Wales and Queensland into CSO payments, consistent with the NWI (PC 2017, p. 420).

Developments since 2017

Since 2017, jurisdictions have made or commenced a number of changes to their decision-making frameworks for new urban water infrastructure in major cities.

- New South Wales is developing a *Greater Sydney Water Strategy* to replace the 2017 *Metropolitan Water Plan*.
- The South Australian Government plans to publish a Water Security Statement in 2021 to provide an overview of water security status for key population centres and water resources in South Australia, as well as identifying strategic priorities for enhancing water security across the state.
 - A priority action is to develop an Urban Water Directions Statement that sets a state framework for optimising the use of all urban water sources in a way that aims to support growth, greening and liveable towns and cities, and more efficient and cost-effective water use, as well as the release of water for productive use outside of urban areas.
- The Western Australian Government and the Water Corporation have renewed aspects of their planning arrangements for Perth's water supply, including the government's 2019 *Water Wise Perth Action Plan* and the Water Corporation's 2019 *Water for Life* plan.
- Tasmania has developed a preliminary *Greater Hobart Strategy*, which maps out water supply requirements over the next 30 years.
- The Northern Territory is developing a detailed business case to update the Power and Water Corporation's *Darwin Region Water Supply Strategy*, which includes a \$2 million commitment from the Australian Government to assess options to meet demands in the region.
 - The Northern Territory also released a *10 Year Infrastructure Plan* in 2017, which outlines a range of urban water infrastructure priorities for government investment. The report is updated annually, most recently in 2019 (Northern Territory Government 2019).
- In the ACT, Icon Water published a *Source Water Strategy 2018-2030* in June 2018. The strategy outlines how Icon Water will meet the ACT Government's level of service

requirement, including determining when supply augmentation investments will be considered to meet projected needs (Icon Water 2018).

No significant changes have been reported for metropolitan supply augmentation planning in Victoria or Queensland.

However, Queensland has progressed a number of major urban water supply initiatives, including the Townsville pipeline from the Burdekin-Haughton Water Supply Scheme, Rookwood Weir on the Fitzroy River, and ongoing activities to recommission the Western Corridor Recycled Water Scheme in south-east Queensland if drought conditions continue.

There have also been developments in how some jurisdictions plan for and fund urban water infrastructure in regional and remote communities.

- Changes made in 2018 to broaden New South Wales' *Safe and Secure Water Program* allow for non-infrastructure projects to be funded, although program criteria have been changed to remove the need for a positive benefit–cost ratio for projects (DPIE (NSW) 2020a). Funding is now allocated based on an assessment of water supply risk, and funding can be provided for non-infrastructure purposes, such as helping utilities to develop local water supply plans that guide investment priorities.
- The Queensland Government has provided a range of capital grants for water projects under the \$120 million *Indigenous Councils Critical Infrastructure Program* (announced in 2017–18 state budget) and the 2019–21 round of *Works for Queensland*.
- In the Northern Territory, the Power and Water Corporation has developed a \$7 million rolling capital program (over five years) to ensure water supply security to remote communities. This includes investing in water source investigations, bulk metering and smart metering, demand management and water quality improvements.

Investment decision-making frameworks for urban water service providers are summarised in table 3.6.

Jurisdictions have also provided the Commission with information on specific government investments in major urban water infrastructure. This has been drawn on below.

The Commission's view

As in 2017, the many elements that affect urban water investment decisions make it unrealistic for the Commission to undertake a definitive assessment of progress against this NWI requirement. Ultimately, efficient investment (by both governments and service providers) derives from good governance frameworks, with robust and transparent decision-making processes that, among other things, avoid the politicisation of decisions. Independent economic regulation provides substantial scrutiny in ensuring that investment decisions made by urban water service providers are in the interests of their customers (section 3.1). And project approval processes ensure that major infrastructure development is ecologically sustainable.

Table 3.6 Investment decision-making frameworks: urban

		Arrangements in 2017	Changes since 2017
NSW	Metro	- Service providers are corporatised. - Investments are subject to independent economic regulation. - Planning for Greater Sydney and the Hunter regions occurs through metropolitan water planning processes coordinated by the NSW Government.	A <i>Greater Sydney Water Strategy</i> is under development to replace the <i>Greater Sydney Metropolitan Water Plan</i> .
	Regional	- Most providers owned by local government, only some providers subject to economic regulation - Investment plans in accordance with NSW Best Practice Management Framework. - Number of capital subsidies provided.	Criteria for the Safe and Secure Water Program amended to remove capital requirement.
Vic		- Service providers are corporatised. - Planning occurs through Urban Water Strategies. - Investments are subject to independent economic regulation.	No changes.
	Metro	- Some service providers are corporatised, while others operate as part of local government. - Investments are subject to limited scrutiny by economic regulator. - Bulk water planning undertaken in accordance with chapter 2A of the <i>Water Act 2000</i> (Qld).	No changes.
Qld	Regional	- Most providers owned by local government, no economic regulation. - Number of capital subsidies provided.	New capital subsidies available under the <i>Indigenous Councils Critical Infrastructure Program and Works for Queensland</i> .
		- Service providers are corporatised. - Investments subject to scrutiny by economic regulator. - Planning arrangements are not formalised.	Updates to government and corporation plans.
WA		- Service provider is corporatised. - Investments subject to independent economic regulation. - Unclear planning arrangements.	SA Government plans to publish a <i>Water Security Statement</i> in 2021.
SA		- Service provider is corporatised. - Investments subject to independent economic regulation. - Informal planning arrangements.	Formal water security planning in progress for Hobart.
Tas		- Service provider is corporatised. - Investments not subject to independent scrutiny. - Informal planning arrangements.	Darwin water security planning being updated in partnership between utility and government.
NT		- Service provider is corporatised. - Investments subject to independent economic regulation. - Informal planning arrangements.	Water security plan published in 2018.
ACT		- Service provider is corporatised. - Investments subject to independent economic regulation. - Informal planning arrangements.	

Sources: PC (2017, p. 419); responses to State and Territory information requests.

A number of jurisdictions have improved (or are in the process of improving) their planning frameworks for major cities. Metropolitan planning is being formalised in Tasmania, the ACT and the Northern Territory, while New South Wales is preparing a new *Greater Sydney Water Strategy*. No substantive changes have yet been made to better formalise supply augmentation arrangements in South Australia or Western Australia.

Progress towards removing capital grants in regional and remote communities is more mixed. As the Commission outlined in 2017, providing capital grants can distort decision making in new infrastructure and lead to suboptimal investment decisions.

- Although the 2018 changes to New South Wales' *Safe and Secure Water Program* reduce the scope for capital subsidies to distort regional utility decision-making, they fall short of a transparent CSO payment as required by the NWI. Projects that are not economically viable (that is, have a negative benefit–cost ratio) are eligible for funding under the program.
- A number of capital subsidies are still provided to Queensland local governments, including under the *Works for Queensland* program. State Government grants for water-related projects have totalled \$161 million over the past three years. These are also inconsistent with the NWI, and may not represent efficient investment decisions.

Independent economic oversight is an important tool for ensuring scrutiny over infrastructure investment decision-making, and in 2017 the Commission recommended improvements to those arrangements. However, there has been no change in the economic regulation of urban water service providers in south-east Queensland, Western Australia or the Northern Territory.

Further, at least one of the major urban investments highlighted to the Commission appears to be inconsistent with the NWI. The Queensland Government has committed \$410 million in grant funding across all stages of the Houghton Pipeline Duplication Project. However, the business case concluded that delivering Stage 1 and Stage 2 of the project concurrently would deliver an expected benefit–cost ratio (BCR) of 0.3, while delivering Stage 2 on its own would have a BCR of 0.5 (Jacobs Australia 2019, p. 196). Neither option meets the NWI criteria of economic viability.

An alternative option of reforming Townsville's residential water tariffs into an NWI-consistent two-part tariff to reduce demand was estimated to provide an indicative BCR of 2.0, but this has not been implemented. Infrastructure Australia's evaluation of the business case concluded that:

... constructing the Stage 2 works would not provide additional water security to Townsville. Furthermore, residential water bills could increase by up to 8% per year and non-residential customer bills by up to 9% per year to help fund the project. (IA 2020, p. 1)

In SP F *Urban*, the Commission noted the importance of both robust system planning and independent economic oversight in ensuring urban water investment decisions are efficient. Enhancing the NWI in those respects would support improved decision-making for major water infrastructure investments.

For regional and remote urban water services, jurisdictions should ensure that government subsidies for high-cost regional services are not limited to capital expenditure, which will help avoid uneconomic investments in urban water infrastructure for regional and remote communities (*SP G Regional*).

Overall, the Commission's view remains that this requirement of the NWI is only partly achieved. Although some jurisdictions have improved their decision-making frameworks, a small number of major projects appear to be inconsistent with the NWI, and no changes have been made to the coverage of economic regulation.

Rural water

In 2017, the Commission considered that high-quality infrastructure decision-making processes included:

- establishing the viability of new infrastructure through cost–benefit analysis
- a limited role for government in projects where the benefits created are largely private in nature, in order to avoid imposing costs on taxpayers and to manage the risk of subsidised infrastructure distorting trade and investment decisions
- risk management measures to ensure the water made available through new infrastructure is taken up and put to productive use to generate the anticipated benefits and to limit the risk to taxpayers of footing the bill for under-utilised infrastructure
- a level of assurance (through an economic regulator) that the charges for access to and use of new infrastructure deliver efficient outcomes.

However, in 2017, the Commission concluded that ‘the role of government in the commissioning of new irrigation infrastructure is an area requiring improvement in all jurisdictions’ (PC 2017, p. 423).

The Commission's approach

As highlighted in section 3.1, most rural water service providers are subject to independent economic regulation, or owned by users. Both arrangements provide significant scrutiny (and incentive) to ensure that service providers make investment decisions in the interests of their customers.

For rural water, the Commission has instead focused on government investments in major water infrastructure, where these are designed to provide water for agriculture.

Building off previous assessments (NWC 2014; PC 2017), the Commission has considered the following criteria in assessing whether government funding or financing of water infrastructure complies with the NWI.

- Commitment to full cost recovery from users, with any government grants or subsidies transparently reported and limited to the extent of public benefits provided by a project.

-
- Economic viability demonstrated through cost–benefit analysis (with a robust benefit–cost ratio greater than one), with the analysis published to allow assumptions to be scrutinised.
 - NWI planning and entitlements frameworks in place prior to the project being constructed, and NWI compliance a condition of government funding.

Developments since 2017

A number of jurisdictions have made significant changes to decision-making frameworks for government funding of major water infrastructure for agriculture.

- The Australian Government established the National Water Grid Authority (NWGA) in October 2019. The NWGA is responsible for coordinating the Australian Government’s \$3.5 billion National Water Infrastructure Development Fund (NWIDF), a rolling 10-year water infrastructure program focused on improving water security for primary industry. Australian Government investment in national water infrastructure now occurs in accordance with the NWGA’s October 2020 *Investment Policy Framework* (NWGA 2020b).
 - In December 2020, the Australian Government announced that the threshold for Infrastructure Australia to evaluate a major infrastructure project would be raised from \$100 million of Australian Government funding to \$250 million (Morrison 2020).
- The New South Wales Government has updated its *Business Case Guidelines* and the *NSW Infrastructure Investment Assurance Frameworks* for government infrastructure investments.
 - The NSW Government is also developing 12 Regional Water Strategies, which are non-statutory ‘roadmaps’ that bring together contemporary climate evidence with other tools to plan for and manage the water needs of urban and rural water users in regional NSW. The draft strategies consider a range of options (including infrastructure) to address the strategy objectives, with a recommended portfolio included in the final strategies.
- The New South Wales Government passed the *Water Supply (Critical Needs) Act 2019* which, in addition to facilitating the delivery of emergency water supplies to certain towns and localities, also declares certain dam developments as ‘critical State significant infrastructure’. The Act nominated four dam projects for expedited development, being the:
 - Wyangala Dam wall raising (Lachlan River)
 - Mole River Dam (Border Rivers)
 - Dungowan Dam (Peel River)
 - Western Weirs program (Barwon-Darling and Lower Darling Rivers).

-
- In Queensland, the *Building Queensland Business Case Development Framework* ensures a consistent and rigorous approach to proposal development, including for water infrastructure, enabling decision makers to compare investment opportunities. The framework integrates with other frameworks and infrastructure investment systems at both State and national levels. It is scalable and can be applied to all infrastructure proposals.
 - The *Queensland Bulk Water Opportunities Statement* was first published in 2017 and has been updated each year since. It outlines Queensland’s strategic bulk water infrastructure priorities across both urban and rural water. The *Building Queensland Business Case Development Assessment Framework* also aims to ensure a consistent and rigorous approach to proposal development, allowing decision makes to compare proposals. The framework is designed to integrate with frameworks at both State and Australian Government levels for projects of all sizes.
 - The Department of Natural Resources, Mines and Energy also published guidance on *Assessing Demand for Water: Guidance for project proponents* to improve the quality of business cases and support best practice water demand assessment (DNRME (Qld) 2020b). This document is available online.
 - The Queensland Government has chosen to publish feasibility assessment and business cases for projects funded under the Australian Government’s NWIDF.
 - In South Australia, there have been no changes to rural water infrastructure funding arrangements since 2017, but Infrastructure SA’s *20-year State Infrastructure Strategy* (published in May 2020) outlines high-level priorities for water infrastructure development, including water for agriculture, and its *Infrastructure Assurance Framework* aims to ensure infrastructure is well-planned and delivers the intended community benefits.
 - In 2019, the Northern Territory Government adopted the *Northern Territory Project Development Framework*, which establishes an approach to capital project assessment (including water projects) where government contributions (financial and otherwise) exceed \$30 million.

No significant changes to rural infrastructure decision-making frameworks were reported in Victoria, Western Australia or Tasmania.

Jurisdictions have also provided information to the Commission on government investments in major rural water infrastructure made since 2017 (table 3.7).

The Commission’s view

In 2017 the Commission noted the mixed performance of jurisdictions against the NWI commitment for new or refurbished infrastructure.

Table 3.7 Government investments in major rural water infrastructure since 2017

More than \$5 million of government funding or financing committed

Project name and jurisdiction	Government funding contribution	Cost–benefit analysis undertaken and published	Subject to independent scrutiny	NWI compliance ^c
Southern Forests Irrigation Scheme (WA)	WA: \$17.5m Cth: \$39.72m	Yes, but unpublished BCR: 2.2	No	Yes
South West Loddon Rural Water Supply Project (Vic) ^a	Vic: \$40m ^b Cth: \$20m ^b	Yes, but unpublished BCR: 1.4	No	Yes
East Grampians Water Supply Project (Vic)	Vic: \$32m ^b Cth: \$32m ^b	Yes, but unpublished BCR: 2.2	No	Yes
Western Irrigation Network (Vic)	Vic: \$65.62m Cth: \$48.07m	Yes, but unpublished BCR: 2.03	Yes economic regulator	Yes
Northern Adelaide Irrigation Scheme (SA)	SA: \$110m Cth: \$45.6m	Yes, but unpublished BCR not provided.	Yes economic regulator	Yes
Willunga Basin Water Expansion (SA)	Cth: \$2.5m	Not provided	Not provided	Not provided
North Esk Irrigation Scheme (Tas)	Tas: \$11.5m ^d Cth: \$18.9m	Yes, but unpublished BCR: 1.3	Yes Infrastructure Australia	Yes
Scottsdale Irrigation Scheme (Tas)	Tas: \$32m ^b Cth: \$25.3m	Yes, but unpublished BCR: 1.3	Yes Infrastructure Australia	Yes
Rookwood Weir (Qld) ^a	Qld: \$176.1m Cth: \$176.1m	Yes, published BCR: 0.6-0.8	Yes Infrastructure Australia Building Queensland	Yes
Granite Belt Irrigation Project (Qld)	Qld: \$13.6m Cth: \$42m	Yes, published BCR: 1.47	No	Yes
Mareeba Dimbulah Water Supply Scheme Improvement Project (Qld)	Cth: \$11.6m	Yes, but unpublished BCR: 1.79	No	Yes
Dungowan Dam (NSW) ^a	NSW: \$242m Cth: \$242m	Analysis in progress	Unknown	Unknown
Wyangala Dam wall raising (NSW)	NSW: \$325m Cth: \$325m	Analysis in progress	Unknown	Unknown

^a Project was previously notified to the Commission in 2017. ^b Finance provided as equity rather than a grant. ^c Whether or not government financial support was conditional on the project being compliant with the NWI. ^d includes contribution from irrigators. **BCR**: Benefit–cost ratio.

Sources: Responses to State and Territory information requests, IA (2015, 2017); NSW Government, sub. 41; NWGA (2020a).

Ensuring that new rural water infrastructure is consistent with NWI planning and entitlement frameworks, along with State, Territory and Australian Government environmental approval processes, is generally sufficient to meet the NWI requirement of ‘ecologically sustainable’,

and also helps support the viability of new infrastructure by promoting investor confidence through certainty around water entitlement and planning arrangements.

NWI compliance remains part of the eligibility criteria for funding under the NWIDF — although it is not an explicit criterion for financing under the Northern Australia Infrastructure Fund. All rural water projects reported to the Commission were required to comply with the NWI to receive government financial support (although this does not necessarily imply that those projects will fully recover costs from users). Although as highlighted by the Institute for Water Futures (sub. 30, p. 16), there is inadequate information publicly available to independently confirm NWI compliance for many Australian Government-funded projects.

Inquiry participants have noted that governments have committed to some projects without meeting the requirement for economic viability.¹⁸ Generally, economic viability requires a benefit–cost ratio greater than 1. Although most reported projects meet this requirement, some do not, and some do not have published BCRs.

As in 2017, the Commission remains concerned about the quality and transparency of project assessment processes in assuring ecological sustainability and economic viability. Projects with positive but marginal benefit–cost ratios are not necessarily economically viable if the assumptions underpinning the analysis are not robust. As discussed in *SP I Infrastructure*, such projects should not be considered as ‘economically viable’ unless supported by appropriate risk and sensitivity analyses that account for the possibility of key assumptions not holding, particularly in regard to demand for water.

All government-funded rural water projects notified to the Commission in 2017 were assessed as providing net benefits (as determined by a benefit–cost ratio), but most of the underpinning analyses had not been published, making it impossible to scrutinise their quality. Nor could the underpinning assumptions be evaluated — leaving uncertainty over whether they were overly-optimistic and would lead to uneconomic investments.

Government funding has been committed to at least one rural project (previously reported to the Commission) that is unlikely to be economically viable, based on a business case published since 2017 — Rookwood Weir. Other government funding commitments have been made prior to the development of business cases and environmental assessments, which gives little confidence that those projects will be economically viable, or that governments will not proceed with the projects if business cases demonstrates that they are not in the interests of the community (box 3.4). (*SP I Infrastructure*: Box 3 also outlines concerns with the feasibility study undertaken for the Dungowan Dam project).

Independent scrutiny of project selection remains important to ensuring that business cases are robust and projects are likely to deliver the anticipated benefits. The raising of

¹⁸ IWF, sub. 30, pp. 16-17; Smit et. al., sub. 31, p. 3; AFA, sub. 45, pp. 9-10; WWF Australia, sub. 50, pp. 8-10; EDO, sub. 54, p. 16; Lifeblood Alliance, sub. 70, pp. 27-8.

Infrastructure Australia's evaluation threshold from \$100 million to \$250 million from 2021 will mean fewer major water projects are subject to that evaluation.

Box 3.4 **Major government-funded rural water infrastructure projects**

Rookwood Weir (Queensland)

In 2016, the Australian Government committed \$130 million to fund the construction of Rookwood Weir (also known as the Lower Fitzroy River Infrastructure Project) (Building Queensland 2017, p. 12). The project aims to provide water security for agriculture, and support industrial and urban water use in the Gladstone, Capricorn Coast and Rockhampton regions (NWGA 2020c, p. 3). Although funding had already been committed, a benefit–cost ratio was not provided to the Commission in 2017 as the analysis had not yet been completed (PC 2017, p. 422).

The detailed business case was published in January 2018, and highlighted a range of uncertainties in the estimates. It concluded that the best estimate of project outcomes would deliver a benefit–cost ratio of 0.6 (with a 7 per cent discount rate) (Building Queensland 2017, p. 144). In April 2018, the Australian Government agreed to increase its funding contribution to \$176.1 million (McCormack et al. 2018).

In June 2018, Infrastructure Australia evaluated the business case and concluded that the costs of the project were likely to exceed the benefits (IA 2018). It further noted the significant downside risks in the estimated agricultural demand for the project, and that:

The short-term need to provide an additional 4,000 megalitres (ML) of water to the Livingstone Shire Council region does not currently require the construction of a weir which could provide 76,000 ML each year. (IA 2018, p. 1)

Wyangala Dam Wall Raising (New South Wales)

A \$650 million project to raise the Wyangala Dam wall was considered as an option to improve water availability as part of WaterNSW's *20 Year Infrastructure Options Study* (WaterNSW 2018). The purpose of the project is to improve water security, drought resilience and flood management in the Lachlan catchment (WaterNSW 2020).

The Australian and New South Wales Governments committed to fund the project during 2019, including the development of a business case and pre-construction works (WaterNSW 2020). The draft *Lachlan Regional Water Strategy* includes the project as a commitment, but does not comment on its merits (DPIE (NSW) 2020d).

A detailed business case is under development but has not yet been released. Regardless of this, pre-construction works were scheduled to commence in late 2020.

However, the NWGA's October 2020 *Investment Policy Framework* (NWGA 2020b, p. 4) aims to address some of these project selection issues for new projects funded by the Australian Government. It aims to set a consistent approach on the assessment and selection of water infrastructure projects for Australian Government funding under the NWIDF, including through economic assessments. It also looks to establish stronger partnerships with State and Territory Governments on project identification.

The Framework's investment principles include that:

- projects should be of demonstrable public benefit and have a national interest element

-
- projects should align with the NWI principles including appropriate cost recovery, and where full cost recovery is not deemed feasible, any subsidies are fully transparent
 - if providing capital, a consistent, robust analysis of costs and benefits is used and assessment of appropriate funding and financing arrangements is undertaken.

Summary

Government funding or financing for rural water infrastructure projects that primarily generate private benefits (even where there is a minor public interest element) detracts from achievement of the NWI's objectives (although the NWGA Framework is clear that projects supplying water for the exclusive use of a private business or individual will not be eligible for funding).

Although many elements of the NWGA's *Investment Policy Framework* represent positive steps, it remains to be seen how effectively it is applied to future projects, and so it does not form part of the Commission's current assessment of progress. The Commission will assess the implementation of the framework in its next review in 2023.

The Commission remains most concerned about government funding for projects that are not economically viable, and about the quality of business cases for major rural water infrastructure more generally. There remains a risk of major developments being funded by governments that are underutilised, do not provide net benefits to the Australian community, and ultimately impose a range of long-term costs on water users, communities and taxpayers.

Many of these concerns are similar to those expressed in 2017 — and a number of projects committed to by governments since that inquiry present further concerns. The Commission's view is that this aspect of the NWI remains partly achieved, and that the commitment of funding to unviable projects represents backsliding since 2017.

These concerns, along with the case for renewal of this aspect of the NWI, are considered in *SP I Infrastructure*.

3.3 Cost recovery for water planning and management activities

An intended outcome of the NWI is to promote economically efficient and sustainable use of government resources devoted to the management of water.¹⁹ To support achievement of this outcome, the NWI requires jurisdictions to:

- bring into effect consistent approaches to pricing and attributing costs of water planning and management, including the identification of all associated costs (including those underpinning water markets) as well as the proportion of costs that can be attributed to water access entitlement holders

¹⁹ NWI paragraph 64(i)(c).

-
- report publicly on cost recovery for water planning and management as part of annual reporting requirements.²⁰

The 2010 *NWI Pricing Principles* clarified how water planning and management costs were to be attributed (NRMMC 2010). Those principles specified what constitutes a water planning and management activity and outlined principles for: determining the cost-effectiveness of those activities; the allocation and differentiation of costs by region and/or water source; and the treatment of community service obligations.

In 2017, the Commission highlighted scope to improve arrangements in Queensland, Western Australia, Tasmania and the Northern Territory, but recognised that cost recovery should not be pursued if the costs of doing so exceed the benefits (PC 2017, pp. 424–425). It also noted that broad-based levies in Victoria, South Australia and the ACT fell short of best practice in terms of the precision and transparency of outcomes.

Developments since 2017

Jurisdictions have made the following progress since 2017 in their approaches to recovering the costs of water planning and management.

- Although no changes have been made in New South Wales, IPART is currently reviewing water management prices to take effect from July 2021 (IPART 2020d).
- Since 2016-17, Victoria has reported expenditure and outcomes under the fourth tranche of the Environmental Contributions. Expenditure towards specific initiatives is published, although the costs of water planning and management are not published, and do not influence the size of Environmental Contributions.
 - An independent evaluation of the outcomes from the fourth tranche of Environmental Contributions was commissioned in late 2019, due to report to the Government in the second half of 2020.
- Western Australia introduced new licencing fees on 13 November 2018, covering mining and public water supply users (DWER (WA) 2018a). These fees are designed to recover costs associated with assessing water license and permit applications (DWER (WA) 2018b). In 2019, the Western Australian government decided not to extend those fees to agricultural and other users (DWER (WA) 2019a).
 - No changes have been made to public reporting on the extent of cost recovery for water planning and management.
- Under the *Landscape South Australia Act 2019* (SA) the new regional landscape boards, which charge land and water levies to cover management costs, must clearly show proposed expenditure in annual business plans and report actual expenditure in annual reports. This legislative change did not alter the administration of the water levy (SA Government 2020a), nor how costs are recovered. If a landscape board proposes to

²⁰ NWI paragraphs 67–68.

change the basis of a water or land levy, the board must provide at least 21 days to receive written submissions on the proposal and prepare a report to the Minister on the outcomes of the consultation. The Department for Environment and Water is improving the transparency of reporting the costs it recovers from landscape boards for the water planning and management activities it undertakes.

No changes have been observed or reported in Queensland, Tasmania, the Northern Territory or the ACT. A summary of current arrangements, compared with 2017, is provided in table 3.8.

The Commission's view

As in its 2017 inquiry, the Commission has not undertaken a detailed review of jurisdictional approaches to cost recovery of water planning and management activities.

In the Murray–Darling Basin, the MDB jurisdictions determine the share of water planning and management costs that are recovered from entitlement holders, and the ACCC monitors water planning and management cost recovery as part of its annual *Water Monitoring Report*. This report provides transparency on the approaches to and degree of cost recovery, as well as trends over time (ACCC 2020b).

The approach taken by New South Wales (overseen by IPART) largely meets the requirements of the NWI in terms of transparency, the degree of costs recovered from water users, and the relationship between costs recovered and activities undertaken.

By contrast, Queensland does not publish the extent to which fees and charges cover water planning and management costs, although the department notes that they generally ‘recover only a small proportion of the total water planning and management costs incurred’ by the department (Business Queensland 2020b). Similarly, there is little reporting in Tasmania or the Northern Territory.

Western Australia has made changes to how water management and planning costs are recovered by introducing a range of new water licence fees, with a view to recognising the principle of user pays in the setting of fees (DWER (WA) 2018b). However, it is still unclear how the additional revenue is used, or what degree of cost recovery it reflects.

As was the case in 2017, there is further scope to improve the NWI-compliance of arrangements in Victoria, South Australia and the ACT. The broad-based levies used in those jurisdictions lack precision, as they are not solely designed to cover the costs of water planning and management. For example, the ACT Water Abstraction Charge also incorporates environmental externalities and water scarcity (source). It is not clear how the revenue from this is apportioned towards its different objectives, and there is apparent over-recovery relative to actual water planning and management costs (ACCC 2020b, pp. 99–100; Commissioner for Sustainability and the Environment (ACT) 2018, p. 76).

Table 3.8 Cost recovery for water planning and management

	Policy in 2017	Change since 2017
NSW	Full cost recovery implemented under the scrutiny of the economic regulator (IPART) and backed by public reporting of costs and cost recovery.	No change.
Vic	Environmental Contributions are funds collected from water corporations which is determined for each tranche by the Minister for Water through a Ministerial Order. For tranche 4, this was generally set at 5 per cent of revenue for urban water and 2 per cent of revenue for rural water set on a base year of 2014-15. The proceeds fund initiatives that promote the sustainable management of water and/or address adverse water related environmental impacts. Those initiatives include water planning and management activities.	Expenditure towards specific initiatives is published.
Qld	Cost recovery is limited to certain transaction-based fees (such as application and administrative fees, water licence fees and Sunwater and Seqwater meter service charges for non-State meters) and volumetric charges in specified areas. There is limited (if any) public reporting of costs and cost recovery.	No change.
SA	A Natural Resource Management (NRM) levy is applied to share the cost of water planning and management (as well as other activities) across users. The nature and structure of the levy, as well as the activities it funds, varies across South Australia's 8 NRM regions and is determined by the NRM boards in each region. Costs are also recovered from SA Water to support water related expenditure.	2019 legislative changes replaced the NRM levy with a Landscape Water Levy. Landscape boards must clearly report how they spend levy funds
WA	Cost recovery is limited to certain transaction-based fees (such as licence transfer fees) and there is limited (if any) public reporting of costs and cost recovery	New licencing fees were introduced on 13 November 2018 to cover licence assessments for the mining and public water supply sectors.
Tas	The costs of water planning and management activities are periodically reviewed to determine the costs to be borne by Government and water users on a beneficiary-pays basis. There is limited public reporting of costs and cost recovery.	Public reporting of costs and cost recovery has occurred through the <i>Regulatory Impact Statement Water Management Regulations 2019</i> .
NT	There is no cost recovery or public reporting of costs.	No change.
ACT	A Water Abstraction Charge is levied on urban water supply at a flat rate per kilolitre. The proceeds are applied to multiple purposes, including funding of water planning and management activities.	No change.

Sources: DWER (WA) (2018a, 2018b); PC (2017, p. 424), responses to State and Territory information requests.

Broad-based levies are administratively simpler, but:

- can impose less discipline on governments to discern between the costs incurred for water planning and management activities and costs incurred in delivering other policy goals (including those that should instead be funded by governments)

-
- create cross subsidies (and inequitable outcomes) when levies are set based on the funding requirements across a jurisdiction (or region) rather than the planning and management needs of particular water sources.

There is a balance to be found across all jurisdictions between the efficiency benefits of an activity-based approach to cost recovery, and the budgetary and compliance savings from a broad-based levy. Regardless, transparent reporting of water planning and management costs, and the degree of cost recovery from beneficiaries, would support efficiency in the use of government resources devoted to the management of water.

Overall, jurisdictions have only partially achieved this requirement of the NWI, although some jurisdictions have widened the scope of cost recovery for planning and management activities.

3.4 Environmental externalities of water use

Under the NWI jurisdictions agreed to:

- continue to manage environmental externalities through a range of regulatory measures (such as through setting extraction limits in water management plans and by specifying the conditions for the use of water in water use licences)
- continue to examine the feasibility of using market-based mechanisms in managing both positive and negative environmental externalities associated with water use
- implement pricing that includes externalities where found to be feasible.²¹

In 2017, the Commission noted that the key actions for the effective management of environmental externalities (extraction limits and conditions on water licences) are in place, with further protection from potentially damaging activities provided by other licences and approvals required under the environmental laws (PC 2017, p. 427).

Developments since 2017

The approaches of the jurisdictions to the management of environmental externalities are summarised in table 3.9. No significant changes have been observed or reported since 2017.

The Commission's view

As concluded in 2017, the key arrangements for managing environmental externalities from water use — through extraction limits and conditions on water licences — are in place. This requirement of the NWI is achieved.

²¹ NWI paragraph 73.

Table 3.9 Management of environmental externalities from water use

	Policy in 2017	Change since 2017
NSW	A range of regulatory measures are used to address environmental externalities including water extraction limits and mandatory water access licence rules. The costs incurred by water utilities in meeting regulatory measures designed to address environmental externalities are scrutinised by IPART and passed through to users in price determinations.	No change.
Vic	Environmental externalities are managed through a range of regulatory measures including setting extraction limits and placing conditions on water use licences. An Environmental Contribution charge is levied on water corporations as determined by a Ministerial Order. For tranche 4, this was generally 5 per cent of revenue for urban water and 2 per cent of revenue for rural water set on a base year of 2014-15. In line with the Water Industry Act 1994 (Vic), the proceeds are applied to initiatives which assist in the sustainable management of water and/or address adverse water related environmental impacts.	No change.
Qld	Environmental externalities are managed by setting extraction limits in water plans, specifying conditions for the use of water in water licences and, in some instances, fees. There are specific operational rules to achieve required environmental outcomes.	No change.
WA	Water allocation planning, policies and guidance documents, as well as licensing the take of water, are all aimed at managing environmental externalities.	No change.
SA	Environmental externalities are managed through a range of mechanisms such as water licences (and conditions on those licences) and salinity management zoning. A Natural Resource Management (NRM) levy is applied to share the cost of environmental impacts across users. The nature and structure of the levy, as well as the activities it funds, varies across South Australia's eight NRM regions and is determined by the NRM boards for the individual regions. The <i>Water Industry Act 2012</i> (SA) allows the Treasurer to issue Pricing Orders to the Essential Services Commission of South Australia on parameters, principles or factors (including environmental externalities) that must be considered in its pricing determinations.	2019 legislative changes replaced the NRM (water) levy with a Landscape Water Levy. Landscape boards must clearly report how they spend levy funds.
Tas	Water planning and regulation are the main means of managing environmental externalities.	No change.
NT	Water planning and regulation are the main means of managing environmental externalities	No change.
ACT	A Water Abstraction Charge is levied on urban water supply at a flat rate per kilolitre. The proceeds are applied to multiple purposes, including funding of water planning and management activities.	No change.

Sources: PC (2017, p. 426); responses to State and Territory information requests.

No jurisdiction applies a specific 'environmental externality' charge on water users, although levies in Victoria, South Australia and the ACT raise funds for multiple purposes, including water planning and management activities (discussed above) and to provide funds to address environmental externalities through other means.

Although these charges and levies may not be well-suited to addressing specific externalities, they can still raise revenue to address the environmental impacts of water use through other

means. Part of the effectiveness of such an approach relies on transparency as to how the levy is determined and how the funds are used (although this is not strictly a requirement of this part of the NWI).

As with recovering the costs of water planning and management, the net benefits of imposing environmental externality charges are less clear where water resources are not fully allocated (and there is a lesser risk of key environmental assets being compromised), which includes much of Western Australia, Tasmania and the Northern Territory. This may, however, change over time as development opportunities are pursued in these jurisdictions.

Some jurisdictions have explored market-based mechanisms for managing negative externalities related to discharges to waters, including salinity trading and pollution trading; these are consistent with the broad outcome of the NWI.

3.5 Release of unallocated water

An intended outcome of the NWI is to provide appropriate mechanisms for the release of unallocated water.²² The NWI provided jurisdictions with the freedom to choose how to release unallocated water, within the context of encouraging sustainable and efficient water use.²³

Jurisdictions agreed that:

- where a release is justified, it should occur only where alternative ways of meeting water demands, such as through water trading, making use of the unused parts of existing entitlements or by increasing water use efficiency, have been fully explored
- releases should occur through market-based mechanisms (to the extent practicable).²⁴

In 2017, the Commission concluded that all jurisdictions use water plans and water resource assessments to inform decisions on the release of unallocated water, while most also use (or legally can use) market mechanisms or a price on entitlements in their release of unallocated water (PC 2017, p. 429). The absence of market-based mechanisms in Western Australia and the Northern Territory was observed, but the relatively low level of development means there is often little (if any) benefit in a market-based approach instead of administrative allocation.

Developments since 2017

The release of unallocated water in all jurisdictions is informed by an assessment of the relevant water plan (table 3.10).

²² NWI paragraph 64(vi).

²³ NWI paragraph 70.

²⁴ NWI paragraph 71-72.

Table 3.10 Process to release unallocated water

	Policy in 2017	Change since 2017
NSW	The <i>Water Resources Management Act 2000</i> (NSW) provides for the release of unallocated water by tender, auction or other process as specified in the Minister's order.	No change.
Vic	Under the <i>Water Act 1989</i> (Vic) unallocated water can be sold via auction, tender or in any other manner that the Minister thinks fit.	In 2020, water was allocated to Traditional Owners in the Mitchell River.
Qld	The <i>Water Regulations 2016 (Qld)</i> provide for the release of unallocated water (both groundwater and surface water) by public auction, tender, fixed price sale, or grant for a particular purpose. Individual Water Plans also provide specific details for the release of unallocated water within those systems. Matters considered in releases of unallocated water include: the efficiency of existing and proposed water use practices; the availability of an alternative water supply for the purpose for which water is required; environmental impacts; cultural heritage impacts; and impact on other water resources and entitlements.	New arrangements for temporary access to strategic reserves. First allocation made during 2019.
WA	The allocation mechanism for the release of unallocated water is first-in-first-served; applications to take water from a particular resource are assessed in the order in which they are received.	No change.
SA	The <i>Release of Unallocated Water Policy</i> is based on the NWI. The policy notes the release of unallocated water by market mechanisms is the preferred approach and that alternative ways of meeting water demands (such as trading) should be considered before deciding to release unallocated water. The <i>Natural Resources Management Act 2004</i> (SA) allows the Minister to determine the procedures for the release of unallocated water (including allowing release through auction or tender).	The <i>Natural Resources Management Act 2004</i> (SA) was replaced with the <i>Landscape South Australia Act 2019</i> (SA). Auctions and tenders are still permitted (s. 122(2)).
Tas	Water releases are assessed on a case-by-case basis. Assessments consider allocation levels at local, sub-catchment and end of catchment scales, as well as accounting for future climate scenarios. The <i>Surface Water Allocation Decision Framework</i> requires that no material environmental harm or significant third party impact should result from a water allocation. Unallocated water in irrigation schemes is released through market mechanisms.	The <i>Surface Water Allocation Decision Framework</i> was amended in 2020, although this did not change the broad approach.
NT	The availability of water is assessed against Water Allocation Plans and the consumptive pools set out in those plans. The allocation mechanism for the release of unallocated water from within the general consumptive pool is by first-in-first-served.	The Northern Territory revised its <i>Processing Water Extraction Licence Applications</i> policy in 2020 to incorporate Strategic Aboriginal Water Reserves.
ACT	The price of entitlements for water released is determined by the ACT Government.	No change.

Sources: DENR (NT) (2020a); DPIPWE (Tas) (2020c); PC (2017, p. 428); responses to State and Territory information requests.

Some changes have been made since 2017.

- In New South Wales, changes have been made to the volumes of unassigned water available in some areas, although this has not changed the strategy for groundwater allocation which requires a competitive process for release (DPI (NSW) 2017).
- In Victoria, the Minister for Water announced in 2020 that Traditional Owners (the Gunaikurnai Land and Water Aboriginal Corporation) would receive 2 GL of unallocated water in the Mitchell River, with the balance of 4 GL to be made available onto the market.
- In Queensland, 2018 amendments to the *Water Act 2000* (Qld) allow for temporary access (up to three years) to strategic water infrastructure reserves, where proposals for which the water is reserved are not being progressed or are on hold. Releases are subject to the relevant water plan, with the first releases occurring in late 2019.
 - The *Water Regulation 2016* provides the process for release of strategic infrastructure reserve water. Some of the principles taken into consideration when determining a release of strategic infrastructure reserve water include: known demand, alternative access to water, the social, economic, environmental and cultural objectives and the stage of development.
 - Unallocated water was made available from a strategic water infrastructure reserve for the first time in 2019. Landholders in the Dawson Valley Water Management Area were invited to lodge submissions for short-term temporary access to 90 000 ML of unallocated water to expand or diversify irrigation activity. Following an assessment by the then-DNRME, three-year water licences were offered to 14 water users at a fixed price, granting access for irrigators to more than 69 000 ML a year.
- As discussed in section 1.6, The Queensland Government's *Cape York Water Plan* (2019) also established a 'Cape York Peninsula Heritage Area' unallocated water reserve and provided for the granting of water licences to eligible persons to support Aboriginal and Torres Strait Islander people to achieve their economic and social aspirations. Water licences will be granted to an eligible person at zero cost per megalitre and will not be subject to water licence fees and charges.
- Processes for releasing unallocated water in Queensland (specified in the *Water Regulation 2016*) are otherwise unchanged, but the Queensland Government is working to improve business processes with the aim of delivering timely and efficient releases of unallocated water to the market.
- Legislative changes in South Australia have not changed how unallocated water is released. The new legislation allows for market-based mechanisms to allocate water, and allocation is subject to the *Release of Unallocated Water Policy* (DEWNR (SA) nd).
- The Northern Territory revised its *Processing Water Extraction Licence Applications* policy in 2020 to incorporate Strategic Aboriginal Water Reserves. New water licences are still assessed administratively on a first-come-first-serve basis (DENR (NT) 2020a).

-
- Alternative approaches were considered as part of the 2018 *Northern Territory Water Regulatory Reform Directions Paper*, but no changes have yet been made (Northern Territory Government 2018, p. 11).
 - And as discussed in section 1.6, the Northern Territory’s Strategic Aboriginal Water Reserve Policy sets aside a percentage of water in the water allocation plan for eligible Aboriginal rights holders.

No changes have been observed in Western Australia, Tasmania or the ACT.

The Commission’s view

The best approach to releasing unallocated water depends on many factors, including the cost of allocation mechanisms, the highest value use of that water, the existence of unregulated externalities, and the quality of information on water demand. Jurisdictions need access to a range of tools; market mechanisms are only one. Indeed, the NWI recognised that use of market mechanisms may not always be practicable, and in undeveloped systems (with little risk of becoming fully allocated), administrative approaches do not detract from achieving the NWI outcome.

There has been little substantive change in arrangements since the Commission’s 2017 assessment. All jurisdictions still use water plans and water resource assessments to inform decisions on the release of unallocated water, while most also use (or can use) market mechanisms (such as auctions) or a price on entitlements in their release of unallocated water. The key exceptions are:

- Western Australia, where, as in 2017, legislative changes are required to allow for market-based approaches for releasing allocated water. Those changes are currently in progress as part of the development of the *Water Resources Management Bill*.
- the Northern Territory, where allocations are still issued on a first-come-first-serve basis as required under the *Water Act 1992* (NT).

As noted by the Commission in 2017, non-market based approaches do not detract from the NWI objectives where, based on resource assessments as part of the water planning processes, it is highly unlikely the water resource will become fully allocated (that is, in systems where water supply far outstrips demand).

In some jurisdictions (including Victoria, Queensland and the Northern Territory), processes are in place to grant unallocated water to Traditional Owners or Aboriginal landholders. Although not canvassed in the NWI, this is not inconsistent with allocating water to its highest-value use. Policy reform in this area is considered in SP D *Cultural Access*.

In summary, the Commission’s view is unchanged from 2017. This requirement remains largely achieved, with legislative reform still required in Western Australia and the Northern Territory in order to allow for market-based water allocation.

3.6 Separation of water management from service delivery

Under the NWI, jurisdictions agreed that, so far as possible, the roles of water resource management, standard setting and regulatory enforcement and service provision would continue to be separated institutionally.²⁵ This reflected earlier commitments under the 1994 COAG framework and the 1995 National Competition Policy (PC 2017, p. 61).

The agreed separation of service delivery from government was largely complete across all jurisdictions by 2011 (NWC 2011), and the NWC did not assess progress again in 2014. In 2017, the Productivity Commission noted an election commitment in South Australia that would have constituted backsliding (PC 2017, p. 14). However, this did not eventuate.

Overall, this NWI commitment has been achieved.

3.7 Performance benchmarking

The NWI requires State and Territory governments to report independently, publicly, and on an annual basis, benchmarking of pricing and service quality for metropolitan, non-metropolitan and rural water delivery agencies.²⁶ Jurisdictions agreed to develop a nationally-consistent framework by 2005, with costs of operating the performance and benchmarking systems to be met through recovery of water management costs by jurisdictions.²⁷

In 2017, the Commission observed that the Urban National Performance Report (NPR) was developed in line with the NWI requirement, and covered both metropolitan and non-metropolitan water delivery agencies that service more than 10 000 properties. Responsibility for the NPR was assigned to the Bureau of Meteorology (BOM) following the abolition of the National Water Commission in 2015.

The Commission also noted that national benchmarking for irrigation water services was discontinued in 2014 as the costs were considered to outweigh the benefits (PC 2017, p. 430). The diversity in the size, nature and ownership of distribution networks across Australia was considered to limit the insights to be gained from making comparisons.

Urban water

Progress since 2017

Since 2017, BOM has published the NPR annually, with the most recent publication for 2018-19 released in February 2020 (BOM 2020c).

²⁵ NWI paragraph 74.

²⁶ NWI paragraph 75.

²⁷ NWI paragraphs 75-76.

In July 2018, NWI signatories, along with BOM and the Water Services Association of Australia (WSAA), agreed to undertake a review of the NPR framework (BOM 2018). The review's objectives were to:

1. set up an enduring capability for the NPR framework and the NPR data set
2. improve the availability of performance reporting and benchmarking data to support the efficient, effective operation of the water sector
3. broaden the value of urban water performance reporting, benchmarking, and shared ownership for the urban water sector
4. ensure that the set of data collected through the NPR framework meets the current and future needs of the urban water sector for regulation, benchmarking, planning, and policy development
5. deliver on relevant recommendations of the Productivity Commission's Inquiry Report on National Water Reform
6. refresh the form and format of reporting carried out under the NPR framework, utilising online reporting and dashboards to meet the needs of key users and stakeholders.

The review was finalised in July 2019, and made a number of recommendations to the Australian Government and the BOM to improve the NPR framework (Aither 2019). These are currently being implemented, including through an additional review of the NPR indicators to be undertaken during 2020–22 (BOM 2020d). These reviews of the NPR are also discussed in SP F *Urban*: box 6.

The Commission's view

The NPR serves an important role in improving the transparency and accountability of urban water service providers, and in enabling assessment of jurisdictional commitments under the NWI. It is important that the report remains fit for purpose.

Although this specific commitment is achieved, there are ways that the NPR could be improved to ensure it best contributes to the objectives of the NWI.

In 2017, the Commission recommended that the NPR include an additional financial return metric that excludes developer charges and contributed assets (section 3.1). Doing so would assist future assessments of progress against the NWI and improve pricing transparency more generally. As discussed in SP F *Urban*, the NPR indicator review is the appropriate process to consider that recommendation, and to ensure that the NPR meets the current and future needs of the urban water sector (and the wider community).

4. Integrated management of water for environmental and other public benefit outcomes

Table 4.1 summarises progress in achieving outcomes and objectives relating to the integrated management of water for environmental and other public benefit outcomes. The remainder of this section provides detail to support these findings.

Table 4.1 Assessment summary: integrated management of water for environmental and other public benefit outcomes

<i>NWI commitment</i>	<i>2017 assessment^a</i>	<i>2020 assessment^a and progress indicator^b</i>	<i>Comments — progress since 2017</i>
Well defined environmental and other public benefit outcomes	Partially achieved	Partially achieved 	Environmental outcomes are increasingly well defined, particularly as plans are reviewed and replaced. The specification of outcomes with cultural benefits for Aboriginal and Torres Strait Islander people has improved, but other public benefit outcomes are poorly specified. The drought has exposed weaknesses in setting and achieving outcomes in some systems during climatic extremes.
Environmental water managers with accountability	Largely achieved	Largely achieved 	All jurisdictions have environmental water managers. But, managers are not always as accountable as they could be. There are monitoring, reporting and review gaps in some systems on whether agreed environmental outcomes have been achieved. In jurisdictions with held environmental water, regular independent auditing processes are not established. It is not clear whether the New South Wales Government's decision to sell environmental water to irrigators in 2018 in response to drought was aligned with the best use of environmental water and free from political interference.
Joint arrangements for shared resources	Achieved	Achieved 	In 2019 the <i>Basin wide Environmental Watering Strategy</i> was updated.

(continued next page)

Table 4.1 (continued)

NWI commitment	2017 assessment ^a	2020 assessment and progress indicator ^{a, b}	Comments — progress since 2017
Common arrangements for connected surface water and groundwater systems	Largely achieved	Largely achieved 	All jurisdictions have recognised the need for common arrangements in managing significantly interconnected surface water and groundwater resources.
Independent audit, review and reporting of environmental and other public benefit outcomes, and supporting management arrangements	Partially achieved	Partially achieved 	The body of knowledge about environmental water (including environmental and other public benefit outcomes) has grown significantly in recent years. But, in some systems, there are gaps in monitoring, review and reporting on where agreed outcomes have not been achieved and the potential for shared community benefits (in particular). In jurisdictions with held environmental water there is no consistent basis for the periodic independent audit of the achievement of environmental and other public benefit outcomes and the adequacy of the water provision and management arrangements in achieving those outcomes.
Environmental water holders able to trade	Achieved	Achieved 	All governments with held environmental water (Australian, New South Wales, Victorian and South Australian) are legally able to trade water allocations and entitlements. The Commonwealth Environmental Water Holder has sold very few allocations and has not directly purchased allocations.
Special requirements for high conservation value assets	Achieved	Achieved 	Ramsar wetlands and other high ecological value sites have been identified through planning. The recent drought has exposed weaknesses in achieving agreed outcomes in some Ramsar sites.
Water recovery options selected primarily on the basis of cost effectiveness	Not achieved	Not assessed	Achieving this commitment is dependent on mechanisms within the Murray–Darling Basin Plan. It was assessed under the <i>Murray–Darling Basin Plan: five year assessment</i> (PC 2018b). The next assessment will be undertaken in 2023.

^a **Achieved:** All requirements met, **Largely achieved:** Requirements generally met, with some exceptions, **Partially achieved:** Only some requirements met, **Not achieved:** No requirements met. ^b Progress indicators reflect an overall assessment of whether, on the whole, jurisdictions have moved closer to consistency with the NWI in the three years since 2017. An upward arrow indicates progress, a flat-line indicates no change and a downward arrow indicates poorer performance or backsliding.

The National Water Initiative (NWI) recognises that water is needed to provide for environmental and other public benefit outcomes (such as the cultural values of Aboriginal and Torres Strait Islanders and recreational opportunities), and that management of this water must be integrated within planning frameworks. Jurisdictions agreed to identify the outcomes desired from use of environmental water and to develop and implement appropriate, effective and efficient management practices and institutional arrangements to achieve them.¹

The Commission has considered progress under this element under the following themes:

- identification of specific environmental and public benefit outcomes
- management and institutional arrangements.

4.1 Identification of specific environmental and public benefit outcomes

Signatories to the NWI agreed to identify the desired outcomes² of environmental water management with as much specificity as possible.³ The greater the level of specificity, the easier it is to target management arrangements to meet objectives and to assess whether objectives are being achieved.

This section assesses the progress made by jurisdictions in identifying desired environmental and other public benefit outcomes, whether through statutory water plans or in planning for the use of held environmental water. The arrangements that aim to provide for these outcomes within water plans are assessed in the *Assessment*: section 1.

The Commission's 2017 assessment noted that environmental outcomes were increasingly well-defined, but remained broad in many cases (with scope to improve the specification of outcomes for some types of groundwater-dependent ecosystems). Other public benefit outcomes were generally poorly specified.

Developments since 2017

As water plans have been reviewed or new ones developed, descriptions of environmental and public benefit outcomes have generally become more specific. New research and information have contributed to this progress. Climate change scenario modelling, and the possible impacts of climate change on water availability, are increasingly being incorporated into water planning processes. (The importance of linking climatic conditions — including

¹ NWI paragraphs 37(i) and 78.

² In schedule b(i) of the NWI, other public benefit outcomes are defined to include mitigating pollution, public health, Indigenous and cultural values, recreation, fisheries, tourism, navigation and amenity values.

³ NWI paragraph 78(i).

both long-term climate change and more immediate extreme events such as drought — to environmental objectives and outcomes is discussed in SP C *Environment*.)

There have been different rates of progress in the identification of environmental, compared to other public benefit outcomes (PC 2017). Developments since 2017 are discussed below.

Identification of environmental outcomes

A number of planning processes have included improved specification of environmental outcomes.

- In the Murray–Darling Basin (MDB), Water Resource Plans (WRP) have improved the specification of environmental outcomes. Victoria, Queensland, South Australia and the ACT have all received accreditation from the Minister responsible for the *Water Act 2007* (Cth) for their proposed plans. New South Wales WRPs are still under review, having missed the 30 June 2020 deadline.
- In New South Wales, long term water plans for eight regions were published in 2020, clearly linking environmental outcomes to water management arrangements (DPIE (NSW) 2020f). These plans are a requirement of the Murray–Darling Basin Plan.
- The NSW Natural Resource Commission (NRC) has reviewed nine water sharing plans since 2017. Two plans — *Bellinger River Area Unregulated and Alluvial Water Sources 2008* and *NSW Great Artesian Basin Groundwater Sources 2008* — have been replaced. The revised plans more clearly specify environmental outcomes. The remaining seven are pending after the NRC found that environmental, social and economic outcomes were insufficiently specified.
- Queensland has established four new water plans since 2017 — *Water Plan (Border Rivers and Moonie) 2019*, *Water Plan (Cape York) 2019*, *Water Plan (Condamine and Balonne) 2019* and *Water Plan (Great Artesian Basin and Other Regional Aquifers) 2017* (published in 2018). These new water plans were based on the latest science and critical flow requirements to inform environmental outcomes. The Border Rivers and Moonie plan saw improvements in the level of spatial and temporal detail in outcome specification. The current state of knowledge about the links between environmental water provisions and outcomes in the Great Artesian Basin and Other Regional Aquifers plan was not sufficient to significantly improve the specification of outcomes in the plan (Queensland Government 2015, p. 33).
- In South Australia, the *Draft Water Allocation Plan for the Far North Prescribed Wells* (an update to the 2009 version of the water allocation plan), proposes to improve the specification of environmental water requirements for groundwater dependent ecosystems (pp. 60–67). The consultation period on the draft plan ended in April 2020 and the final plan is scheduled to be adopted in early 2021.

-
- In South Australia, two new Long-Term Environmental Watering Plans (LTEWPs) were published and one existing LTEWP was amended. The South Australian Murray Region and Eastern Mount Lofty Ranges LTEWP were published in late 2017. The River Murray LTEWP was revised and amended to improve consistency with the accredited South Australian River Murray WRP. These plans are a requirement as part of the Murray–Darling Basin Plan.
 - The *Cockburn groundwater allocation plan 2020* in Western Australia commenced, improving outcome specification compared to its precursor plan. It includes a range of performance indicators that are clearly linked to environmental objectives (pp. 45–46).
 - In Western Australia, Water Allocation Statements provide amendments to (non-statutory) water allocation plans. Those that have been released since 2017 do not improve the specification of environmental outcomes.
 - There have been no Tasmanian (statutory) water plan reviews completed since 2017, although three reviews are underway (Great Forester River Catchment, Lakes Sorell and Crescent and Mersey). Four new (non-statutory) Water Management Statements (for the Duck, Shannon, North Esk and Swan Rivers) all have descriptions of environmental outcomes and objectives.
 - The Northern Territory has established three new water plans and replaced one existing plan since 2017. The plans specify environmental outcomes according to the current state of knowledge on the water requirements of the local ecosystems and outline processes for integrating new information into outcomes as research is undertaken. The *Western Davenport Water Allocation Plan 2018–2021* replaced its precursor in 2018. The plan incorporated a ‘substantially improved scientific basis’ into its outcomes specification, including those for groundwater dependent ecosystems (DENR (NT) 2018, p. 6).
 - Changes to legislative and policy frameworks also support the definition of outcomes in planning.
 - Victoria continues to implement actions set out under the Water for Victoria plan:
 - ... The *State Environment Protection Policy (Waters)* was gazetted in 2018, setting out clear environmental quality indicators and objectives, replacing a previous set of objectives (EPA (Vic) 2018).
 - ... The state is continuing to invest through the Our Catchments, Our Communities program, which helps to define catchment management objectives and outcomes through community engagement (DELWP (Vic) 2019d).
 - South Australia passed its *Landscape South Australia Act 2019*, which reaffirms the NWI requirement for water allocation plans to include ‘a statement of the environmental outcomes expected to be delivered’.⁴

⁴ NWI paragraph 53 b) (iii).

-
- In 2019, the Queensland Government adopted the *Environmental Protection (Water and Wetland Biodiversity) Policy 2019*. This policy assesses local environmental values (including recreational values, ecosystem health and Indigenous cultural and spiritual values) and provides them as inputs into water planning. It replaces a previous policy written in 2009 and incorporates a separate policy on the Great Barrier Reef (p. 10). The guidance on defining water quality outcomes is improved by including references to the recently updated Australia & New Zealand Guidelines for Fresh & Marine Water Quality (2018).

Managers of held environmental water identify targeted environmental and other public benefit outcomes under a range of water availability scenarios.

- The *Basin Annual Environmental Watering Priorities* guide the annual planning and prioritisation of environmental watering across the Murray–Darling Basin. They provide annual objectives necessary to achieve long-term outcomes in the *Basin-Wide Environmental Watering Strategy*. The reports clearly define environmental objectives of water management and how they respond to changes in resource availability.
 - In 2019, the MDBA released a review and updated the *Basin-Wide Environmental Watering Strategy* to reflect policy changes and new evidence from research projects (MDBA 2019h).
 - Environmental outcomes identified in the *Basin Annual Environmental Watering Priorities* have explicitly been adjusted in each year since 2017 in response to drought conditions (MDBA 2018a, 2019a, 2020b).
- The Victorian Environmental Water Holder (VEWH) releases seasonal watering plans, which identify the delivery priorities and outcomes under different climatic scenarios.
- The Commonwealth Environmental Water Holder (CEWH) releases annual watering plans, which identify the delivery priorities and outcomes under different climatic scenarios. In 2020 the CEWH also released a summary brochure that provided a simplified snapshot of the plan.

There have been advances in the development of tools for setting environmental priorities in water planning, as well as improved management processes to provide water to achieve particular environmental outcomes.

- The Australian, State and Territory Governments are developing a national Ecosystem Environmental–Economic Account. This account records environmental and economic data on the service provision of specific ecosystems and offers decision makers a framework for understanding trade-offs in water resource management (DAWE 2019). The Gunbower-Koondrook-Perricoota Forest icon site in the MDB is one of three pilot projects testing approaches to measuring ecosystem services. Results for the Gunbower-Koondrook-Perricoota Forest are set to be released in March 2021 (DAWE 2020c).

-
- New South Wales, Victoria and Tasmania have updated guidelines for environmental water planning to clarify the use of SMART (Specific, Measurable, Attainable, Realistic, Timebound) objectives in planning (DPIPWE (Tas) 2018).⁵
 - South Australia has invested in groundwater models which provide risk assessments to inform the specification of outcomes in water planning development for the Tatiara Prescribed Wells Area. Similar models are being developed for the Lower Limestone Coast Prescribed Wells Area.
 - Defining outcomes for groundwater-dependent ecosystems in plans has been an area of increased focus:
 - South Australia has incorporated hydro-ecological investigations in water planning (in Barossa, Eastern Mount Lofty Ranges, Western Mount Lofty Ranges, Musgrave and Southern Basins) to identify relationships between groundwater, surface water and ecological outcomes, enabling a transparent identification of trade-offs in decision making.
 - Tasmania has established a project to develop a groundwater risk assessment and management framework to ensure the sustainable management of existing and future resources by identifying and quantifying groundwater-dependent values.

Identification of other public benefit outcomes

Outcomes with cultural benefits for Aboriginal and Torres Strait Islander people are increasingly being considered and implemented where these are compatible with the achievement of environmental outcomes. Progress since 2017 includes:

- The *Water (Indigenous Values and Uses) Direction 2018* requires the MDBA to report on how held environmental water managers considered Indigenous values and uses of water (as defined by the Murray–Darling Basin Plan). In 2019, the MDBA released a set of ten case studies highlighting First Nations involvement in environmental water management and the first of its annual reports on this matter (MDBA 2019i, 2019f).
- The MDBA and the Commonwealth Environmental Water Office (CEWO) have been working with the Basin’s First Nations to develop a well-defined and transparent methodology for First Nations’ environmental watering objectives to be incorporated in environmental water planning. The First Nations Environmental Water Guidance project identified objectives that were included in the Basin Environmental Watering Priorities 2020-21 (MDBA 2019f).
- In 2019, Victoria’s *Water Act 1989* (Vic) was amended to recognise Aboriginal cultural values and uses into the planning, operation and management of water. This amended change provided greater recognition and involvement for Traditional Owners and

⁵ New South Wales and Victoria reported on their updated water planning guidelines in response to information requests.

Aboriginal people in Victoria in the ongoing management and planning of waterways and catchments.

- From 2018, all new and reviewed water plans in Queensland must explicitly state cultural outcomes for Aboriginal and Torres Strait Islander peoples separately from social, environmental and economic outcomes. Three new water plans — Cape York, Condamine and Balonne, and Border Rivers and Moonie — have incorporated these changes.
- Two amended water plans adopted since 2017 — Bellinger River Area Unregulated and Alluvial Water Sources and NSW Great Artesian Basin Groundwater Sources — in New South Wales have included revised ‘Aboriginal cultural objectives’, including broad and target objectives, strategies and performance indicators.
- In Western Australia, the development of a *Fitzroy River catchment water allocation plan* involves extensive definition of Aboriginal benefits, where 95 per cent of the catchment has Native Title determinations (DWER (WA) 2020b). Similar engagement is taking place as part of the *Derby groundwater allocation plan: for public comment* (DWER (WA) 2020a).
- The four water plans adopted in the Northern Territory since 2017 have all established objectives, timelines and responsibilities to define cultural values for Aboriginal and Torres Strait Islanders.

There has been little change reported by jurisdictions in the specification of other non-environmental public benefits — such as recreation, fisheries, tourism, navigation and amenity values — in water plans.

The Commission’s view

To meet the requirements of the NWI, State and Territory Governments should have processes in place to ensure environmental and public benefit outcomes are clearly identified, whether environmental water is provided through water plans, held entitlements or other water management arrangements.

Outcomes in environmental water management were raised by a number of inquiry participants, particularly with reference to the Murray–Darling Basin (MDB) (NFF, sub. 42, p. 9; ADF, sub. 43, p. 1; Wentworth Group of Scientists, sub. 68, p. 2). In coastal New South Wales catchments, outcomes are claimed to be too broadly defined (Sydney Water, sub. 94, p. 24).

The recent drought has exposed weaknesses in achieving outcomes in some systems during climatic extremes. Although some inquiry participants raised poorly defined outcomes as an ongoing issue in water planning, particularly in New South Wales, there has been progress in most jurisdictions in line with the NWI. While the definition of outcomes may have improved, extreme climatic conditions, significant levels of extraction and inadequate

environmental management in some systems has strained ecosystems. This has revealed instances where the specification of outcomes needs to be improved.

As new plans are established or existing plans reviewed and updated, there is evidence that the specification of environmental and other public benefit outcomes has improved. This partly reflects accumulated knowledge and research about water systems that supports the specification of outcomes. Outcomes are also amended or adapted in light of consequential new information and implementation experience. Queensland's second generation water plans (plans that have been reviewed since 2016) are believed to have significantly improved the measurability of their environmental outcomes (WWF, sub. 50, p. 4).

Environmental, hydrological, social and economic assessments are routinely undertaken as part of the water planning process to inform decision making on the agreed environmental outcomes sought, and in defining the rules-based water provisions that aim to achieve outcomes. In Victoria, Queensland, South Australia and Tasmania, these are informed by comprehensive databases of environmental and public benefit values. In New South Wales, Western Australia, the Northern Territory and the ACT, environmental outcomes are identified within individual water plans.

Some inquiry participants suggested that, while jurisdictions have made progress in legislating the protection of groundwater dependent ecosystems (GDEs), there needs to be further improvement to the consistency of valuation methodologies (IAH, sub. 15, p. 4; Inland Rivers Network, sub. 86, p. 4). In certain plans, there are opportunities to strengthen GDE protections, such as through more specificity around GDE definitions, mapping and rules around groundwater access points (NRC (NSW) 2020e).

Participant comments are consistent with the Commission's 2017 finding that GDE outcomes were not as well-defined in water plans relative to other environmental outcomes. Jurisdictions have made considerable progress in identifying and improving their understanding of GDEs. However, developing a better understanding of the diverse range of GDEs would aid water planners in defining specific outcomes for those ecosystems (where the value of the GDE to the community warrants the definition of outcomes). The implementation of relevant actions from the 10-year National Groundwater Strategic Framework continues to support the understanding of these ecosystems and the likely outcomes that would arise from greater water quality and quantity.

Technical assessments that inform the development of water plans also inform decisions to deploy held environmental water entitlements. Environmental water holders plan on an annual basis and for individual watering events, and so are able to identify in greater detail the environmental outcomes targeted through water delivery. But overall, there is still scope to improve the specification of environmental outcomes.

There has been significant progress in the identification and specification of cultural and spiritual values associated with water. Tasmania, despite increased engagement with Aboriginal communities since 2017, remains the only state that does not specify these values in its water plans. However, there continues to be relatively few examples of well-identified

and measurable other public benefit outcomes in water plans, and when included they are often closely linked with environmental outcomes.

Overall, and based on the information provided to the Commission, jurisdictions (that have updated their water plans) have been making good progress on the specification of environmental outcomes, since 2017. The specification of outcomes with cultural benefits for Aboriginal and Torres Strait Islander people has improved, but other public benefit outcomes are poorly specified. Specification of outcomes for GDEs have room for improvement, although progress has been made.

Despite this progress, the drought has exposed weaknesses in setting and achieving environmental, cultural and other public benefit outcomes in some systems during climatic extremes (SP C *Environment*). Therefore, on the whole, the Commission has assessed the NWI requirement of well-defined environmental and other public benefit outcomes as partially achieved, with some progress since 2017.

4.2 Management and institutional arrangements

Parties to the NWI agreed to appoint environmental managers with the necessary authority and resources to achieve identified environmental and other public benefit outcomes.⁶ Governments were to develop effective and efficient management and institutional arrangements, including:

- accountable environmental water managers
- joint arrangements for any shared resources
- common arrangements for inter-connected surface water and groundwater systems
- independent audit, review and public reporting on outcomes and the adequacy of management arrangements
- enabling environmental water managers to trade water on the temporary market
- special requirements to sustain high conservation value environmental assets.

Developments since 2017

Environmental water provisions in water plans provide for the needs of both surface water and groundwater-dependent ecosystems. Rules-based provision is the primary means of implementing environmental water objectives across Australia. Jurisdictions generally set allocation limits and access rules to ‘leave behind’ water to meet environmental outcomes. Rules-based provisions include cease to pump rules, flow sharing arrangements, passing flow releases from water storages, environmental water allowances and groundwater access rules. These provisions do not require any active decision making on their use, but water

⁶ NWI paragraph 78(ii).

managers must ensure consumptive users comply with the rules to ensure environmental outcomes are not jeopardised (*Assessment*: section 1).

In the MDB and Victoria planned water is supplemented with held environmental entitlements. In these cases, environmental water holders and managers must make decisions on where and when to use water, and on whether to trade it or make use of ‘carryover’ provisions to keep it for use in subsequent years.

Environmental water managers with accountability

All jurisdictions have achieved the NWI agreement to appoint environmental managers.⁷

Jurisdictions have established entities with responsibility for defining and enforcing planned environmental water provisions. And the Commonwealth, New South Wales, Victoria and South Australia also have bodies with responsibility for actively managing held water entitlements. Queensland, Western Australia, Tasmania, the Northern Territory and the ACT do not own entitlements for environmental purposes, although Queensland facilitates the use of Commonwealth-owned entitlements within the State.

Table 4.2 lists the current institutional arrangements for planned environmental water provisions and held environmental water, reflecting machinery of government changes since 2017.

Most held environmental water is located in the MDB. Outside the MDB there are entitlements in southern Victoria. The vast majority of entitlements relate to surface water. Institutional arrangements vary between jurisdictions. In Victoria, the VEWL is a statutory body corporate, while the CEWL is a statutory office holder within a government department. Environmental water is managed by State Government departments in New South Wales and South Australia. Held environmental water in the MDB is managed under the Murray–Darling Basin Plan.

Parties to the NWI also agreed that environmental water managers were to be accountable for the management of environmental water provisions and the achievement of environmental and other public benefit outcomes.⁸

In 2017 the Commission reported that although all jurisdictions have established managers with responsibility for environmental water provision, these managers are not always as accountable as they could be due to the limits to their arrangements for independent auditing, review and reporting of environmental outcomes (PC 2017, pp. 439–440). Since 2017, there has been some progress in this area. (This is discussed below in the section *Independent audit, review and public reporting*.)

⁷ NWI paragraph 79(i(a)).

⁸ NWI paragraph 79 (i(a)).

Further, in 2017 the Commission recommended that where governments own significant environmental water that can be actively managed, accountability requires decisions on the best use of environmental water to be made by independent managers at arm's length from government (PC 2017, p. 162). In 2018, the New South Wales Government sold 15 GL of environmental water allocation to irrigators within the Gwydir, Macquarie, Lachlan, Murrumbidgee and Murray-Lower Darling valleys in response to the drought. It is not clear whether this decision was aligned with the best use of environmental water and was free from political interference.

Table 4.2 Responsibilities for environmental water

<i>Jurisdiction</i>	<i>Planned environmental water</i>	<i>Held environmental water</i>
Australian Government	Murray–Darling Basin Authority ^a	Commonwealth Environmental Water Office Murray–Darling Basin Authority (The Living Murray)
New South Wales	Department of Planning, Industry and Environment	Biodiversity and Conservation Division (BCD) ^b
Victoria	Department of Environment, Land, Water and Planning	Victorian Environmental Water Holder ^c
South Australia	Department for Environment and Water	Department for Environment and Water
Queensland	Department of Regional Development, Manufacturing and Water ^d	Not applicable
Western Australia	Department of Water and Environmental Regulation	Not applicable
Tasmania	Department of Primary Industries, Parks, Water and Environment	Not applicable
Northern Territory	Department of Environment and Natural Resources	Not applicable
ACT	Environment, Planning and Sustainable Development Directorate	Not applicable

^a The Murray–Darling Basin Authority has responsibility for reviewing (and in some cases, preparing) water resource plans in the Basin. These plans identify planned environmental water requirements. ^b In 2019, as part of machinery of government changes, the New South Wales environmental water holder function was moved from the former Office of Environment and Heritage to the newly formed Department of Planning, Industry and Environment (within the Environment, Energy and Science Group and under the Biodiversity and Conservation Division (BCD)). ^c Some entitlements held by the Victorian Environmental Water Holder include rules based environmental water. ^d In 2020 the management of Queensland's water resources moved from the Department of Natural Resources, Mines and Energy to the Department of Regional Development, Manufacturing and Water.

Source: Updated from (PC 2017, p. 439).

Joint arrangements for shared resources

The NWI requires that jurisdictions establish effective and efficient management and institutional arrangements to ensure the achievement of environmental and other public benefit outcomes where resources are shared by jurisdictions.⁹ Joint arrangements aim to coordinate the provision of environmental water across jurisdictions and provide a consistent decision framework for identifying and determining priorities for rivers, wetlands and groundwater dependent ecosystems. This largely applies to the MDB and has been achieved.

The *Basin-wide Environmental Watering Strategy*, published in 2014 and updated in 2019, coordinates activity in the MDB (MDBA 2019b). The Strategy guides the planning and delivery of water for the environment at the Basin scale over the long-term.

The Living Murray (TLM) is a joint initiative funded by the New South Wales, Victorian, South Australian, Australian Capital Territory and Australian governments, coordinated by the Murray–Darling Basin Authority. Works on the ground and environmental watering are managed by a partnership of state government departments and catchment management authorities. The Living Murray delivers environmental water to improve the health of six ecologically significant sites in the Murray catchment (Barmah-Millewa Forest, Gunbower-Koondrook-Perricoota Forest, Hattah Lakes, Chowilla Floodplain and Lindsay-Wallpolla Islands, the Lower Lakes, Coorong and Murray Mouth and the River Murray Channel), chosen for their environmental, cultural and international significance. The Commission is not aware of any key developments in the coordination of TLM since 2017. Progress on TLM monitoring and review is reported in the section below on *Independent audit, review and public reporting*.

Other key joint arrangements have included the *Intergovernmental Agreement on Implementing Water Reform in the Murray–Darling Basin* (which supports the objectives of the Murray–Darling Basin Plan), the *Great Artesian Basin Sustainability Initiative* (GABSI) (which concluded in 2017)¹⁰ the *Lake Eyre Basin Intergovernmental Agreement*¹¹ and the *Border Groundwaters Agreement — South Australia-Victoria*.¹²

⁹ NWI paragraph 79(i(b)).

¹⁰ The *Great Artesian Basin Sustainability Initiative* (GABSI) was a basin-wide coordinated approach to bore rehabilitation delivered in partnership by the Australian, New South Wales, Queensland, South Australian and Northern Territory governments. GABSI supported the restoration and repair of uncontrolled bores and bore drains from 1999 and contributed to improved pressure in Great Artesian Basin springs and the sustainable management of water resources within the Great Artesian Basin. GABSI concluded on 30 June 2017 after 17 years and over \$124 million in investment by the Australian Government (DAWE 2020d).

¹¹ The Lake Eyre Basin is of conservation significance on a world scale. The Basin and its waterways are subject to threats from land-uses, pest plants and animals, and development. Communities and governments have committed to collaborative, cross-border management. The *Lake Eyre Basin Intergovernmental Agreement* was established between the Australian, Queensland and South Australian governments in 2000. The Northern Territory subsequently signed the Agreement in 2004 (DAWE 2020e).

¹² Along the South Australian, Victoria border, groundwater is the only reliable water source and there is increasing demand for its use. Victoria and South Australia entered into the *Border Groundwaters*

Current strategies for managing the Great Artesian Basin include the *Great Artesian Basin Strategic Management Plan* (2020 to 2034) that takes a principles-based approach to guiding governments, industry and the community and the *Improving Great Artesian Basin Drought Resilience Program* (2019 to 2024) which builds on the investments under GABSI.

A review of the *Lake Eyre Basin Intergovernmental Agreement* is mandated every ten years. The second review was completed in May 2018 (DAWE 2020e). The review focussed on the operation of the Agreement, the extent to which objectives identified have been achieved and considered possible changes to improve the effectiveness of the Agreement; to reflect new knowledge, emerging issues and institutional frameworks. Recommendations proposed: changes to management arrangements including the development of a risk-based Lake Eyre Basin Strategic Plan; consideration of expanding the Agreement to cover the whole hydrologic boundary of the Basin; and an assessment of current water demands across the Basin from development, agriculture and other industry to establish current consumptive levels.

The Lake Eyre Basin Ministerial Forum is expected to release a response to the review of the *Lake Eyre Basin Intergovernmental Agreement*. The Department of Agriculture, Water and the Environment, in consultation with Basin jurisdictions, is currently addressing the recommendations from the review. In October 2020 a report to national Cabinet, *the Review of COAG Councils and Ministerial Forums* (Conran 2020, p. 25), recommended that the Lake Eyre Basin Ministerial Forum disband and that Lake Eyre Basin issues should be managed by Environmental ministers.

Common arrangements for interconnected surface water and groundwater systems

The NWI requires common arrangements for significantly inter-connected groundwater and surface water systems.¹³

All jurisdictions have recognised the need for common arrangements in managing significantly interconnected surface water and groundwater resources. Although few water plans fully integrate the management of surface water and groundwater, an increasing number of plans recognise the connectivity between these resources. Where not managed under the same plan, some water plans in connected systems take into account cases where rivers, wetlands and other ecosystems are dependent on groundwater (PC 2017, p. 440). Recent progress and developments of the integration of surface water and groundwater management is discussed in section 1 (*Entitlements and planning*).

Agreement in 1985 (and it was updated in 2005) to share the groundwater resource equitably between the two states (DEW (SA) 2020).

¹³ NWI paragraph 79 (i(c)).

Independent audit, review and public reporting

NWI parties agreed to establish periodic independent audit, review and public reporting of the achievement of environmental and other public benefit outcomes and adequacy of the water provision and management arrangements in achieving outcomes.¹⁴

In 2017 the Commission's assessment found that:

- jurisdictions have developed programs that measure water provision and hence are able to review the extent to which planned water regimes are being implemented
- all managers of held environmental water monitor, review and report on the outcomes from delivery of their entitlements
- despite progress, jurisdictions needed to increase their focus on monitoring outcomes, provide more balanced reporting, and provide for independent auditing.

Key developments since 2017 on monitoring, reporting and review are listed below.

- The CEWO has invested \$80 million in monitoring the impact of its use of water for the environment since 2013. *The Long Term Intervention Monitoring Project* and the *Environment Water Knowledge and Research Program* both concluded in June 2019. The CEWH's new *Monitoring, Evaluation and Research Program (Flow-MER)* provides evidence on how water for the environment is helping maintain, protect, and restore the ecosystems and native species across the MDB (DAWE nd).
- The CEWO has introduced a requirement to work with Traditional Owners and community groups in monitoring, evaluation and reporting work.
- In the MDB, monitoring outcomes of environmental water is shared between the Basin states, the MDBA and the CEWH. MDBA long-term monitoring programs include: the Murray–Darling Basin Fish Survey; the aerial waterbirds survey of specified environmental assets; and the tree-stand condition monitoring program. These monitor the condition of native fish, waterbirds and river red gum, black box and coolabah within the Murray–Darling Basin, how these compare to relevant targets and objectives, and trends in conditions over time. The main change to this approach since 2017 has been an increased use of remote-sensing data to monitor, report and evaluate.
- In May 2018, the MDBA published an icon site condition report for TLM initiative. It draws on over ten years of ecological monitoring undertaken for the six priority TLM environmental assets. It provides a high level qualitative assessment of the ecological condition of these assets against icon site ecological objectives from 2006-07 to 2016-17 by tracking the ecological responses to environmental water delivery (MDBA 2018b).
- In response to the fish deaths of 2018-19, the Australian Government and Basin States have developed the *Native Fish Recovery Strategy* to guide future investment and achieve four key outcomes. The Australian Government has also injected \$20 million into the *Murray–Darling Water and Environment Research Program* to strengthen scientific

¹⁴ NWI paragraph 79(i(d)).

knowledge of the Murray–Darling Basin and the MDBA have adapted and improved their environmental management activities including an early warning and emergency response system.

- In September 2020, the Australian Government announced a further investment of \$7.5 million for the MDBA to monitor and report on social, economic and environmental conditions in the Murray–Darling Basin to improve the understanding of other public benefit outcomes from environmental water use. This builds on the \$20 million investment in Murray–Darling Basin specific research so that river management and planning can be based on the best available science.
- In New South Wales:
 - *Monitoring, Evaluation and Reporting Plans* have been developed for all inland valleys as part of WRP development, including an overarching New South Wales *Monitoring, Evaluation and Reporting Plan*
 - in September 2019, the Natural Resources Commission published the final report, *Review of the Water Sharing Plan for the Barwon-Darling Unregulated and Alluvial Water Sources 2012*. It focused on the extent to which water sharing provisions in the Plan have materially contributed to the achievement of, or the failure to achieve, environmental, social and economic outcomes. It also identifies where changes are warranted (NRC (NSW) 2019)
 - in July 2020 the final report *Better Management of Environmental Water*, was published. It provides a summary of the better management of environmental water work program including implementation of interim solutions through flow events in the Barwon-Darling River system and enduring solutions including limiting daily water take, managing resumption of flows after extended dry periods and actively managing held environmental water (DPIE (NSW) 2020b)
 - environmental water delivery outcomes are reported annually in the *Use of water for the environment in NSW: Outcomes* report. This has been published as a web-based report from the 2017-18 reporting year to improve readability and accessibility.
- In Victoria:
 - outcomes of environmental watering are reported through media releases and other publications by catchment management authorities and the VEW, and the annual *Reflections* booklet published by the VEW. *Reflections 2018-19* provides examples of increasing expertise in managing water under dry conditions and in the face of water security challenges such as population growth, drought and climate change (VEW 2019b)
 - the *Victorian Environmental Flows Monitoring Assessment Program* (VEFMAP); investigates the effects that environmental flows have on native fish and aquatic and riverbank vegetation. VEFMAP Stage 6 (2016–2020) monitoring was conducted at 225 sites along 21 rivers. In 2020, the program’s Stage 6 results were published with a focus on outcomes and the importance of natural resource management (DELWP (Vic) 2020e)

-
- the *Wetland Monitoring Assessment Program* (WetMAP) examines the effects of water for the environment on native vegetation, waterbirds, fish and frogs in wetlands. WetMAP monitoring for 2016–2020 was conducted at 55 Victorian wetlands
 - In Queensland, new water plans now include a measure to develop a *Monitoring, Evaluation and Reporting Strategy* (MERS). MERS sets out monitoring objectives and information to be collected over the life of the water plan. This informs and assists in the monitoring and evaluation of whether agreed outcomes have been achieved. Since 2017, MERSs have been developed for the Cape York water plan, Murray–Darling basin regions and the Great Artesian Basin and other regional aquifers water plan.
 - In Western Australia, the Department of Water and Environmental Regulation undertakes annual evaluations of water resources and water management covered by the Department’s water allocation plans. These statements form part of the Department’s adaptive management approach to improve the management of water resources including whether the objectives and outcomes of the plan are being met. For example, the Upper Collie (2009–2017) evaluation statement reported that managing groundwater in the Collie Coal Basin, and salinity in the upper Collie River, is challenging in the context of climate change, changing mining activities and the prospect of rising salinity in the catchment. It identified the need to: continue river health assessments to identify the ecological implications of changing stream flows and salinity; and re-evaluate the allocation limit for Wellington Dam to reflect inflows to the dam under a drier future climate (DWER (WA) 2019c).
 - The 2017-18 evaluation program published evaluation statements for the Whicher, Ord and La Grange water plan areas and improved monitoring programs in the Lower Collie, Myalup, West Canning Basin, Jurien, Peel Coastal and La Grange plan areas.
 - The 2018-19 evaluation program published the evaluation statement for the Upper Collie plan and improved monitoring programs in the Cockburn, Murray, South West groundwater areas and Peel Coastal plan areas.
 - The 2019-20 evaluation program initiated work on evaluation statements for Murray, Gingin, Pilbara (Millstream aquifer), Esperance and Arrowsmith and improved monitoring programs in Lower Collie and Warren-Donnelly plan areas.
 - In South Australia, the outcomes of environmental water use are monitored and evaluated through programs including condition and intervention monitoring undertaken at TLM icon sites, regional wetland monitoring programs and CEWH funded monitoring activities. These are reported through formal and informal mechanisms by the Department for Environment and Water and the Murraylands and Riverland Landscape Board and in the case of TLM via the MDBA website. This includes providing information at community and stakeholder forums and through media, and the production and distribution of technical reports and regular reports to water holders, funding bodies and stakeholder groups. The South Australian Government reported that although these processes have remained relatively consistent over the past five years, there has been greater coordination between water holders and the jurisdiction in relation to communication and monitoring and reporting of system scale water delivery.

-
- In Tasmania, since 2017, the Department of Primary Industries, Parks, Water and Environment have finalised a process and content for annual reporting on water management plans. Whilst each plan is unique, the new automated process provides information to examine the season past, where this sits in a historical context, and how the objectives under each plan have been met. Annual reports include information on items such as yields, low flows, flood thresholds, rainfall, restriction notices and river health.
 - In the ACT, the *Water Resources Environmental Flow Guidelines 2019* came into effect on 20 July 2019 (replacing the 2013 guidelines). The changes align the guidelines with the framework of the *ACT Water Resource Plan* under the Murray–Darling Basin Plan and revise ecological objectives to more closely align with specific flow requirements for each water ecosystem.
 - In the Northern Territory, in addition to ongoing monitoring of water management plan areas, the Government has completed the following studies:
 - *Mapping of Wetlands in the Northern Territory Portion of the Lake Eyre Basin* (2018)
 - *Georgina Basin Groundwater Assessment: Daly Waters to Tennant Creek* (2019)
 - Water resource assessments and reports for Gove, Wadeye and Georgina Basins.

These developments demonstrate that there has been increased effort on monitoring, reporting and review in recent years.

Independent auditing is important for accountability and adaptive management. The NWI recognises the need for ‘periodic independent audit ... of the achievement of environmental and other public benefit outcomes and the adequacy of the water provision and management arrangements in achieving those outcomes’.¹⁵ The National Water Commission (NWC) independently reviewed the arrangements in all jurisdictions for its Australian Environmental Water Management reports in 2010, 2012 and 2014. However, these biennial reviews ceased with the abolition of the NWC in 2014.

- In November 2017 an independent panel (Byron 2017) undertook a *Review of the Commonwealth Environmental Water Holder’s operations and business processes*.
- In 2018, the Victorian Public Sector Commission was commissioned by the Department of Land, Water and Planning Victoria to review the VEWH’s first seven years of operation (VEWH 2019a, p. 11).

But currently, there is no consistent or regular basis for this activity. While the Commission now has the NWC’s former responsibilities for reviewing the NWI and the Murray–Darling Basin Plan, the Commission’s role is too broad to enable detailed evaluation of environmental water management arrangements. Independent auditing should be focused on the adequacy and best use of held environmental water to achieve outcomes, regular and publicly reported.

¹⁵ NWI paragraph 79(i(d)).

Trading

The NWI requires provision for environmental water managers to trade water allocations at times the water is not required to contribute towards environmental and other public benefit outcomes.¹⁶ All environmental water holders have the authority to trade. Environmental water holders can use water trade in two key ways:

- administrative water transfers enable environmental water to be moved across river systems and/or between environmental water holders for environmental purposes (under no financial considerations). These are the majority of trade types undertaken by water managers and are required to operationalise many environmental water decisions outlined in seasonal watering plans
- trading environmental water allocations with consumptive users (both selling and buying) where it is in line with their statutory objectives such as that it benefits the environment.

The CEWH has sold water allocations on five occasions (the first was in 2014). Since 2017 two commercial trades have been undertaken:

- January 2018 — 6 700 ML sold by tender in the Gwydir system to commercial entities.
- September 2018 — 20 837 ML sold in the Goulburn system to commercial entities.

The CEWO publishes a summary of trade intentions on its website once per quarter. This identifies not only potential commercial trades being considered, but also large administrative zero-dollar water transfers to delivery partners to meet environmental water needs. Trade history is also available on the website.

Although the CEWH has not purchased water allocations through direct market mechanisms, the CEWO implemented a market-like instrument in the Lower Balonne in early 2020 that resulted in additional water remaining in the Narran River through a ‘no-pump’ contract. A grant was accepted by a landholder who agreed to forgo pumping of their water allocations during a flow event.

The Victorian Environmental Water Holder has bought and sold small volumes of water allocations since 2011. For example:

- in Southern Victoria in 2018-19, the VEWL purchased water from entitlement holders to increase the supply of water to help manage the risks of dry conditions to native fish and other aquatic animals and plants. VEWL:
 - entered into a once-off exchange of 500 ML with Central Highlands Water to boost water availability in the Moorabool system
 - bought 1 000 ML in the Moorabool system from Barwon Water
 - bought 300 ML from licence holders in the Maribyrnong River.

¹⁶ NWI paragraph 79(i(e)).

-
- in February 2019, the VEWB sold 10 000 ML of water allocation in the Murray system. Revenue from the sale was committed to fund the construction of a fishway at Koondrook Weir (VEWB 2019b, p. 18).

In 2019, the VEWB engaged an independent auditor to review the implementation of commercial trading activity in northern Victoria. Key findings included that: the VEWB's allocation trades have not impacted on the market; the VEWB has a clear and open way of signalling its trade intents; and the VEWB has effective processes to ease potential adverse impacts on other parties and avoid any distortion in the water market. The review's recommendations for the VEWB included consideration being placed on informing the water market about the end of its trade activities and reporting trade results in more detail to promote water market transparency (MJA 2019).

In New South Wales, there are a number of situations that can trigger environmental water trade.

- A budget requirement for purchase or sale identified through monthly budget forecasting.
- Unusual market conditions which present unplanned opportunities.
- A very high environmental water demand that exceeds water availability.
- The risk of forfeit due to reaching an account limit anytime through the year or exceeding the carryover allowed under the licence.
- If environmental water needs are unable to be met with existing allocation.

New South Wales has bought and sold small volumes of environmental water allocations since 2017.

- In 2017-18 — 2 297 ML sold to the Gwydir, Macquarie, Murrumbidgee and Murray river systems.
- In 2017-18 — 2 700 ML purchased from the Lachlan River catchment.
- In 2018-19 — 15 005 ML sold to the Gwydir, Macquarie, Lachlan, Murrumbidgee and Murray regulated river water sources.
- In 2019-20 — 1 500 ML sold to the Murrumbidgee River system.

In addition, New South Wales has sold environmental water carryover space in the Murrumbidgee catchment and purchased carryover space in the New South Wales Murray catchment.

Special requirements for high value assets

The NWI requires special arrangements (where warranted) to sustain high conservation value rivers, reaches and groundwater areas.¹⁷

¹⁷ NWI paragraph 79(i(f)).

Special requirements have been put in place to sustain a number of high conservation value assets. For example, the CEWH is required to protect assets covered by international agreements, such as wetlands of international importance listed under the Ramsar Convention (most of the sites to which TLM delivers held environmental water are Ramsar listed sites). Efforts to protect such assets are facilitated by the Aquatic Ecosystems Toolkit, which provides nationally consistent guidelines for identifying and classifying high ecological value aquatic ecosystems (DAWE nd).

High ecological value aquatic ecosystems have been identified in Victoria and South Australia (PC 2017, p. 442). In New South Wales the high ecological value ecosystems framework has been adopted to prioritise ecosystems for focused water management in water sharing plans (DOI (NSW) 2018a).

Progress on the integration of environmental water management with natural resource management, since 2017 includes:

- in September 2020, the Australian Government announced \$37.6 million in projects to contribute to improved river health and habitats in the lower Murray in light of slower than expected progress in recovery of 450 GL of additional water for the environment. The Australian Government also announced \$20 million to fund community-driven grants for on-ground projects that will improve the health of rivers and wetlands throughout the Basin.
- the Australian Government reported that the CEWO works to ensure complementary measures are employed where possible. For example, in September 2020 the CEWH and Australian Landscape Trust signed a Collaboration Deed focussed on improving the health of the internationally important Calperum Floodplain (part of the Riverland Ramsar site) near Renmark in South Australia (DAWE 2020a). The five year plan includes complementary management projects to improve the effectiveness of environmental watering at Calperum Station. Projects include: infrastructure and works; revegetation, soil remediation and restoration of native plant communities; and management of grazing pressure.
- The Victorian Government has invested \$222 million over four years (2016–2020) to help improve the health of waterways and catchments. Victoria’s approach to this investment was focussed on: partnerships with Traditional Owners, community groups and individuals; targeting priority areas; integrated management; and monitoring (DELWP (Vic) 2019c, pp. 2–3). In Victoria, environmental water management is part of a broader integrated catchment management framework. This provides a holistic way of managing land, water and biodiversity from the top to the bottom of catchments. Environmental outcomes are specified at the state level in Water for Victoria and the Victorian Waterway Management Strategy, and at the regional level in Regional Waterway Strategies. These set priorities for environmental water management and complementary management activities.

The Commission's view

Jurisdictions have made significant progress towards meeting environmental management commitments under the NWI. Joint arrangements in shared water systems have been achieved and arrangements for integrating connected surface water and groundwater systems are largely achieved, with no change in these assessment ratings since 2017.

All jurisdictions have identified agencies responsible for managing water for environmental and other public benefit outcomes through water plans and (where relevant) held environmental water.

For jurisdictions with held environmental water entitlements, any decision to trade environmental water (to ensure accountability) should be based on an objective and transparent approach that takes into account the environmental condition of key assets and the best use of environmental water (for water-dependent ecosystems), free from political interference. The CEWH and VEWH have demonstrated independence. The New South Wales Government should review current governance arrangements to ensure that held environmental water is managed at arm's length from government. As such, the Commission has assessed the NWI commitment of establishing environmental water managers with accountability as largely achieved.

Special requirements are in place to sustain high conservation value assets. Ramsar wetlands and other high ecological value sites have been identified in planning processes. The Commission has therefore assessed the NWI requirement for special arrangements (where warranted) to sustain high conservation value rivers, reaches and groundwater areas, as achieved. However, the recent drought has exposed weaknesses in achieving outcomes in some Ramsar sites during climatic extremes. In particular, there is evidence that ecological conditions have declined since 2017 in the Macquarie Marshes and Narran Lakes (SP C *Environment*).

Moving forward, it is important for environmental water managers to understand the extent to which environmental decline in some Ramsar wetlands (in particular) was an inevitable consequence of the severity and longevity of the recent drought (and outside the bounds of planning), a failure of environmental management or an indication that current environmental water provisions are inadequate. To achieve the best outcomes for water dependent ecosystems, it is also paramount that environmental managers take further steps to integrate environmental water management with natural resource management. This should be considered in a renewed NWI (SP C *Environment*).

All governments with held environmental water (Australian, New South Wales, Victorian and South Australian), are legally able to trade water allocations and entitlements. Therefore, the Commission has assessed this NWI requirement as achieved. However, although the CEWH manages a large quantity of water rights, to date it has only sold water allocations on five occasions. It is desirable that over time the CEWH and other environmental water holders fully exploit trade in allocations to maximise benefits for the environment.

The body of knowledge about environmental water has grown significantly in recent years, but increased effort on monitoring, review and reporting would build on this and enable environmental water managers to improve management and ensure that water for the environment is used for best use and accountably. It is important that investment in monitoring, review and reporting is focussed on agreed outcomes. Areas for attention include reporting on instances where agreed outcomes have not been achieved and increased coverage of the potential for shared community benefits from the delivery of environmental water.

Investment in monitoring, review and reporting should also reflect the risk to achieving agreed outcomes and their value to the community. However, even in areas where the risk is relatively low, some monitoring is needed to ensure management arrangements remain sufficient to maintain the value of environmental assets.

But, investment in monitoring, review and reporting is of little benefit without environmental managers making a steadfast commitment to implement adaptive management. Environmental management requires feedback loops to ensure that the knowledge gained through experience, monitoring, evaluation and research continuously improves management decisions.

Currently, there is no consistent basis for the periodic independent audit of the achievement of environmental and other public benefit outcomes and the adequacy of the water provision and management arrangements in achieving those outcomes. Because of this and the need for an increased focus on monitoring, review and reporting (in some systems and especially where environmental outcomes are not achieved) the Commission has assessed the NWI commitment to independent audit, review and reporting of environmental and other public benefit outcomes, and supporting management arrangements as partially achieved, with no overall change in this rating since 2017.

For jurisdictions that actively manage environmental entitlements to meet NWI commitments, governments should make provisions for the regular and transparent independent auditing of outcomes and the management arrangements in place to support those outcomes. This is needed to ensure the accountability of environmental water holders.

These issues are examined in *SP C Environment*.

5. Water resource accounting

Table 5.1 summarises progress made by jurisdictions towards implementing the water resource accounting actions of the National Water Initiative (NWI). The remainder of this section provides detail to support the findings in the table.

Table 5.1 Assessment summary: water resource accounting

<i>NWI commitment</i>	<i>2017 assessment</i>	<i>2020 assessment^a and progress indicator^b</i>	<i>Comments — progress since 2017</i>
Water accounts			
Practical, credible and reliable information	Largely achieved	Largely achieved 	Water accounting is generally providing practical, credible and reliable information. However, while the requirements of the National Water Initiative are largely met, demand for information and timely provision of it, particularly for system water accounts, have increased.
Avoid unnecessary duplication of effort	Largely achieved	Largely achieved 	Reforms to streamline information collection have largely been implemented.
Environmental water accounting			
Held environmental water is fully and publicly accounted for	Largely achieved	Largely achieved 	All jurisdictions with held environmental water publicly report their holdings annually.
Public reporting on use of held environmental water	Largely achieved	Largely achieved 	Jurisdictions report on the provision of held environmental water, though there is some scope to improve practices. For example, there are some differences in reported volumes of held environmental water account use between jurisdictions.
Public reporting on planned environmental water	Partially achieved	Partially achieved 	Jurisdictions generally undertake public reporting on planned environmental water through rules-based arrangements agreed upon in water plans, but there is scope to improve how information is publicly reported. There is great variation between jurisdictions regarding the amount and types of information available, the frequency of reporting, and how navigable and accessible reported information is.

(continued next page)

Table 5.1 (continued)

NWI commitment	2017 assessment	2020 assessment ^a and progress indicator ^b	Comments — progress since 2017
Water metering and measurement			
Develop and implement metering actions Non-Urban Metering Framework implemented	Partially achieved	Partially achieved 	Most States and Territories are still in the process of implementing non-urban metering policies on the ground with dates extended from 2020 to 2025 in Murray–Darling Basin (MDB) jurisdictions. Some jurisdictions metering policies do not meet all the requirements of the Non-Urban Metering Framework. However, the Metrological Assurance Framework which underpins the Framework is currently being reviewed by the States and Territories.
Compliance and enforcement			
National Compliance Framework implemented	Partially achieved	Partially achieved 	The MDB Compliance Compact included commitments from MDB jurisdictions to review and revise their compliance frameworks. Some jurisdictions have also made amendments to penalties for non-compliance to improve consistency. However, there are still jurisdictions which do not publicly report on compliance activities.

^a **Achieved:** All requirements met, **Largely achieved:** Requirements generally met, with some exceptions, **Partially achieved:** Only some requirements met, **Not achieved:** No requirements met. ^b Progress indicators reflect an overall assessment of whether, on the whole, reforms have moved closer to consistency with the NWI in the three years since 2017. An arrow pointing upward indicates progress, a flat-line indicates no change and a downward arrow indicates poorer performance or backsliding.

Water planning and management rely on adequate information on water resources and water use. Under the NWI, parties agreed that the outcome of water resource accounting arrangements is:

... to ensure that adequate measurement, monitoring and reporting systems are in place in all jurisdictions, to support public and investor confidence in the amount of water being traded, extracted for consumptive use, and recovered and managed for *environmental and other public benefit outcomes*.¹

This section considers progress in achieving the NWI outcomes and objectives relating to water accounts, environmental water accounting, metering and compliance. Section 2 (water markets and trading) assesses jurisdictions' progress in implementing state water registers that underpin the integrity of water entitlements and markets and provide information for water accounts.

¹ NWI paragraph 80.

5.1 Water accounts

Under the NWI, parties agreed to develop and implement robust water accounting, which ultimately could be reconciled and aggregated to produce a national water balance. The NWI includes commitments to develop accounting standards and standardise reporting (to enable ready comparison of water use, compliance against entitlements and trading information). Parties also agreed to benchmark jurisdictional water accounting systems on a national scale and integrate accounting of groundwater and surface water use.²

In addition, the National Water Commission noted that developing water accounts is not a means to an end — the information they provide must be useful for planners, managers and users (NWC 2014, p. 53). And while the range of information in water accounts has significantly expanded, it is important to ensure the accounts are not seen as an outcome in their own right. Reflecting this, the Commission (2017, pp. 449–450) considered whether national water accounting provided practical, credible and reliable information, and avoided unnecessary duplication of effort in 2017. This is also considered in this assessment.

Developments since 2017

In 2017, the Commission found that national water accounting was generally providing practical, credible and reliable information (PC 2017, p. 450). States and Territories had made good progress against their NWI commitments. All jurisdictions were collecting and managing water data and information to inform their water management, and to provide key inputs to national water accounts, which includes surface water and groundwater resources. The National Water Account (published by the Bureau of Meteorology (BOM)) contained information from regions that accounted for 75 per cent of Australia’s population and 70 to 80 per cent of annual water consumption.

There were some reforms underway to streamline information collection (to reduce unnecessary duplication and improve accounting methods). This included the development of a ‘parallel National Water Account (led by BOM) and Water Account Australia (led by the ABS) for a selected region’ (PC 2017, p. 450).

Since then, there have been some developments in both national and state and territory water accounts.

- There has been work to integrate separate, but complementary, national water accounts. BOM and the ABS have integrated a set of water accounts for the ACT as a pilot. This involved BOM’s National Water Account (which measures the volume of water in the environment and available for abstraction, the rights to abstract water and the actual abstraction of water), and the ABS Water Account Australia (which measures flows of water from the environment to the economy, water use in the economy and the monetary value of water). This is intended to aid reporting and environmental management in the

² NWI paragraphs 81-83.

region and support a collaborative approach to environmental-economic accounting, as well as assist in understanding of data and data gaps and improved sharing of data (BOM 2020b).

- Some effort has been made to reduce regulatory burden for reporting entities. For example, since 2017, BOM has developed and trialled a single portal for urban utilities to provide data required for the National Water Account and Urban National Performance Report (led by BOM) and the ABS Water Account Australia and Water Supply and Sewerage Services Survey. The intent was to: reduce regulatory burden for urban utilities (which now only supply data once to both agencies); improve data consistency; and align the reporting of data between BOM and the ABS.
- Initiatives to improve consistency across water accounts are underway. The BOM is collaborating with the Murray–Darling Basin Authority (MDBA) to align the BOM’s National Water Account for the Murray–Darling Basin (MDB) region and the MDBA’s Water Take Report to ensure consistency of concepts, numbers reported and messaging.
- Some jurisdictions have focused on improving public access to water information. For example, New South Wales is developing a new suite of dashboards providing information on trade, water accounting rules, allocations, usages and issued entitlement volumes. It also is progressing work on a ‘Water Insights’ platform to provide more real time information. Victoria launched its *Visualising Water Accounts* website, which explains: how water is managed; water availability, its source and use; and water for the environment. Queensland has trialled a water dashboard to provide water users with easy online access to information about their water entitlements, water availability and usage and there is ongoing development of tools for water entitlement holders under the Rural Water Futures program. South Australia has developed publicly accessible water trade dashboards which provide details on water trades relating to South Australian River Murray water (including price and volume).

In addition, there are plans to further improve water resource accounting in some jurisdictions. For example, Queensland’s *Rural Water Management* program plans to streamline and simplify water accounting rules and processes, and to enable automation.

The Commission’s view

To meet the intent of the NWI, national water accounting should:

- provide practical, credible and reliable information
- avoid unnecessary duplication of effort.

National water accounting is generally providing practical, credible and reliable information. This conclusion is supported by a number of reviews that have found that water accounts provide key benefits to users (including better investment decisions, risk management and operation decision making), and inform policy decisions in relation to water services and infrastructure investment (ANAO 2014, p. 24; BOM 2016, p. 26). Jurisdictions have also

progressed improvements in water registers. These registers underpin the integrity of water markets and provide information to national accounts (*Assessment*: section 2).

Initiatives to reduce reporting burdens and avoid any duplication of effort have progressed. In 2017, BOM had largely addressed the recommendations and actions to reduce reporting burden made by an interagency working group a year earlier (BOM 2017, p. 3). Since then, BOM has completed outstanding actions (for example, as noted, a single portal for urban utilities has been established) and is continuing work to improve data sharing with the MDBA.

However, there is scope for improvement. While several participants to this inquiry recognised the good progress, they also noted some gaps in accounts and variation in progress across jurisdictions. In terms of gaps, participants noted several areas where proper accounting has not occurred. These included: accounting for ‘transfer water’ that is needed to move water over greater distances (Leeton Shire Council, sub. 29, p. 2) and interception activities such as floodplain harvesting (MDBA, sub. 23, p. 5; Lifeblood Alliance, sub. 70, p. 4; IRN, sub. 86, p. 4,). In terms of progress, variation was noted by Coleambally Irrigation Co-operative Limited (sub. 7, p. 8) and the National Farmers’ Federation (sub. 42, p. 18). For example, the New South Wales general purpose water accounting reports were noted as highly useful, but equivalent reports are not available in other states (CICL, sub. 7, pp. 8–9).

Further, the most recent drought has shown that insufficient information and untimely provision of it, particularly through water accounts at the system level, have contributed to a growing mistrust and lack of confidence in water system managers in the MDB. Timely provision and effective communication of information to stakeholders are fundamental in ensuring the integrity of water system management, however the NWI does not include provisions that reflect this. And while these issues are largely relevant to highly developed systems such as the MDB, they provide important lessons for water system management nationally.

Overall, jurisdictions have largely achieved their NWI commitments for water accounting — accounts provide practical, credible and reliable information, and largely do not involve duplication of effort. However, while the requirements of the NWI have largely been met, demand for more information (particularly at the system level) and timely provision of it have increased. Water accounting requires improvement, particularly at the system level. Information gaps, including for interception activities, must be addressed, and more timely and effective communication of information is required. Consequences of not providing information that meets community needs are evident in the MDB, where there has been mistrust in water system management. SP E *Integrity* discusses these issues further and provides advice on how this could be addressed in a renewed NWI.

5.2 Environmental water accounting

Under the NWI, parties agreed to develop principles for environmental water accounting and establish and implement an environmental water register with annual reporting arrangements.³

The Commission has assessed whether jurisdictions have met their NWI commitments by assessing the extent to which held environmental water is fully and publicly accounted for, and if there is regular public reporting on held and planned environmental water.

Developments since 2017

In 2017, the Commission found that jurisdictions had largely met their environmental water accounting commitments for held environmental water, but there was scope to improve reporting on the amount of planned environmental water (PC 2017, p. 452).

Since then, environmental accounting across jurisdictions has remained largely unchanged. For held environmental water, reports are still published by the Commonwealth Environmental Water Holder, Victorian Environmental Water Holder, MDBA (on behalf of The Living Murray program), the NSW Department of Planning, Industry and Environment and the SA Department for Environment and Water, and the types of information reported have not changed. The types include annual reporting on registered entitlements and the volume of water delivered under these entitlements. One development has occurred since 2017 — South Australia has enacted legislation that replaces Natural Resources Management regions with landscape regions. In areas outside of the MDB in South Australia, there is no held environmental water. Water provisions for the environment are taken into account in water planning before water is allocated for consumptive use, and is not actively managed as held environmental water as it is in the MDB.

For planned environmental water, States and Territories still generally report on compliance with rules-based arrangements (generally as part of reporting requirements for water plans and/or state water accounts). The detail, formatting and period of reporting remains varied across jurisdictions.

Some developments are underway. For example, the MDBA is undertaking a work program with Basin States to improve accounting of held environmental water (MDBA 2020d, p. 19). Other initiatives to improve accounting of planned environmental water were not identified.

³ NWI paragraphs 84-85.

The Commission's view

Key requirements for meeting the objectives of the NWI include that:

- held environmental water is fully and publicly accounted for, as applies for other entitlement holders
- there is regular public reporting on how held environmental water is being used (to promote accountability)
- there is regular public reporting on planned environmental water (to ensure that water is allocated as agreed in water plans).

Jurisdictions have largely met the requirements for held environmental water. It is fully accounted for and there is annual public reporting. However, the data collected and reported could be improved. For example, the MDBA (2020e, p. 164) noted that there are issues regarding environmental water accounting in the MDB, including differences in reported volumes of held environmental water account use between Commonwealth Environmental Water Office and Basin States. However, as noted above, the MDBA is undertaking a work program with Basin States to improve this (MDBA 2020d, p. 19).

In regards to public reporting on planned environmental water, there is scope for improvement. While jurisdictions generally undertake public reporting, there is significant variation between them, including in regards to: the amount and types of information available; the frequency of reporting; and how navigable and accessible the information is (SP C *Environment*). For example, New South Wales annually reports on its planned and held environmental water as part of its general water accounting for catchment areas (Burrell et al. 2020, pp. 32–34). Whereas in Queensland, the effectiveness of rules-based arrangements for planned environmental water is assessed using a range of information, including from the state's *Environmental Flow Assessment Program* — of which frequency of reporting and the type of data collected varies across projects (DES (Qld) 2020; DNRM (Qld) 2018, p. 5).

All jurisdictions have developed programs to review and monitor outcomes for planned, and held environmental water (where applicable), and there have been increased efforts in recent years (section 4). In some water systems, however, jurisdictions either have not met their sought environmental outcomes or have not established processes or evidence bases to effectively complete these evaluations. Governments should make provisions for regular and transparent independent auditing of outcomes, and management arrangements to support those outcomes (*Assessment*: section 4).

Overall, jurisdictions have largely achieved their NWI commitments for environmental water accounting, however, more work is required. In particular, the amount of information made publicly available for planned environmental water and its accessibility is limited, and reporting is irregular in some jurisdictions.

5.3 Water metering and measurement

NWI parties agreed that metering should be undertaken on a consistent basis in particular circumstances (such as where water access entitlements are traded and in areas where there are disputes over the sharing of available water).⁴ Recognising that metering needs to be practical, credible and reliable, they also agreed to develop and apply: a national meter specification; national meter standards specifying the installation of meters; and national standards for ancillary data collection systems associated with meters.⁵

In 2009, COAG agreed to a National Framework for Non–Urban Water Metering (the Non–Urban Metering Framework) to help meet the NWI commitments. The Non–Urban Metering Framework had a ten year implementation period, requiring meters to comply with the national metering standards by 2020. Jurisdictions agreed to develop implementation plans to document priorities and targets for non–urban water metering. The Australian Government was to prepare and publish a National Implementation Plan for Non–Urban Water Metering drawing on state and territory implementation plans.

As part of the Non-Urban Metering Framework, parties agreed that State and Territory Governments would publicly report on the implementation of the Framework every two years from 2012 and that BOM would maintain and publish information from state and territory reports on its website.

Developments since 2017

In 2017 all technical aspects of the Non–Urban Metering Framework — such as the development of the Australian standards for non–urban meters and accreditation of meter testing facilities — had been completed and there had been improvement in accuracy and coverage of metering in many parts of Australia (PC 2017). However, States and Territories were assessed as having partially achieved the commitments to develop and implement metering actions and to implement the Non–Urban Metering Framework. The Commission noted that while non–urban metering policies had been developed by States and Territories, they were still in the process of implementing them. Implementation had been subject to delays, partly due to difficulties associated with having meters certified to the required standard, but also more generally taking longer than the timelines set out in the Framework.

There has been a range of policy developments since the 2017 assessment:

- The MDBA is coordinating the revision of the Metrological Assurance Framework (MAF) between the states and territories (MDBA 2019e; NMI and DIIS 2019, p. 9). The MAF is a core component of the Non–Urban Metering Framework, developed to ‘enable implementation of new standards for non–urban water meters’ and covers requirements

⁴ NWI paragraph 87.

⁵ NWI paragraph 88.

related to installation, maintenance, validation, verification, compliance, auditing and reporting of meters (DAWR 2009, p. 1).

- In June 2018, the Australian Government and MDB jurisdictions signed the Murray–Darling Basin Compliance Compact (MDBCC). Commitments related to metering and measurement by Basin States included:
 - publication of a work program by 30 June 2019 to improve transparency about water take under entitlements to be implemented no later than 2025, and rolled out progressively with a priority on high risk areas, with any exemptions supported by justification and published on the website of the relevant state agency⁶
 - publication of a metering policy and implementation plan addressing: meter accuracy (all new and replacement meters must comply with Australian Standard (AS) 4747 no later than June 2025); meter coverage (all take via water entitlements to be metered by June 2025 and a plan for achieving this); transmission of data (a program to progressively automate the reporting of water take no later than 2025); accurate measurement and telemetering of the highest risk take by December 2019; publication of what constitutes highest risk take in metering policies; and identification of a timetable for installing new meters and telemetry, auditing and maintenance of the metering fleet⁷
 - report annually on progress against the implementation plan including the relative proportion of take via AS 4747 meters, interim verified meters, unverified meters and unmetered take from 30 September 2019.⁸
- In 2019 best practice guidelines for minimum non–urban water metering thresholds were designed collaboratively by all Australian states and territories to assist in developing and reviewing metering thresholds. The guidelines were a requirement of the MDBCC⁹ however, they were also developed for zones outside the MDB in MDB jurisdictions and all zones in Western Australia, Tasmania and Northern Territory (MDBA 2019c).
- In response to recommendations from water compliance reviews in 2017 (Matthews 2017a; MDBA 2017b), the New South Wales government developed the ‘Water Reform Action Plan’ (WRAP) (NSW Government 2017). The WRAP committed to ‘build a compliance and enforcement regime that ensures strong and certain regulation’. Actions under this commitment included to publicly consult on a metering and water discussion paper (including an approach to implementing ‘no meter, no pump’ objectives) and to finalise a timetable for implementing new metering requirements following consultation as part of implementing a robust metering framework.
- The NSW Non-Urban Water Metering Policy, the metering–related provisions of the *Water Management (General) Regulation 2018*, and the metering–related provisions of the *Water Management Act 2000* commenced on 1 December 2018 (DPIE

⁶ MDBCC action 1.2(b).

⁷ MDBCC action 3.2 to 3.6.

⁸ MDBCC action 3.7.

⁹ MDBCC action 3.3(iv).

(NSW) 2020j). The rollout dates for new metering requirements for stages 1 through to 3 were postponed by 12 months due to severe drought conditions (Alluvium 2020). New metering requirements that meters must be pattern-approved, have a local intelligence device and tamper-evident seals (and for surface water pumps > 200 mm to have telemetry) came into place for all new and replacement meters from 1 April 2019. All surface water pumps >500 mm are to be compliant with the new requirements from 1 December 2020 and all remaining works that require a meter are to be compliant by 1 December 2023 (DPIE (NSW) 2020i).¹⁰

- Currently 10 000 of the around 37 000 surface and ground water works licensed to take water are required to meter. Under the NSW non-urban metering policy, 22 000 surface and groundwater works will be required to meter by 1 December 2023, accounting for 95 per cent of licensed water take capacity.
- Victoria's policy on non-urban water metering was revised in March 2020, following a review into the implications of the MDBCC and consultation with key stakeholders, to align with the requirements of the MDBCC. The Policy is consistent with the requirements of the MDBCC except for where costs have been determined to outweigh benefits – for example, meters will not be required for sites where water take is for domestic and stock use under section 8 of the *Water Act 1989* (Vic).
- Metering action plans are to be prepared and implemented between water corporations and rural customers and will detail how they meet the requirements of the non-urban water metering policy. This includes requirements that all new or upgraded extraction sites to be metered with an AS 4747 compliant meter, with meters on existing extraction sites to be replaced with an AS 4747 compliant meter at the end of their operational life. Meters should be replaced to comply with AS 4747 or an interim standard by June 2025 and metered water take is also to be telemetered by June 2025 where the costs outweigh the benefits. A risk-based approach has been adopted in metering where the requirement to have a compliant meter can be varied by the water corporation where the risks are manageable and meter reading frequency is based on risk.¹¹
- Victoria has approximately 63 083 non-urban water meters. Approximately 84 per cent of water take is metered, 56 per cent is telemetered and 73 per cent is measured through meters that are AS 4747 or that meet the ± 5 per cent accuracy target set by the National Framework for Non-Urban Metering (State of Victoria 2020, p. 1).¹²
- In 2018 Queensland established the *Rural Water Management Program* to address findings from the Independent Audit into non-urban water measurement and compliance and commitments under the MDBCC. The program aims to strengthen water

¹⁰ Compliance with metering requirements will be implemented in stages by region. All remaining works requiring meters in the northern inland region are to be compliant by 1 December 2021, the southern inland region by 1 December 2022 and the coastal region by 1 December 2023.

¹¹ A minimum standard of once a year for low volume low risk, twice a year for surface winter fill licences and more frequently for higher risk situations.

¹² As at September 2020, only 13 per cent of take is from fully AS4747 compliant meters (State of Victoria 2020, p. 2).

measurement and improve water information transparency amongst other objectives. It has since evolved into the Rural Water Future program.

- Consultation on a range of non-urban water measurement policy proposals was undertaken in late 2019. A number of complexities that need further scoping were identified, including application of telemetry, transitional arrangements for existing meters and meter performance requirements. Queensland has commenced trials of telemetry devices to further support the development of the policy and associated technical standards. Further consultations on policy are required with a view to delivering a final policy in 2021.
- Queensland has prepared a Program to Improve the Measurement of Overland Flow, including a new policy to provide a method for measuring the take of overland flow water in complex infrastructure settings.¹³ The first stage of the program (expected to be completed Q1 2021) is the implementation of a consistent framework for measurement of water levels in storages is an important precursor to the accurate accounting for volumes taken by overland flow take.¹⁴ Implementation will be prioritised for the Queensland MDB catchments, with further implementation to occur across other catchments where required. The final stage of the program is a water balance derivation process for accurately determining overland flow water volumes taken. This is expected to be implemented by late 2025.
- The former Department of Natural Resources, Mines and Energy introduced performance measures and targets into the 2020-21 Compliance Plan — water and metering and audit targets are identified.
- In Queensland 51 per cent of water entitlements are currently metered which accounts for approximately 77 per cent of the total volume of water allocated under water entitlements across the State.
- Western Australia made amendments to the *Rights in Water and Irrigation Regulations 2000* in early 2018 to require metering for licences in specific entitlement categories by certain times, consistent with the staged implementation of the ‘Measuring the Taking of Water Policy’ (first published in 2016 and updated in 2019) to improve metering regulation and licensing fees regulation (for public water supply and mining/industry licences). The regulations remove the requirement for metering to be administered through complex licence conditions and override any existing metering conditions applied to water licences. The Measuring the Taking of Water Policy is in the final stages of implementation and from 31 December 2020, all water licences in Western Australia

¹³ It builds on the existing framework which ensures no growth, includes a process for establishing fully specified water licences and allows for simple measurement to be implemented.

¹⁴ In a consultation paper on proposals to strengthen non-urban water measurement, the Department of Natural Resources, Mines and Energy (Qld) (2019c, p. 16) noted it is considering other measurement options such as ‘desktop satellite imagery analysis and the use of remote sensing technologies such as Lidar to assess storage volumes and potential growth’ where metering is not suitable to improve the accuracy of measuring overland flow take. Measuring on-farm water storages currently does not account for on-farm operations, take under other entitlements and climate that make it difficult to assess compliance against an overflow water licence (DNRME (Qld) 2020c).

greater than 10 megalitres (ML) per year will be subject to metering requirements (97 per cent of licensed water entitlements) unless they fall within a statutory exemption category. The Measuring the Taking of Water Policy has facilitated a transition from a ‘mostly’ state-owned water metering regime to a self-metering regime where licensees bear the statutory responsibility and cost of water meter supply, installation, maintenance, reading and meter read reporting.

- South Australia undertook a review of the legislative and policy framework around metering licensed water use in 2019. New regulations, policy and specifications for the metering of licensed water use were introduced on 1 July 2019 requiring that all new and replacement meters must comply with national metering standards.
- In South Australia, 96 per cent of licensed non-urban water take is subject to metering¹⁵
- The *Tasmanian Standard for Non-Urban Water Meters* (DPIPWE (Tas) 2014) and *Tasmanian Water Accountability and Reporting Policy, 2014* remain in place. In October 2020, the draft *Rural Water Use Strategy* (DPIPWE (Tas) 2020a, p. 9) was released for public comment, and while it does not explicitly mention metering, it includes an action to review ‘reporting frameworks to strengthen risk-based water use and water conveyance measurement and reporting’. Tasmania is involved in the review of the MAF and will consider reviewing its metering policy once the review is finalised.
- In Tasmania, of the 2 120 licences for water take, 770 require metering and account for 34 per cent of water allocated by volume.
- The ACT Government has made no changes to metering policy since 2017. Future changes are likely and will be in line with any changes to the MAF. All licenced water use in the ACT must be metered but some uses of water do not require a licence. Approximately 95 per cent of water take in the ACT is metered.
- In the Northern Territory the *Non-Urban Water Metering Code of Practice for Water Extraction Licences* was published mid-2017, consistent with the national framework, however, instead of compliance by 2020 the code allows implementation until 2027.
- The proportion of water use that is allocated through licences in the Northern Territory is unknown as all water resources have not been quantified. As of 31 August 2020, 536 294 ML was allocated through 553 water extraction licences with some licences having multiple extraction points requiring meters.

¹⁵ Noting that metered use includes all use confirmed to be metered as well as environmental water use that is measured using an alternative measuring system. Forestry water use is not included in the remaining 4 per cent ‘unmetered use’ as it is a land use that is unable to be physically metered. Water use in the Far North Prescribed Wells Area is not currently metered (largely due to practical challenges with high temperatures and pressure) and is also not included in the ‘unmetered use’. Water use by the petroleum and mining industry is accounted for and reported back to the South Australian Government. Work is in progress to identify options to account for water use for pastoral purposes.

The Commission's view

To meet the intent of the NWI, water accounting (including water metering) should provide adequate measurement to support public and investor confidence in the amount of water being traded and extracted for consumptive use. The NWI also noted that metering should be practical, credible and reliable. To facilitate this all jurisdictions were to develop and implement metering actions and implement the Non-Urban Metering Framework so that all meters were compliant with the national standard (AS 4747) by July 2020.

There has been significant movement in this space since 2017, particularly in MDB jurisdictions, where non-urban metering policies have been reviewed to meet MDBCC commitments.¹⁶ The MDBCC Assurance Report (MDBA 2019g) had key concerns with respect to South Australia's lack of a work program to improve the transparency of real-time information on extractions and flows in unregulated systems and the ACT's lack of public justification for exemptions from requirements of the MDBCC regarding metering. The 2020 evaluation of the Basin Plan noted:

There have been significant improvements in water metering, monitoring and accounting' but that further improvements are required to build confidence that all water being traded, used for consumptive or environmental use is accounted for and all players have a fair system. (MDBA 2020c, p. 115)

Western Australia is in the final stages of rolling out their Measuring the Taking of Water Policy so that 97 per cent of water licences will be metered and the Northern Territory now has in place a non-urban water metering code of practice. Best practice guidelines for metering thresholds have been developed for all States and Territories (MDBA 2019c).

Irrigation Australia noted that not all elements of State and Territory metering policies meet the requirements of the national framework and that the 'lack of compliance has led to a very inconsistent outcome for metering across states and territories which has resulted in confusion and unnecessary complications for certified meter installers and validators, water users and irrigators' (sub. 3, p. 8). Inconsistencies between jurisdictions water measurement policies was also raised by other inquiry participants (CICL, sub. 7; NIC, sub. 13; EDO, sub. 54).

Despite the recent progress in this space, the Commission's view is that no jurisdiction has fully achieved the NWI commitment of implementing the Non-Urban Metering Framework. Many are still in the process of implementing commitments to have AS 4747 pattern approved meters installed by 1 July 2020, with dates pushed out until 2025 in the MDB jurisdictions and 2027 in the Northern Territory, and no defined dates for Tasmania and Western Australia.

The severe drought that has affected much of Australia since early 2017 highlighted metering and compliance failures, with several participants to the inquiry raising concerns with respect

¹⁶ New South Wales reviewed its non-urban water metering policy as part of Water Reform Action Plan in 2017, prior to the MDBCC agreement.

to floodplain or overland flow harvesting (SRI, sub. 77; RGA, sub. 82; MVPD, sub. 101; AFA, sub. 45) and accounting for water take in real-time (SRI, sub. 77; Engineers Australia, sub. 63; AWA, sub. 89; EDO, sub. 54). It is not yet clear whether jurisdictions' non-urban metering policies will effectively target these failures. The 2023 assessment will be better placed to assess the implementation of these updated policies.

In 2017 the Commission considered that it was important for the Australian, State and Territory Governments to agree on a way forward with the Non-Urban Metering Framework that maximises the net benefits of rolling out new meters, and clearly communicates this to affected water users (PC 2017, p. 292). The MAF modernisation project being led by the MDBA provides an opportunity for consideration of proportionate, well targeted metering that follows the type of risk-based and fit-for-purpose approach outlined in SP E *Integrity*.

5.4 Compliance and enforcement

State and Territory Governments are responsible for administering water compliance and enforcement laws within their jurisdiction. The development of the National Framework for Compliance and Enforcement Systems for Water Resource Management (the National Compliance Framework) implemented a 2009 COAG commitment to improve compliance and enforcement of water resources and represents the nationally agreed standard for ensuring compliance with state based water laws and regulations.

The National Compliance Framework comprised six major components:

1. water laws — each jurisdiction agreed to use 'best endeavours to introduce and pass legislation to adopt consistent offence provisions to minimise unlawful water take'
2. risk assessment — assessment of all water resources according to a nationally consistent risk profile requiring minimum levels of compliance monitoring by jurisdictions in line with the level of risk categorisation.
3. toolbox — development of new and efficient processes and products to improve the efficiency of compliance activities and the skills of compliance officers
4. stakeholder education — a structured approach to 'provide information to educate the public and the stakeholders on the importance of compliance and enforcement of water resources management to the environment and other water users'
5. monitoring — compliance monitoring rates should be based on the level of risk. The majority of monitoring activity will take place where there is high competition for water resources with more compliance officers in the field to 'carry out annual monitoring events equal to ten per cent of the total number of water entitlement/licence holders of a water resource, using on ground officers'
6. reporting — publication of annual reporting and compliance strategies, plans and statistics by water agencies (COAG 2012, pp. 1,7-9).

Developments since 2017

The 2017 assessment found that jurisdictions' commitments to implement the National Compliance Framework had been partially achieved based on a KPMG (2016) evaluation of the National Compliance Framework and on evidence of poor compliance arrangements in some MDB jurisdictions (PC 2017). Water resource accounting was recognised within the NWI as an important underpinning of public support and investor confidence in water entitlements and planning frameworks and markets. However, the Commission noted that findings from reviews into water licence compliance in the MDB (DNRM (Qld) 2017; Matthews 2017b; MDBA 2017b; NSW Ombudsman 2017) raised questions as to whether the guidance on compliance embodied by the National Compliance Framework is sufficient to achieve this objective (PC 2017, p. 294).

Between 2017 and 2020, much of Australia has experienced drought conditions. The scarcity of water during this time has emphasised the importance of licence holders accessing water as set out by their license conditions and a compliance and enforcement regime that ensures this is happening. There has been a range of relevant policy developments with respect to compliance and enforcement since the 2017 assessment.

- As noted above, in June 2018 the Australian Government and the MDB jurisdictions signed the MDBCC. Commitments related to compliance and enforcement included:
 - review of internal governance arrangements for non-urban water management to ensure a strong culture of compliance
 - public reporting on compliance and enforcement actions by location including the timeliness with which allegations are addressed
 - publication of a revised compliance framework addressing the requirements of recommendation 6 of the MDB Compliance Review
 - establishment of a network of water compliance practitioners, coordinated by the MDBA, to promote best practice and innovation in compliance.
- Establishment of a new statutory compliance role with the Interim Inspector-General of Water Compliance was announced 4 September 2020 (Pitt 2020). The Inspector-General will be supported by the Office of Water Compliance which will be in the Department of Agriculture, Water and Environment once amendments are made to the Water Act (IGWC 2020).¹⁷
- New South Wales' commitment to 'build a compliance and enforcement regime that ensures strong and certain regulation' under the WRAP had a focus on capability, independent regulation and innovative technologies (NSW Government 2017). There was also an action to publish compliance and enforcement activities to increase transparency in water management and actions to build capability to support

¹⁷ Until amendments to the Water Act are made, the MDBA will retain responsibility for compliance and enforcement with the Water Act, Basin Plan and Water Resource Plans (IGWC 2020).

implementation of water reforms. All the actions related to compliance and enforcement, except one, have been independently assessed as being completed (Alluvium 2020).¹⁸

- The New South Wales Natural Resources Access Regulator (NRAR) was established in 2017 under *The Natural Resources Access Regulator Act 2017*. It has legislated responsibility for ensuring compliance with metering regulations and licence conditions. It takes both proactive monitoring and audit activities and reactive enforcement responses to reports of non-compliance. The NRAR also has specific obligations under the MDBCC to engage in risk-based auditing of validated metering requirements with the MDBA.
- The NRAR uses satellite data as well as high-resolution aerial photography to monitor changes in on-farm water storage volumes, wetting and drying of irrigation canals, and changes in the conditions of river channel beds and banks over time. This information is used for rapid assessment of whether something in an image requires further investigation by field staff as well as to plan proactive compliance campaigns.
- Victoria made legislative amendments to the *Water Act 1989* in 2019 to strengthen both the penalties for unauthorised take and water corporations' powers to enforce compliance.¹⁹ Licences can be cancelled or suspended, and water corporations can now issue penalty infringement notices for less serious water offences. An independent review into water corporations and the Department of Environment, Land, Water and Planning's compliance systems and processes was undertaken in 2020 (Pearson 2020). The review made 40 specific recommendations which have been accepted by Victoria. Priorities identified in the *Water Compliance Report 2019-20* are to implement the recommendations from this review, namely to:
 - implement a consistent zero-tolerance approach to addressing unauthorised take
 - embed a more rigorous proactive monitoring approach to monitor non-compliance
 - strengthen governance and reporting arrangements on unauthorised take
 - step up communications to effectively engage with the public about water compliance in Victoria.
- Since 2017 Queensland has made changes to the *Water Act 2000* and *Water Regulation 2016* that have:
 - established a new offence for taking more water, or taking water at a greater rate, than authorised by a water entitlement
 - increased the penalty for failure to comply with a water compliance notice
 - clarified liability for entitlement holders sharing an unsupplemented water meter

¹⁸ No Water Monitoring Technology Plan had been published at the time of the final review in early 2020.

¹⁹ The maximum fines for intentional water theft and related offences if they cause substantial harm are now \$990 000 for companies or \$198 000 for individuals, (an increase from \$9 514 for an individual first offence and \$19 028 subsequent offences in 2017-18). The *Water and Catchment Legislation Amendment Act 2019* (Vic) came into effect on 9 October 2019.

-
- supported additional processes for ensuring unsupplemented water meter faults are identified and repaired
 - made minor, consequential and operational amendments to give effect to normal operational business processes.
 - Queensland has developed a whole of department compliance framework and strategy (2020–24) for the former DNRME²⁰ which incorporates natural resources. A whole of department compliance plan, setting out performance measures, focus areas, activities and targets for each regulatory division’s business area plan, including water, has been published for 2020-21 and has made enhancements to improve the data available to complete compliance and enforcement reporting. A new compliance web page has been developed with this information.²¹
 - The 2018-19 Annual Report committed the Department to publishing an annual review of water regulatory activities (DNRME (Qld) 2019a, p. 18).
 - The whole of department compliance plan supports those business areas to take a risk-based, transparent and consistent approach to regulating Queensland’s water resources. The plan is completed annually to identify the activities that support each business area to implement the compliance approach. In mid-2021, the Department expects to publicly report on the outcomes of the 2021 plan.
 - Two new compliance governance groups were created in 2018: a Major investigations group (conducts investigations) and a Compliance review group (reviews processes, procedures and guidelines).
 - A new authorised officer training program has also been developed which includes a blended learning approach of online training modules, virtual training delivery and workplace activities and assessments for staff to practice and demonstrate their new skills.
 - In addition to the training program, the appointment pathway of authorised officers has been refined by incorporating a workplace certification where managers confirm that the staff member has the knowledge, skills and capability to undertake the role prior to appointment. The appointment system has also been redeveloped to improve management, monitor appointments and the issuing of identity cards.
 - Queensland currently only reports publicly on water compliance and enforcement actions undertaken in the MDB. However, it is in the process of developing a new compliance management system to support the administration of compliance in natural resources and legislative improvements to enhance the regulatory framework. The new system is proposed to go live in March 2021 and will support the capture of more consistent data and deliver enhanced reporting to support regulatory capability.

²⁰ Following the Queensland State election in October 2020, responsibility for the management of Queensland’s water resources transferred to the Department of Regional Development, Manufacturing and Water. At 27 January 2021, it is unclear whether the regulatory compliance role had shifted across from what is now the Department of Natural Resources.

²¹ www.dnrme.qld.gov.au/home/about-us/regulatory-role

-
- Western Australia appears to have made no changes in non-urban water compliance and enforcement policy since 2017. The final stage of the Measuring the Taking of Water Policy was to be implemented by December 2020, requiring all licensees (with entitlements greater than 10 ML per year) to record monthly meter readings and submit these annually through the Water Online Customer portal.²² The Department of Water and Environmental Regulation is responsible for ensuring compliance with non-urban water metering requirements and undertakes risk-based and periodic water meter audits post installation under the *Rights in Water and Irrigation Regulations 2000* or via water licence conditions. Compliance and enforcement actions are reported in the annual reports.
 - The South Australian Government has made a number of changes since 2017. These included:
 - moving from an annual to a quarterly water accounting period and compliance approach for the River Murray Prescribed Watercourse with a process to review and re-Gazette the penalty charge for overuse each quarter so it is in step with the value of the water in the water market
 - development of a draft policy escalating compliance actions for water users that continually exceed their licence allocation. The policy also aims to apply consistency around when a licence is varied, suspended or cancelled. Initial steps of the policy (education) commenced in the 2019-20 water year
 - implementation of administrative penalties for using in excess of authorised volumes in all South East Prescribed Wells Areas following metering and volumetric conversion. Penalties for overuse and illegal take of water have been in place since 2016-17 and have more recently been introduced for any unauthorised water use by holders of section 105 authorisations²³ across the state
 - published a revised compliance framework and compliance data on its webpage ‘Water compliance reporting’ and an enhanced water register is being developed as part of its commitments to compliance and enforcement under the MDBCC (MDBA 2019g, p. 27).
 - Remote sensing is being used in South Australia to determine whether there has been unauthorised water use or non-authorised or non-compliant works undertaken. It is also used if a meter temporarily stops working and other records are not available.
 - Tasmania has not made any changes to its reporting on compliance since 2017 and still does not publish this information. However, an operational review undertaken in 2017-18 has resulted in a number of changes to how compliance activities are delivered which may facilitate better reporting in the future. These changes have included:
 - a shift from a regional to a centralised model of compliance delivery to deliver consistent outcomes across the state

²² Alternative submission methods to the electronic Water Online Portal can be approved.

²³ *Landscape South Australia Act* (2019).

-
- an increased focus on education and engagement activities through information days and other communication
 - an audit compliance program developed on a risk profile of all catchments (to date 117 licences have been audited in 5 catchments, prioritised using a risk assessment framework)
 - a Water Investigations Panel made up of senior representatives from the three water branches has been established to assess and provide direction for compliance cases
 - a risk assessment tool has been developed to assign risk to compliance cases and filter low risk cases before they go to the Water Investigations Panel.
- As part of its commitments under the MDBCC, the ACT has published a revised compliance framework and annual compliance planning (MDBA 2019g, p. 31). Details on compliance activities are provided as an annexure to the annual report of the Chief Minister, Treasury and Economic Development Directorate.
 - In the Northern Territory the offence and penalty provisions in water legislation were substantially revised in the *Water Legislation Amendment Act 2018* and now reflect contemporary practice. The NT Department of Environment and Natural Resources has published its Compliance and Enforcement Priorities (operational policy) for the 2020 water accounting year online. Reporting against these priorities is not currently published. Remote sensing has been used to track the expansion of irrigated agriculture on properties to determine if the irrigated footprint exceeds the known development plan of the licence holder and aligns with the licence entitlements.

The Commission's view

Credible and cost effective compliance and enforcement frameworks for water resources are fundamental to ensuring clear and secure property rights to water. The National Compliance Framework sought to establish a nationally agreed standard for ensuring compliance with state based water laws and regulations, develop and apply a risk category to water resources, adopt best practice tools to assist with compliance and enforcement, educate the public and stakeholders in laws and the importance of compliance, ensure monitoring and enforcement requirements are implemented according to levels of risk and to report on policies and statistics on compliance.

Since 2017, there has been a further strengthening of compliance and enforcement activities in almost all jurisdictions with respect to non-urban water. Notable is that MDB jurisdictions have reviewed their compliance frameworks to meet commitments made under the MDBCC in 2018 and that Victoria, Queensland, South Australia and the Northern Territory have all made legislative changes strengthening penalties and offences. Tasmania has undertaken an operational review that has changed the way compliance activities are delivered.

The Basin Plan 2020 Evaluation (MDBA 2020c, p. 111) found that while there has been considerable progress by MDB jurisdictions against their MDBCC commitments,

opportunities leveraging technological advancements to further improve compliance should be pursued as a priority. Many jurisdictions do not require the installation of telemetry in systems at high risk and rely on self-reporting in all systems. There is currently limited information on auditing to verify the efficacy of self-reporting, despite the requirement of jurisdictional agencies to check compliance of each non-urban meter at least once every five years under the Non-Urban Metering Framework and to provide bi-annual audit report to provide an overview of metering activities.

Participants to the inquiry have raised concerns around compliance and enforcement, even with the high level activity in this space since 2017.

- Irrigation Australia noted that even where metering policies meet the requirements of the national framework (sub. 3, p. 4), in some jurisdictions there is no evidence of enforcement.
- The Environmental Defenders Office raise that ‘compliance and enforcement in Western Australia appears to be *prima facie* problematic’ as they ‘have been unable to find any publicly reported prosecutions brought by the state for alleged breaches of the *Right in Water and Irrigation Act 1914* (WA) (sub. 54, p. 8).

While the Commission acknowledges the large amount of work in this space since 2017, most jurisdictions are yet to fully achieve the commitment to implement the National Compliance Framework. New South Wales and Queensland undertook independent reviews and began their own reform agenda prior to the MDBCC being agreed to. While New South Wales has made significant changes to their non-urban water compliance regime, Queensland is still in the process of developing a number of reforms and is yet to publish information on compliance activities outside of the MDB. Tasmania and the Northern Territory do not publish information on non-urban water compliance activities and the information published by Western Australia and the ACT does not include the location or the timeliness of enforcement actions. For most jurisdictions, it is not clear whether or not water resources at higher risk have at least 10 per cent of licences subject to compliance monitoring.

6. Urban water reform

Progress against the objectives, outcomes and actions under the NWI urban water reform element is considered under the following headings:

- urban water service quality
- water reuse, end use efficiency, water sensitive urban design and innovation.

Table 6.1 summarises this progress.

Table 6.1 Assessment summary: urban water reform

<i>NWI commitment</i>	<i>2017 assessment^a</i>	<i>2020 assessment^a and progress indicator^c</i>	<i>Comments — progress since 2017</i>
Achieving healthy and safe water supplies: Major cities	Largely achieved ^b	Achieved 	Water quality compliance generally achieved, occasional water quality incidents reported.
Achieving healthy and safe water supplies: Regional and remote	Largely achieved ^b	Largely achieved 	Most jurisdictions are taking steps to improve regional service quality. Some poor outcomes have been caused by drought. Drinking water quality remains an issue in some remote communities.
Pursuing water reuse, end use efficiency, water sensitive urban design and innovation	Largely achieved	Largely achieved 	Jurisdictions have continued to maintain progress in this area and substantially met their commitments under the current NWI. Efforts to encourage cost-effective water reuse and efficiency measures, as part of embedding integrated water cycle management as 'business as usual', should continue.

^a **Achieved:** All requirements met, **Largely achieved:** Requirements generally met, with some exceptions, **Partially achieved:** Only some requirements met, **Not achieved:** No requirements met. ^b The Commission's 2017 assessment did not distinguish between outcomes in major cities and regional and remote communities. ^c Progress signals reflect an overall assessment of whether, on the whole, reforms have moved closer to consistency with the NWI in the three years since 2017. An arrow pointing upward indicates progress, a flat-line indicates no change and a downward arrow indicates poorer performance or backsliding.

6.1 Urban water service quality

The NWI committed jurisdictions to providing healthy, safe and reliable water supplies,¹ but did not include any specific actions to address these aspects of water service delivery.

¹ NWI paragraph 90(i).

In 2014, the NWC assessed progress in this area in general terms, noting that:

Regional and remote service providers face their own range of economic, demographic and geographic challenges, and there have been incidents of non compliance with drinking water standards. Boil water alerts have been triggered in many regional and remote communities across Australia to manage public health during system failures. (2014, p. 66)

In its 2017 inquiry, the Commission analysed drinking water quality outcomes to develop an updated understanding of progress. It concluded that regulatory practice broadly reflected the approach set out in the *Australian Drinking Water Guidelines* (ADWG).

Developments since 2017

In the absence of specific actions to assess progress since 2017, the Commission has considered:

- the extent to which State and Territory drinking water quality management and reporting frameworks reflect the ADWG
- water service outcomes (including water quality and reliability)
- policy changes and programs designed to improve water service outcomes.

Drinking water quality management and reporting frameworks

The ADWG offer a framework within which drinking water quality outcomes can be monitored and managed, consistent with the overall objective of healthy and safe water supplies. The ADWG form part of the *National Water Quality Management Strategy* and are overseen by the National Health and Medical Research Council.

States and Territories have all endorsed the ADWG, and most implement them through regulatory arrangements (table 6.2). These jurisdiction-based regimes typically require water service providers to establish risk management, monitoring and reporting regimes consistent with those set out in the ADWG, and to report on instances of contamination exceeding the guideline parameters.

Water service quality outcomes

The Commission has undertaken a high-level review of water service quality outcomes, which incorporates both drinking water quality outcomes and service reliability.

Table 6.2 State and Territory drinking water quality regulation

	Utility	Legislation	Regulatory framework
NSW	WaterNSW Sydney Water Hunter Water	<i>WaterNSW Act 2014</i> <i>Sydney Water Act 1994</i> <i>Hunter Water Act 1991</i>	The Independent Pricing and Regulatory Tribunal administers licences that require ADWG compliance as defined by NSW Health. NSW Health's MOUs with the water businesses ensure cooperation.
	All NSW drinking water suppliers	<i>Public Health Act 2010</i> <i>Public Health Regulation 2012</i>	NSW Health monitors public drinking water supplies and ensures all providers have water quality assurance programs based on the ADWG. Regional utilities are subject to NSW Health's Drinking Water Monitoring Program.
Vic	All Victorian water businesses	<i>Safe Drinking Water Act 2003</i> <i>Safe Drinking Water Regulations 2015</i>	The Department of Health and Human Services audits water businesses' risk management frameworks and ensures that standards for water quality meet the ADWG.
Qld	All Queensland drinking water service providers	<i>Water Supply (Safety and Reliability) Act 2008</i> <i>Public Health Act 2005</i> <i>Public Health Regulation 2018</i>	The Department of Regional Development, Manufacturing and Water requires providers to register and develop a drinking water quality management plan. Queensland Health provides directions during public health incidents and sets standards based on the ADWG.
SA	All entities who supply drinking water to the public ^c	<i>Safe Drinking Water Act 2011</i> <i>Safe Drinking Water Regulations 2012</i>	SA Health requires all providers to register with them, implement a risk management plan and are subject to audits and inspections to implement the ADWG as per the Act.
WA	All water corporations ^a and regional providers ^b	<i>Water Services Act 2012</i>	The Economic Regulation Authority issues licences based on compliance with an MOU with WA Health. WA Health audits water quality and management to comply with the ADWG through the MOU. For regional providers, exemptions to licensing may be granted or revoked by the Minister for Water.
Tas	TasWater	<i>Public Health Act 1997</i>	Director of Public Health issues Tasmanian Drinking Water Quality Guidelines based on the ADWG.
NT	Power and Water Corp. Indigenous Essential Services	<i>Water Supply and Sewerage Supply Act 2000</i>	NT Health has an MOU with the Power and Water Corporation. The Power and Water Corporation implements internal water quality monitoring in line with the ADWG.
	Small private suppliers	<i>Public and Environmental Health Act 2011</i> <i>Public Health Regulations 2014</i>	Operators should maintain a water supply management plan. NT Health recommends regularly testing drinking water quality against the ADWG and taking immediate action if there is a public health incident.
ACT	Icon Water	<i>Public Health Act 1997</i> <i>Public Health (Drinking Water) Code of Practice 2007 (No1)</i>	ACT Health issues the Code based on the ADWG. Icon Water must comply with the Code to be issued the Drinking Water Utility Licence from ACT Health.

^a Water Corporation, Busselton Water and Aqwest. ^b Department of Communities (Housing Authority) provides water to 79 remote Aboriginal communities through the Remote Essential & Municipal Services Program. Local governments and small private entities provide drinking water to some small communities.

^c Includes SA Water, water carters, town suppliers, rural and remote communities and private providers.

Sources: DHHS (Vic) (2020b); DOH (NSW) (2020a, 2020c, 2020b); DOH (NT) & Power and Water Corporation (2011); DOH (NT) (2019, p. 5); DOH (WA) (2020); DWER (WA) (2020d); Icon Water (2020, p. 10); Power and Water Corporation (2019, p. 18); Queensland Health (2020); SA Health (2020); TasWater (2020a); Water Corporation (2020b).

Contemporary drinking water quality outcomes reported by the jurisdictions are summarised in table 6.3.

Table 6.3 Water quality outcomes

Reported compliance

	Reporting entity	Reporting period	Outcomes
NSW	Sydney Water	2018-19	100 per cent microbiological compliance across all 13 schemes.
	Hunter Water	2019-20	99 per cent microbiological compliance. 100 per cent aesthetic and health-related chemical compliance. ^a
	Regional	..	No comprehensive public reporting of water quality outcomes since 2015-16. Aboriginal communities generally achieved full chemical and microbiological compliance in 2018-19, although mixed outcomes on physical compliance, and samples were not collected in some communities. ^b
Vic	Department of Health and Human Services	2018-19	97.2 per cent of providers fully compliant with water quality standards based on the ADWG.
Qld	Department of Natural Resources, Mines and Energy	2019-20	97 per cent of drinking water providers compliant with drinking water quality regulatory requirements.
WA	Water Corporation	2018-19	100 per cent microbiological, radiological and health-related chemical compliance, but some aesthetic non-compliance.
	Busselton Water	2019-20	100 per cent microbiological, radiological and health-related chemical compliance, but some aesthetic non-compliance.
	Aqwest	2018-19	100 per cent microbiological, radiological and health-related chemical compliance, but some aesthetic non-compliance.
SA	SA Water	2018-19	At least 99 per cent compliance with the ADWG in all regions, including remote Aboriginal communities.
Tas	TasWater	2018-19	100 per cent microbiological compliance, some chemical and aesthetic non-compliance.
NT	Power and Water Corporation	2017-18	<i>Urban and minor centres:</i> Compliance largely achieved against ADWG; health parameter exceedances observed in 4 of 20 urban centres. <i>Remote communities:</i> Health related (radiological and microbiological and chemical) parameters were met in 65 of 72 remote communities. There was aesthetic non-compliance against ADWG. The required number of samples were not collected in 21 remote communities.
ACT	Icon Water	2019-20	General microbiological and chemical compliance against ADWG, but some aesthetic non-compliance. ^a

^a Hunter Water and Icon Water do not regularly test for radiological compliance. ^b Based on information provided by the New South Wales Government in response to the Commission's information request.

Sources: Aqwest (2019, p. 24); BOM (2020c); Busselton Water (2020); DHHS (Vic) (2020a, p. 4); DNRME (Qld) (2020a, p. 116); Hunter Water (2020); Icon Water (2020, p. 37); Power and Water Corporation (2018, pp. 41–55); SA Water (2019, p. 57); TasWater (2019, p. 13); Water Corporation (2019b, p. 7); responses to State and Territory information requests.

Jurisdictions have also provided information to the Commission on water quality and supply incidents since 2017, which are summarised in table 3.4.

Table 3.4 Water quality and reliability incidents
Reported to the Commission since January 2017

Jurisdiction	Boil water notices	Water carting
NSW	59	23
Vic	3	1
Qld	142 drinking water advisories ^b	Not provided ^d
WA	None	None
SA	None	2
Tas	Permanent: 11 ^c Temporary: 6	1 (due to raw water availability) ^d
NT ^a	2	None
ACT	None	None

^a Only for communities supplied by NT Power and Water Corporation. ^b includes 'boil water', 'do not drink' and 'do not use' notices; some are issued precautionarily. ^c All permanent boil water notices have been removed as of 2019-20. ^d Water carting is used regularly in some communities.

Sources: DHHS (Vic) (2018, 2019, 2020a); responses to State and Territory information requests.

Jurisdictions also reported on the use of water restrictions, which can also be a measure of service reliability. Water restriction definitions vary by state, and many of these restrictions were applied in response to persistent drought across southern and eastern Australia.

- In New South Wales, level 1 water restrictions were first applied across Sydney in June 2019, and level 2 restrictions were in place between December 2019 and February 2020. Level 1 restrictions remain in place.
 - Water restrictions are implemented at the local utility level across the rest of the state. Temporary water restrictions were applied for at least some of the year in:
 - ... 2016-17: 17 utilities (16 per cent of utilities)
 - ... 2017-18: 24 utilities (22 per cent)
 - ... 2018-19: 39 utilities (36 per cent).
- Permanent water saving rules apply across Victoria. Since 2017, additional water restrictions were put in place in the Northern, Eastern and South Eastern regions of the state.
- Temporary water restrictions have been applied in eight water supply schemes outside of south-east Queensland. Since 2017, regional utilities have applied water restrictions for at least one day as follows.
 - 2016-17: 75 utilities (28 per cent of utilities)
 - 2017-18: 81 utilities (30 per cent)

-
- 2018-19: 114 utilities (41 per cent)
 - 2019-20: 64 utilities (23 per cent).
 - Permanent water efficiency measures are in effect across Western Australia, with stages of water restrictions set out in the *Water Services Regulations 2013* (WA). Only one temporary water restriction has been applied since 2017.
 - Permanent water restrictions are in effect in South Australia, and no temporary restrictions have been imposed since 2017.
 - For Tasmania, there were 20 applications of catchment-specific temporary water restrictions imposed since 2017, including one ‘Statewide’ application in early 2020.
 - The Northern Territory did not report any temporary or permanent water restrictions.
 - Permanent water conservation measures are in place across the ACT, and no temporary water restrictions have been applied since 2017.

Policy initiatives commenced or progressed since 2017

Since 2017, most jurisdictions have introduced or extended programs or projects to improve drinking water quality.

- In 2009, the New South Wales Government committed to invest \$200 million over 25 years to improve drinking water quality in Aboriginal communities through the *NSW Aboriginal Communities Water and Sewerage Program*.
- The New South Wales Government has also committed \$1 billion to the *Safe and Secure Water Program*, which was redesigned in 2018 from a grants program into a needs-based funding program. The program aims to allocate funding to projects based on an assessment of the risks (including water security, water quality and environmental risks) to particular regional urban water systems across New South Wales.
 - The program allows for both capital and non-capital solutions to identified water supply risks, including support for local utility water supply planning.
- In 2017, Queensland committed \$120 million over four years through the Indigenous Councils Critical Infrastructure Program to deliver critical water, wastewater and solid waste infrastructure to Queensland’s 16 Indigenous Councils (DLGRMA (Qld) 2020). As at 30 June 2020, \$51.88 million had been committed under this program.
 - Between 2017 and 2019, the *Safe and Healthy Drinking Water* pilot program was delivered in the Torres Strait Islands (Tropical Public Health Service (Cairns) 2019, p. 9). As a result of this program, microbial drinking water incidents reduced from 16 incidents in 2017 (pre-project) to two incidents in 2018 (post-project). The project was funded until June 2019 but has not been rolled out elsewhere.

-
- There have been a number of policy efforts to improve drinking water quality in Western Australia.
 - In 2019, \$23 million was committed through the *Essential and Municipal Services Upgrade Program* to upgrade water services in three remote Aboriginal communities in the Kimberley (Government of Western Australia 2019).
 - In 2020, \$38.9 million has been committed through the WA Recovery Plan to upgrade water services in a further four remote Aboriginal communities on the Dampier Peninsula in the West Kimberley (Government of Western Australia 2020).
 - Since 2017, the South Australian Government has undertaken several actions to improve drinking water quality, including:
 - a \$3.8 million project with the Goyder Institute to complete groundwater investigations to identify potential new water sources for remote communities, completed in 2019-20
 - providing technical advice and services to investigate and develop town water supplies in the Eyre Peninsula and South East Regions, as part of an ongoing investment in water monitoring, science, planning and management to inform water management, including town water supplies, for these regions
 - engaging SA Water to provide water and wastewater services to the APY Lands (SP G *Regional*: box 5), at a cost of about \$3 million (depending on the nature and extent of unforeseen works). Since 2017, this has included the complete upgrade of domestic water supply infrastructure at Watinuma, and the upgrade to water supply and distribution (including new water treatment facilities) at Kanpi, Nyapari and Murputja.
 - Since 2017, TasWater has spent \$60 million on improving water quality outcomes through the *24 glasses campaign*, improving aesthetic drinking water quality and installing fluoridation.
 - As of November 2020, there were no permanent boil water notices in place, compared with 11 in place in December 2017. Taswater reported full microbiological compliance in 2019-20.

The Commission's view

Drinking water quality management frameworks

All jurisdictions have arrangements in place to implement the ADWG, but these regulatory arrangements vary across and within jurisdictions. Water quality regulation in regional and remote areas of New South Wales, Western Australia and the Northern Territory are less rigorous than the major cities.

In the Northern Territory, drinking water standards are currently not set in legislation. This gap was highlighted by the Central Land Council (sub. 35, p. 15):

Under the WSSS [Water Supply and Sewerage Services] Act, the Minister can specify the minimum standards that PAWC [Power and Water Corporation] must meet (S45), and a similar power to prescribe minimum water quality standards exists in the Water Act (S73) and the Public and Environmental Health Act 2011 (NT) (S133). However, instead of enforceable standards, the Department of Health (2011) and PAWC have entered into a Memorandum of Understanding (MOU), which concedes that ‘no minimum standards for drinking water have been set’, although the Australian Drinking Water Guidelines (ADWG) ‘will be used as the peak reference’ (Department of Health, 2011, Clause 4). The MOU allows the Department to vary the quality criteria drawn from the ADWG ‘in specific circumstances ... as long as public health is not compromised’ (C4). The MOU contains criteria for the administration and implementation of the ADWG, the safe treatment of water, water testing regimes, responses to public health incidents and events, and annual public reporting of drinking water quality across the NT. However, in strict legal terms, despite the appearance of regulation of drinking water quality and a measure of public transparency the MOU is unenforceable.

Water service quality outcomes — metropolitan

In terms of outcomes, the ADWG are generally met in metropolitan areas. Some States and Territories, such as Victoria, South Australia and the ACT, achieve good drinking water quality results across their jurisdictions. Across most States and Territories some aesthetic non-compliance persists. While these qualities may not directly affect human health, they have the potential to affect health indirectly if people avoid using otherwise safe water due to these aesthetic factors.

Water service quality outcomes — regional and remote

Service quality in some regional and remote areas appears to have declined in recent years, with relatively frequent application of temporary water restrictions in parts of New South Wales and Queensland as a consequence of drought. Although microbiological compliance has remained relatively good, a number of boil water alerts have been issued in both states and emergency water carting has been required in some New South Wales communities.

Water quality issues also remain for some remote communities in the Northern Territory, largely as a result of:

- naturally occurring chemicals in water sources (such as arsenic in groundwater) (PowerWater 2018, p. 50)
- contamination in water sources (such as PFAS from fire-fighting foam leaching into groundwater) (Hall et al., sub. 84, p. 6)
- infrastructure related contamination (such as lead in plumbing) (PowerWater 2018, pp. 41–47).

Jurisdictions are taking steps to address water quality issues in regional and remote areas.

- The redesign of the New South Wales *Safe and Secure Water Program* should better target State government support to areas with the highest risk of poor water quality outcomes. And implementation of the *NSW Aboriginal Communities Water and Sewerage Program* is ongoing.
- Queensland has also made efforts to improve regional and remote drinking water quality since 2017, such as through the *Safe and Healthy Drinking Water Pilot Program* in the Torres Strait Islands. This reflects a shift in Queensland's approach towards partnership with local communities to develop water service delivery skills locally.
- The Western Australian Government has focused on improving the quality of drinking water in remote Aboriginal communities, in partnership with the Water Corporation, under the *Essential and Municipal Services Upgrade Program*. But so far this partnership currently applies to only seven communities.
- In 2017, the Commission observed some water quality issues in regional Tasmania, including 13 permanent boil water alerts (PC 2017, p. 463). Since then, Tasmania has made significant progress to improve regional drinking water quality, and no boil water alerts (temporary or permanent) were in place in November 2020.

However, it is difficult to assess compliance with the ADWG for those states with a large number of utilities reporting on water quality at the local utility level (such as Queensland and New South Wales). Jurisdiction-wide water quality reports have not been published in New South Wales since 2015-16 or in the Northern Territory since 2018. And in all jurisdictions, there is usually little, if any, data published on communities that self-supply, or on remote Aboriginal and Torres Strait Islander communities. Improved national oversight of this reporting could be worthwhile (discussed in *SP G Regional*).

Summary

In summary, the Commission considers that water services in major cities are achieving the NWI outcome of safe, healthy and reliable water supply.

In regional and remote areas, Tasmania and Western Australia have made progress in addressing areas of water supply risk, although issues persist in the Northern Territory. Drought has led to significant service quality issues in parts of New South Wales and Queensland, which indicates that more could be done to ensure communities are prepared for drought.

On balance, NWI outcomes are being achieved in most regional and remote areas, but jurisdiction-wide service quality outcomes are difficult to assess in some cases. New South Wales and the Northern Territory should ensure they report on regional and remote water quality outcomes in a timely fashion to improve transparency.

6.2 Water reuse, end use efficiency, water sensitive urban design and innovation

The NWI set out:

- an overarching objective to have ‘policy settings which facilitate water use efficiency and innovation in urban and rural areas’²
- outcomes to increase water use efficiency, encourage reuse and recycling of wastewater where cost effective and ‘encourage innovation in water supply sourcing, treatment, storage and discharge’.³

Parties to the NWI agreed to a range of actions to support these aims, a number of which were to be completed by 2006.⁴ These actions included:

- implementing the *Water Efficiency Labelling Scheme* by 2005
- implementing a *Smart Water Mark* program for household gardens
- reviewing the effectiveness of temporary water restrictions and associated public education strategies, and assessing the scope for extending low level restrictions as standard practice
- implementing management responses to improve water use efficiency measures, where cost-effective
- developing national health and environmental guidelines for recycled water and stormwater
- developing national guidelines for evaluating water sensitive urban developments
- evaluating existing water sensitive developments to identify gaps in knowledge and lessons for future developments
- reviewing institutional and regulator models for achieving integrated urban water cycle planning and management, followed by preparation of best practice guidelines
- reviewing incentives to stimulate innovation.

Subsequent agreements made by COAG set out further actions that would promote a similar objective and outcomes. The 2008 *COAG Work Program on Water* included actions to establish the National Centre of Excellence in Desalination and the Australian Water Recycling Centre of Excellence (COAG 2008).

Many of these specific actions were implemented in the early days of the NWI, including ‘substantial water efficiency gains through pricing reforms, public education,

² NWI paragraph 23(viii).

³ NWI paragraph 90(ii), (iii) and (v). This element of the NWI also included the outcome to facilitate water trade between rural and urban sectors (considered in section 2) and to achieve improved pricing for metropolitan water (considered in section 3.1).

⁴ NWI paragraphs 91-2.

implementation and monitoring the Water Efficiency Labelling and Standards Scheme, the Smart Water Mark for gardens, and water conservation rules and incentives’ (NWC 2014, p. 63).

In 2017, the Commission concluded that jurisdictions had undertaken significant action in this area, with the NWI commitments largely being met, but noted the importance of ensuring that future policies focused on cost-effective water efficiency measures in order to support broader efficiency objectives (PC 2017, pp. 466–467).

Developments since 2017

Jurisdictions achieved significant coordinated policy actions in this area in the early years of the NWI. The actions listed above were completed in line with the timeframes envisaged by the NWI and subsequent agreements. The National Centre of Excellence in Desalination and the Australian Water Recycling Centre of Excellence were closed in 2016.

Some jurisdictions have reported further progress towards these NWI outcomes.

- The Australian Government announced the third five-year independent review of the Water Efficiency Labelling and Standards scheme on 16 October 2020 (WELS Regulator 2020).
- The New South Wales Government commissioned an independent review into the barriers to cost-effective recycled water initiatives. In response, the Independent Pricing and Regulatory Tribunal completed a review of water recycling prices for public utilities in July 2019.
 - Changes to funding criteria under the *Safe and Secure Water Program* now allow local water utilities to apply for funding to prepare, renew and/or complete local 30-year Integrated Water Cycle Management strategies.
- The Victorian Government is undertaking a whole-of-Government review and update of Victoria’s recycled water regulatory guidance to streamline and clarify approvals processes and facilitate increased uptake for safe and suitable uses.
 - The Victorian Government has also established 15 integrated water management forums to help government organisations and Traditional Owner groups with responsibility for water management work together on: urban water management, water supply, wastewater, flood resilience, waterway health and to develop healthy urban and recreational spaces.
- The Western Australian Government launched the *Waterwise Perth Action Plan* in October 2018, focusing on government-led initiatives to implement IWCM in on-ground developments.
- In South Australia, the Department for Environment and Water has worked with the Department of Planning, Transport and Infrastructure, the Department of Treasury and Finance and the Department for Health to understand the costs and benefits of the

inclusion of water sensitive urban design (WSUD) and green infrastructure in the new Planning and Design Code (currently under development).

- The new planning rules will aim to ensure that better WSUD and greening policies are included in the Code, particularly for infill development, and to improve urban stormwater management in new developments.
- The Northern Territory Government has assisted the City of Palmerston in early work to improve integrated water management, but has made no other changes.

No additional actions were identified in Queensland, Tasmania or the ACT.

The Commission's view

Overall, the Commission's view remains that jurisdictions, both collectively and individually, have undertaken significant activities in this area and largely met their NWI commitments. Jurisdictions should continue to pursue these outcomes, where cost-effective.

However, the relative lack of progress in this area since 2017 reflects that many of the actions sought were relatively modest, or are now outdated.

The Commission has proposed significant enhancements to this area of the NWI in order to embed water use efficiency outcomes of urban water management as part of 'business as usual' — particularly, with regard to integrated planning and management of water supply, wastewater and stormwater (SP F *Urban*). Enhancements to this part of a renewed NWI would be coupled with renewed actions to encourage innovation, and to further promote cost-effective implementation of water reuse and efficiency measures, and water-sensitive urban design.

7. Knowledge and capacity building

Jurisdictions agreed to the following knowledge and capacity building actions to support the implementation of the National Water Initiative (NWI):¹

- identifying the key knowledge and capacity building priorities necessary to support the NWI
- identifying and implementing proposals to better coordinate the national water knowledge effort.

The NWI identified a number of areas where there were significant knowledge and capacity building needs including:²

- regional water accounts and assessment of water availability over time and across catchments
- changes to water availability from climate and land use change
- interaction between surface water and groundwater
- ecological outcomes from environmental flow management
- improvements in farm, irrigation system and catchment water use efficiency
- catchment processes that impact on water quality
- improvements in urban water use efficiency
- independent reviews of the knowledge base.

Table 7.1 summarises the collective progress of all jurisdictions toward implementing the knowledge and capacity building actions of the NWI. The remainder of this section provides detail to support the findings in the table.

¹ NWI paragraph 101.

² NWI paragraph 98.

Table 7.1 Assessment Summary: Knowledge and capacity building

NWI commitment	2017 assessment	2020 assessment ^a and progress indicator ^b	Comments — progress since 2017
Knowledge and capacity building will assist in underpinning implementation of the NWI	Largely achieved	Largely achieved 	All jurisdictions are undertaking activities to build knowledge to support water resource management and service delivery, however, further research is needed to fill knowledge gaps. Capacity building activities are not being undertaken in all jurisdictions.
Identify key knowledge and capacity building priorities needed to support ongoing implementation of the NWI	Achieved	Partially achieved 	While some jurisdictions have transparently stated knowledge building priorities, this is not the case for all parties to the NWI. Priorities for capacity building have not been identified.
Identify and implement proposals to better coordinate the national water knowledge effort	Partially achieved	Partially achieved 	The Australian, State and Territory Governments work together on topic-specific working groups. A gap remains in terms of a mechanism to support the coordination of knowledge and capacity building at a national level.

^a **Achieved:** All requirements met, **Largely achieved:** Requirements generally met, with some exceptions, **Partially achieved:** Only some requirements met, **Not achieved:** No requirements met. ^b Progress indicators reflect an overall assessment of whether, on the whole, jurisdictions have moved closer to consistency with the NWI in the three years since 2017. An arrow pointing upward indicates progress, a flat-line indicates no change and a downward arrow indicates poorer performance or backsliding.

7.1 Developments since 2017

Previous assessments by the National Water Commission (NWC) (2011, 2014) and the Productivity Commission (2017) found that progress had been made in addressing the knowledge and capacity needs identified as necessary for the implementation of the NWI. However, the Commission found that work to coordinate research efforts at a national level had halted with the cessation of the National Water Knowledge and Research Platform and the NWC.

Since 2017, knowledge building has continued through investment by Australian, State and Territory Governments in research projects and programs. Some programs to build the capability of water managers are continuing or have been established. The section below details processes for identifying priorities, examples of knowledge-generating initiatives and capacity building activities.

National initiatives

The Australian Government is continuing to fund, or has renewed, a number of the knowledge building initiatives and programs summarised by the Commission in 2017. Of the programs identified in 2017 none have ceased and in addition some new projects have been undertaken. Most of the work is focused on the Murray–Darling Basin (MDB) and the Murray–Darling Basin Authority (MDBA) performs or initiates most of the Government’s work, but other agencies also play a role.

Priority setting processes

The MDBA has run, or participated in three separate processes that help identify research priorities in the MDB since 2017:

- The Murray–Darling Water and Environment Research Program (2019–2024) is based on priorities identified by the MDBA, the Commonwealth Environmental Water Office and the Department of Agriculture, Water and the Environment (DAWE) (Australian Government 2020b).
- The MDBA Knowledge Framework was developed in 2019. It is a process within the MDBA to guide knowledge priorities and inform investment across a range of projects.
- The MDBA participates in the Basin Science Platform, established by the Basin Officials Committee in 2019, to understand and prioritise knowledge and science investment across the Basin.

Knowledge generating initiatives

- MDBA:
 - The Murray–Darling Water and Environment Research Program, run by the MDBA, will operate from 2019 to 2024, replacing the Murray Darling Basin Environmental Water Knowledge and Research project that ran until 2019. The program has three components: summarising existing science for water managers; undertaking focused tasks using existing science and expertise to address short-term needs; and conducting strategic research with co-investment from research consortia (Australian Government 2020b).
 - Since 2018, the Authority has worked with Geoscience Australia and CSIRO on MDBSat, a remote sensing platform that enables tracking, monitoring and compliance auditing of river flows, including embargoed environmental water.
 - The Authority has five priority projects with CSIRO researching best practice for: Basin river modelling; innovative inundation modelling; ecosystem trajectories; ecosystem functions; and water quality particularly blue-green algae and blackwater events.

-
- The MDBA is undertaking co-design and development of Bureau of Meteorology (BOM) products including: monthly water resource availability scenarios; identification of step changes in rainfall in the Basin due to a changing climate; delivery of regular executive briefings on current conditions; and seasonal outlooks for climate, surface and ground water.
 - Since 2017, the MDBA has invested in a range of work on social and economic values to better support water planning, including:
 - ... research commissioned by the Independent Panel on Social and Economic Condition in the Basin
 - ... the annual University of Canberra *Regional Wellbeing Survey*
 - ... work on cultural flows and cultural values of water projects to understand First Nations' values of water; for example, the MDBA–CEWO Cultural Flows project
 - ... the DAWE-led Land and Ecosystem Accounting Program to measure and account for ecosystem service benefits and value of environmental watering
 - ... Australian Bureau of Agricultural and Resource Economics and Sciences (ABARES) water market and trade modelling to measure past and future impacts of changes in water availability on the water market dynamics and price
 - ... research on ownership of water entitlements by Aboriginal organisations in the Murray-Darling Basin and the change in ownership over time, by Professor Sue Jackson (Griffith University)
 - ... quantification of employment impacts of water recovery in southern Basin communities, released in 2018.
 - DAWE compiled the report *Socio-economic effects of Commonwealth water recovery in the Murray-Darling Basin – Insights from the Regional Wellbeing Survey (2013–2016)* in February 2018.
 - The Australian Competition and Consumer Commission continues to deliver an annual water monitoring report, which includes monitoring of fees and charges for water infrastructure. In 2019, it was also directed to conduct an inquiry into markets for tradable water rights in the MDB. The interim report was released in July 2020 and a final report is expected in early 2021.
 - ABARES produces water research and undertakes modelling and analysis of water policy, especially in regard to the implementation of the Basin Plan and the Australian irrigated agricultural industry. Work published by ABARES in 2020 includes: *Water Market Outlook (2020)*; *Economic effects of water recovery in the Murray–Darling Basin (2020)*; *MDB water market data (2020)*; and *Murray–Darling Basin water markets: Trends and drivers 2002-03 to 2018-19 (2020)*.

Other national knowledge building initiatives extend beyond the MDB.

- DAWE continues to run the extended Geological and Bioregional Assessments program with collaboration from the BOM, CSIRO and Geoscience Australia. Since 2017, two of

three steps have been completed and the last step is expected to be completed in 2021. The program studies the potential impacts of shale and tight gas projects on the environment (including water resources) in three regions of Australia: the Cooper, Isa and Beetaloo regions

- The National Water Grid Authority, established in 2019, funds water resource assessments through its science program that help identify water resources to support agriculture and primary industries.
- The ABS produces an annual water account and is working with BOM and MDBA to standardise water data sources and classifications and where possible reduce duplication. As a result of this work, integrated water accounts for the Canberra region were released in 2019 (ABS 2019a).
- BOM:
 - is developing the Hydrological Projections service, due for release in 2021. The service will produce projections of hydrological change across Australia, such as evaporation, runoff, and soil moisture for a range of climate change scenarios. The climate projections used for the model will be available for other organisations to use in their own hydrological models
 - updated its Hydrologic Reference Stations web portal in August 2020 to increase the number of sites from 222 to 467. This service identifies streamflow trends and detects long-term variability and change in streamflow at sites across the country
 - is working with the NSW Government to develop additional seasonal forecasts of inflows to major storages to allow water managers and water users to prepare for possible and likely water availability scenarios.
- CSIRO has a water research stream that aims to help Australia better manage its river basins and groundwater resources.
- The North Queensland Water Infrastructure Authority is undertaking a range of knowledge building activities related to proposed water infrastructure in Northern Queensland. In particular, it has commissioned groundwater research, geotechnical analyses, extensive hydrological modelling of North Queensland river systems, and undertaken engineering analysis of potential irrigation schemes.

New South Wales

Priority setting processes

The *Water Science Strategy (2018 – 2023)* identifies goals and priority activities for the Department of Planning, Industry and Environment — Water. Actions under the strategy include identifying and filling science knowledge gaps. The Department also released a *Water Science Research Prospectus* in 2020 which describes four projects to fill knowledge gaps or address known issues.

Knowledge generating initiatives

As part of the development of integrated water strategies, NSW has invested in new climate modelling methods and datasets to develop a better understanding of both historical climate variability and likely future climate conditions. The new modelling allows for the identification of potential future climate characteristics of each region in NSW.

In 2019, a *River Styles database* for NSW was completed with Macquarie University, providing users with access to consistent information on geomorphic river character, behaviour, condition and recovery for all third and higher order rivers in NSW. This information can be used to develop river management tools, systems and strategies at a range of scales and serves as a decision-support tool for integrated river management (DPIE (NSW) 2019a).

Also in 2019, the NSW Department of Primary Industries — Agriculture formed an Agricultural Resources Group. One of its tasks is to undertake research and development to improve the productive and sustainable use of water for NSW. A Climate Group was also formed which undertakes a number of climate change vulnerability assessments for a range of agricultural industries including irrigated agriculture.

NSW Department of Primary Industries, in partnership with the Cotton Research and Development Corporation, have been monitoring water productivity in irrigated cotton since 2006 to facilitate continuous improvement in water use efficiency. The latest phase of the work, a project on trends and drivers of water productivity, commenced in 2019 (DPI (NSW) 2020).

Capacity building activities

The *Water Science Strategy*, in addition to identifying priority activities includes actions to support study for staff members, provide training and development opportunities for new technologies and monitor and report on capacity, capability or efficiency gains from the adoption of new technologies.

Victoria

Priority setting processes

In 2017, the *Applied Aquatic Ecology Research Hub* was established to aid the Victorian Government's current and future aquatic research and monitoring needs through improved connection and collaboration between Victorian agencies. Key themes have been identified and will be adapted to new priorities as they arise (Victorian Government 2017, p. 6).

Knowledge generating initiatives

Between 2017 and 2020, Victoria has continued to implement knowledge building actions from the *Water for Victoria* plan. Some key developments include:

- the *Victorian Water and Climate Initiative*, a four-year research program started in 2017 aiming to provide a clearer picture of what climate change means for Victoria's water resources (DELWP (Vic) 2019g)
- continuation of the Aboriginal Water Program which includes research projects led by Traditional Owners to better define and document Aboriginal values, uses, and cultural and environmental flows (DELWP (Vic) 2020h, p. 8).

Victoria continues to undertake reviews of water management activities and use these to inform management and policy decisions (such as the review of market efficiency described in section 2 and assessing the benefits of water for the environment). And the State Government maintains cash and in-kind support for the Cooperative Research Centre for Water Sensitive Cities (DELWP (Vic) 2019b).

The *Water Grid Partnership*, formed in 2018, coordinates knowledge and expertise across the water industry to maximise the efficiency and effectiveness of the state grid.

Capacity building activities

Melbourne Water continues to host Clearwater, a water industry capacity building program to support implementation of Integrated Water Management practices.

Under the *Water for Victoria plan*, specialist water emergency management training packages are being developed for industry and government to improve capability of staff (DELWP (Vic) 2019b)

The Department of Environment, Land, Water and Planning, Victorian Environment Protection Authority and VicWater are collaborating to produce supporting materials that will assist industry to adopt Victoria's revised recycled water regulatory guidance, once it is finalised in early 2021.

Queensland

Priority setting processes

Queensland's *Water Planning Science Plan 2014–19* was refreshed in 2017 and peer reviewed in 2019. A new *Water Planning Science Plan 2020–2030* is currently in development, and is being jointly prepared by the Department of Regional Development, Manufacturing and Water and the Department of Environment and Science. The Plan will set out the state-wide science needs for water plans. In an extension on its predecessor, the

new science plan will cover social and economic science, cultural science and climate change.

Knowledge generating initiatives

The former Department of Natural Resources, Mines and Energy worked with partners in 2019-20 (University of Queensland and the Royal Society of Queensland) to produce publications on the Great Artesian Basin hydrogeology and springs. These reports generated knowledge on the Basin for use by groundwater managers and other stakeholders.

The Department of Environment and Science manages a climate science program delivering downscaled, high-resolution climate projection data that can be included in water models. Water planning has been identified as a priority area of focus for the climate science program over the next three years to improve climate change data and information informing the water planning process.

In 2017, the Queensland Water Modelling Network commenced to improve the State's capacity to model its surface and groundwater resources and improve the quality of models. Since then, it has initiated more than 16 projects from cataloguing major water models used by the Queensland Government through to improving integration between agricultural and water catchment models.

Capacity building activities

The Queensland Water Skills Partnership continues to operate with 46 members drawn from councils and water utilities. Its functions include:

- securing skills and training funding for industry
- producing reports and workforce planning documentation
- coordinating industry wide skills and workforce development projects
- piloting training initiatives
- information sharing
- collaboration opportunities and representation on national industry skills committees.

In 2020, the Queensland Water Directorate was appointed the Industry Skills Advisor for the water industry. Among other things, the Advisor is required to engage with employers and industry stakeholders to provide advice about skills needs and training solutions. The advice helps to inform State training and skills priorities and decision making; supports implementation of the vocational education and training quality framework; informs and contributes to national vocational education and training reform agendas; and supports engagement with vocational education and training pathways (Department of Employment, Small Business and Training (Qld) 2020).

South Australia

Priority setting processes

A state-wide climate change science and knowledge plan is under development and will include actions specific to the water sector.

Knowledge generating initiatives

The SA Government supports water-focused research through the Goyder Institute for Water Research. In 2018-19, two new projects were established at the Goyder Institute: *Independent review of the science underpinning reductions to allocations as scheduled in the Lower Limestone Coast Water Allocation Plan*, and *Urgent investigations for restoring the ecological character of the South Lagoon of the Coorong*. Three projects were completed in 2018-19 and eight projects are ongoing. In 2020, the Institute partners (the South Australian Government, CSIRO, Flinders University, The University of Adelaide, and the University of South Australia) agreed to the third term of the Institute for 2020–2023.

Since 2017, South Australia has progressed specific knowledge building activities, some of which are supported with Commonwealth funding. Activities include:

- approval of a research grant in 2019 for the University of Adelaide to address climate change adaptation for environmental and water resources planning
- a number of projects under the Commonwealth's 2018 *Healthy Coorong, Healthy Basin Program*. These include: a research report conducted by the Goyder Institute to fill knowledge gaps and help restore the health of the southern lagoon of the Coorong; development of an integrated hydro-geochemical and ecological model; and development of a database to capture the Ngarrindjeri's cultural knowledge for managing the Coorong
- an examination of ecosystem dependence on shallow groundwater systems in the Western rivers region of Lake Eyre to inform surface and groundwater resource management and planning in the region (completed in late 2017)
- collaboration on a project to develop and test a global standard for the status of Wetlands of International Importance to support the assessment and reporting on ecological condition of internationally important wetlands, listed under the Ramsar Convention. The project received an Australian Research Council Linkage Grant in 2019 and involves a range of government, university, non-profit and international organisations
- development of a hydrological model for the Great Artesian Basin and upgrades to the River Murray Source model
- development of water plans using the results of hydro-ecological investigations and amendments of plans in response to reviews.

Capacity building activities

South Australia's capacity building activities since 2017 have focused on building the capacity of Aboriginal and Torres Strait Islander people, and the capacity of water managers regarding cultural values. Activities, some supported by Australian Government funding, have included:

- establishing First Nations water coordinator and project officer positions in Aboriginal corporations and through the *Project Coorong initiative*. The positions provide capacity building and knowledge sharing for the host organisations, individual staff and Aboriginal communities on issues related to water planning and management, and engagement with communities.
- convening First Peoples working groups to help build capacity of First Nations communities on water planning and management matters as they relate to their communities.

Western Australia

Priority setting processes

The *State Groundwater Investigation program* is a targeted, capital-funded program that provides new and improved information about groundwater resources aligned to the State's water demand and management priorities. The program has a robust, consultative two stage prioritisation process to determine where groundwater investigation projects should focus.

Knowledge generating initiatives

In Western Australia, targeted studies and investigations support water-related planning and development.

- The WA Government has continued with its groundwater investigations. Investigations assess the connection between rivers, lakes, wetlands and dependent ecosystems to inform allocation plans. The *Fitzroy Valley Groundwater Investigation*, undertaken as part of the *Water for Food program*, was finalised in 2019 and helps consolidate knowledge of groundwater resources and their links to environmental, social and cultural values of the river.
- The *Perth Region Confined Aquifer Capacity project*, completed in 2018, aimed to optimise take and use water from the Gnangara system. The project involved data collection, monitoring bores, seismic surveys to update a groundwater model.
- A series of three reports commissioned by the Department of Water and Environmental Regulation identified water supply and demand management options for addressing the long-term water needs of the Perth–Peel region.

-
- Responding to an action identified in the Lower Collie surface water allocation plan, a report was completed in 2018 re-evaluating the yield from the Wellington Reservoir under a changing climate and various diversion and development scenarios. It provides information on water availability and the results of scenario modelling considering climate, demand, water release and diversion options.
 - The Water Corporation has undertaken a residential water use study for Perth, known as the H2OME Study, which gathers vital data to understand water use patterns and appropriately inform future change management projects and potential reforms.

Tasmania

Priority setting processes

Tasmania is currently developing a *Rural Water Use Strategy*, with the draft strategy released for public comment in October 2020. Research needs and priorities have been identified through the drafting process. The Tasmanian Government also works with key stakeholders, such as Hydro Tasmania and the Tasmanian Institute of Agricultural Research, on an informal basis to identify research needs and priorities.

Knowledge generating initiatives

Tasmania primarily works to further knowledge through information sharing forums with Hydro Tasmania, Irrigation Tasmania and national working groups such as the Jurisdictional Reference Group on Water Information and sub-committees of the National Water Reform Committee. Other knowledge building activities include:

- providing funding to the University of Tasmania's Institute of Agriculture for research involving the efficiency and effectiveness of irrigation and irrigation policy considerations
- working to identify and address groundwater knowledge gaps as part of the development of a groundwater risk assessment framework
- undertaking hydrological modelling to support the objectives of the *Water Management Act 1999* (Tas) and the Department of Primary Industries, Parks, Water and Environment's decision-making and regulatory procedures
- investigations, planning, research and data collection as part of the development process for the urban water strategies of Greater Hobart, Greater Launceston, North West.

Capacity building activities

TasWater established the Capital Delivery Office in 2019 to improve processes, systems, tools and technical ability in the planning and delivery of projects and programs.

Northern Territory

Knowledge generating initiatives

In the Northern Territory, research is conducted to inform development and updates to water plans. For example, the environmental and cultural water requirements for the Katherine-Tindall Limestone Aquifer are currently being quantified to inform the water allocation plan.

In June 2018, a report on mapping of wetlands in the Northern Territory portion of the Lake Eyre Basin was completed. This was to fill an identified knowledge gap and will support decision making.

The Government has also commenced the Mapping the Future program, and is currently undertaking projects in five regions, with projects in another five regions yet to commence.

ACT

Knowledge generating initiatives

The ACT Government continues to implement the *ACT Water Strategy 2014–44*. A review of the first phase of implementation was conducted in 2018 and a second implementation plan for 2018–23 was developed. The second implementation plan includes a specific focus on creating and maintaining effective partnerships and collaborations between government, academic, research, business and community organisations; and continuing to use best practice science to guide on-ground actions to protect and manage or water estate. The plan also includes preparation of a research strategy about water quality and catchment health.

Other knowledge building activities undertaken by the ACT Government since 2017 include:

- the *ACT Healthy Waterways project*, a joint initiative with the Australian Government, which includes research into water quality of rivers and water bodies
- establishment of a hydrological modelling framework through eWater to support implementation of the Basin Plan and urban water planning and management
- continued funding and support for the Upper Murrumbidgee Waterwatch and Frogwatch citizen science programs to collect data on water quality across the ACT
- a number of research studies to analyse water quality issues, mainly blue green algae problems in urban lakes
- research on scarcity pricing that included building a framework for adjusting the water abstraction charge according to the level of ACT dam storages.

7.2 The Commission's view

Australian, State and Territory Governments have continued to advance knowledge across topics relating to water resource management and water service provision. Australian Government investments, however, have been very focused on the Murray–Darling Basin. Areas of research investment across jurisdictions include responding to climate change, building and using hydrological modelling, and informing water plans and water supply options. In particular, the information generated is being used to support the development of water plans, and in Victoria and the MDB the use of environmental water.

However, there has been concern that there are research gaps, and these may be of increasing importance for key areas of water management in the future. For example, Vertessy et al. (2019, p. 77) found that there were long standing gaps in knowledge of riverine hydrology and ecology. A key recommendation from that report was that governments should increase investment in research and development. Inquiry participants also called for the NWI to be supported by well-funded research (Stormwater Australia, sub. 38, p. 4; Campbell sub. 60, p. 2; Wentworth Group of Concerned Scientists, sub. 68, p. 5; AAS, sub. 95, p. 1; WaterRA, sub. 98, p. 2).

Some jurisdictions have identified priority research needs through processes such as the NSW *Water Science Strategy* and Queensland's *Water Planning Science Plan*. Other states and territories, however, do not appear to have processes in place to clearly identify priority research areas.

In 2017, the Commission found there was a gap at the national level in priority setting and coordination which arose due to the abolition of the NWC and the National Water Knowledge and Research Platform. While there are some priority identification processes for the MDB, no truly national initiatives have developed to replace the programs that ceased in the past decade.

Some national information sharing is conducted through working groups managed by BOM (such as the Jurisdictional Reference Group on Water Information, the National Water Account Committee, National Flood Warning Infrastructure Group, and the Water Monitoring Standardisation Technical Committee) and committees associated with the National Water Reform Committee (such as the Groundwater Sub Committee and the Water Quality Policy Sub Committee), but there is not a structured strategic approach to knowledge sharing and priority setting. There is greater coordination, however, between the Basin States through the MDBA and the Basin Science Platform, established by the Basin Officials Committee.

There is evidence of investment in capacity and capability by the water sector, but this does not appear to be an area of focus for jurisdictional governments.

Overall, the Australian, State and Territory Governments have largely met their NWI commitments to build knowledge and capacity to support implementation of the NWI. However, the Commission considers that greater consideration should be given to

implementing prioritisation and coordination processes, including at the national level. Strategic consideration of research needs is likely to be of particular importance in light of emerging challenges associated with climate change and population growth. The Commission also sees a need for jurisdictions to monitor the capacity and capability needs of the water sector. This is discussed further in SP K *Knowledge*.

8. Community partnerships and adjustment

This section outlines the progress to date across two community related areas — community partnerships and assistance with structural adjustment. Community partnerships include the processes of community consultation and engagement, along with the provision of information to stakeholders on a range of water planning matters. Assistance with structural adjustment relates to government programs and measures aimed at helping communities adjust to the effects of water reform.

Progress against National Water Initiative (NWI) commitments is assessed below, and table 8.1 summarises the collective progress of all jurisdictions.

Table 8.1 Assessment summary: community partnerships and adjustment

<i>NWI commitment</i>	<i>2017 assessment</i>	<i>2020 assessment^a and progress indicator^b</i>	<i>Comments — progress since 2017</i>
Community partnerships			
Engage water users and other stakeholders by:	<i>Largely achieved</i>	<i>Largely achieved</i>	All jurisdictions have demonstrated that they have:
- improving certainty and building confidence in reform processes - transparency in decision making - ensuring sound information is available to all sectors at key decision points	<i>Largely achieved</i>	 <i>Not assessed</i>	provided opportunities to communities to express their views in a range of processes.
			The Commission, on the information available, is unable to determine whether all jurisdictions have continued (as assessed in 2017) to largely achieve the following requirements: - provide information to support decision making through these processes - take steps to respond to stakeholder concerns, and document outcomes from these processes.
Community adjustment assistance			
Address adjustment issues raised by the implementation of the NWI	<i>Largely achieved</i>	<i>Largely achieved</i>	Progress in monitoring and evaluation of adjustment assistant measures should be a key priority for jurisdictions. And MDB jurisdictions need to demonstrate that water recovery decisions have been made primarily on the basis of cost effectiveness.
			

^a **Achieved:** All requirements met, **Largely achieved:** Requirements generally met, with some exceptions, **Partially achieved:** Only some requirements met, **Not achieved:** No requirements met. ^b Progress indicators reflect an overall assessment of whether, on the whole, reforms have moved closer to consistency with the NWI in the three years since 2017. An arrow pointing upward indicates progress, a flat-line indicates no change and a downward arrow indicates poorer performance or backsliding.

8.1 Community partnerships

The NWI commits parties to engaging with water users and other stakeholders in achieving the objectives of the Agreement by:

- improving certainty and building confidence in the reform process
- being transparent in decision making
- ensuring sound information is available to all sectors at key decision points.¹

More specifically, the States and Territories agreed to open and timely consultation with all stakeholders in relation to: pathways for returning overdrawn surface and groundwater systems to environmentally sustainable extraction levels; periodic review of water plans; and other significant decisions that may affect the security of water access entitlements or the sustainability of water use.² The States and Territories also agreed to provide timely and relevant information to all stakeholders regarding:

- progress with the implementation of water plans, including the achievement of objectives and likely future trends regarding the size of the consumptive pool
- other issues relevant to the security of water access entitlements and the sustainability of water use, including the science underpinning the identification and implementation of environmental and other public benefit outcomes.³

Previous assessments of progress against the NWI by the National Water Commission (NWC) (2011, 2014) and the Productivity Commission (2017) found that Australian governments were providing stakeholders with adequate opportunity to contribute to water planning decisions. In its 2017 assessment, the Commission found that all jurisdictions had set in legislation, or policy, minimum requirements for stakeholder engagement and consultation when developing and reviewing water plans; and further, that State and Territory Governments had delivered improved decision making through open and timely consultation with stakeholders, aided by the publication of supporting information at key decision points.

Developments since 2017

To inform this assessment, jurisdictions were asked to advise the Commission about any changes to their community partnership arrangements since 2017 to:

- better achieve the objectives and outcomes of the NWI, and/or
- address recommendations and findings from the PC's 2017 inquiry.

¹ NWI, paragraph 93.

² NWI paragraph 95.

³ NWI paragraph 96.

Examples of significant community and Aboriginal and Torres Strait Islander people consultation and engagement initiatives initiated since 2017 are also detailed below.

National initiatives

The Commission notes that:

- in accrediting Water Resource Plans under the Basin Plan for Victoria, South Australia, Queensland and the ACT, the Murray-Darling Basin Authority (MDBA) had accepted that the community and traditional owner consultation processes undertaken by these jurisdictions to satisfy Basin Plan requirements were adequate
- the MDBA has commenced to regionalise a formal presence in some of the larger regional cities across the Basin outside of Canberra, with the aim of facilitating more regular contact and conversation with Basin communities.

The Australian Government reported that:

- the Commonwealth Environmental Water Office (CEWO) ran processes to engage with:
 - local stakeholders in the planning and delivery of Commonwealth environmental water
 - First Nations, local communities, scientists and other water holders to identify objectives and outcomes to be targeted within annual MDB catchment environmental -water management plans, supported by six local engagement officers who live and work in the Basin
 - First Nations people across the MDB to deliver water for environmental and cultural outcomes. In 2020, CEWO partnered with the MDBA, the Northern Basin Aboriginal Nations (NBAN) and the Murray Lower Darling Rivers Indigenous Nations (MLDRIN) to deliver the First Nations Environmental Watering Guidance project.

New South Wales

The New South Wales Government reported that, since 2017:

- as part of implementing its Water Reform Action Plan, it had developed a new stakeholder engagement policy to improve transparency of engagement with NSW communities, and under its auspices, had implemented a new stakeholder engagement framework, and commenced publishing a schedule of stakeholder engagement activities
- on 10 March 2020, it initiated an independent review of the 2020 Northern Basin First Flush event to respond to a range of community concerns raised after water restrictions were imposed on water take from Northern NSW Basin rivers and floodplains, following significant rainfall across NSW and Queensland in January and February 2020

-
- it had undertaken First Nations consultation in partnership with the MLDRIN and NBAN organisations on the latest iteration of Water Resource Plans. To date, consultation with 28 Nations has been completed with two Nations remaining.

The Commission also notes that:

- Sydney Water and Hunter Water, as part of preparing their most recent pricing submissions to the NSW Independent Pricing and Regulatory Tribunal, used willingness-to-pay research to inform benefit–cost analysis of service options, supported by subsequent validation of survey findings at deliberative forums (Gillespie Economics 2020).

Victoria

The Victorian Government reported that:

- the Birrarung Council was established in 2018, including three Wurundjeri Woi Wurrung Elders as members, to provide advice on implementation of actions to protect the Yarra River and its lands, and is an advocate for achievement of the 50-year Community Vision and Wurundjeri Woi Wurrung’s aspirations for the Birrarung
- legislative amendments to the *Water Act 1989* (Vic) and the *Catchment and Land Protection Act 1994* (Vic) were passed in August 2019 to enable greater recognition and involvement of Traditional Owners and Aboriginal Victorians in the management and planning of waterways and catchments. The *Water and Catchment Legislation Amendment Act 2019* (Vic) embedded Aboriginal cultural values into the planning and operations of Victoria’s water resource managers
- as of June 2020, the Victorian water industry had 46 active partnerships between water agencies and Traditional Owners (Victorian Government Aboriginal Affairs Report 2020)
- it had successfully established the Water Grid Partnership in late 2018 between the Victorian Government, Victorian water corporations and key stakeholders to oversee the use of the State’s water grid and consider the need for its future augmentation
- an Integrated Water Management (IWM) Framework was released in September 2017 establishing IWM forums to collaborate on place-based IWM solutions. 15 IWM Forums covering the state have been set up. These forums are an important tool to enable cross-water cycle discussions within a collaborative platform to plan for key challenges (for example, water cycle impacts of population growth and climate change). The Forums are helping government organisations and traditional owner groups to work together on urban water management, water supply, wastewater, flood resilience, waterway health and to develop healthy urban and recreational spaces
- a Review of Northern Victorian delivery share arrangements completed in 2018, was consulted upon with Sunraysia and Goulburn-Murray irrigation communities. This consultation process identified a series of actions to be collaboratively developed and

implemented between these communities, the Victorian Government and Goulburn Murray Water and Lower Murray Water to refine delivery share arrangements to manage water delivery and network capacity risks in these irrigation areas

- Ministerial Advisory Councils were established for Melbourne’s Waterways of the West, along with the Barwon and the Moorabool River systems, with the objective of developing recommendations for the enhancement and protection of these rivers, their associated waterways and their landscapes — building on recent community engagement and focusing on a long-term community vision and embedding Traditional Owners’ voice and values in all planning and engagement activities for improving these waterways including representation on the Barwon and Waterways of the West Ministerial Advisory Committees, the Victorian Catchment Management Council, and as one of the four Victorian Environmental Water Holder commissioners
- development of a new sustainable water strategy for the Central and Gippsland regions of the state commenced in 2019. A collaborative planning process with water industry partners and agencies will be used to develop the draft Strategy. A consultative committee will advise on development of the draft strategy, community feedback will set the direction for the final strategy. The Consultative Committee will recommend a Final Strategy to the Minister for Water
- Victorian catchment management authorities (CMA) continued to actively engage with Traditional Owners, key stakeholders and the local community to provide local knowledge, views and solutions to inform annual environmental watering priorities during preparation of their seasonal watering proposals and throughout each watering year.

The Commission also notes that:

- Yarra Valley Water, as part of preparing its 2018–2023 pricing submission to the Victorian Essential Services Commission, used a Citizens Jury to help the organisation to understand and describe the services and outcomes that its customers expect (YVW 2017)
- the Victorian Essential Services Commission (ESC) implemented the PREMO water pricing framework on 1 July 2018 to encourage Victorian water businesses to deliver better value to their customers. An independent performance review of PREMO released by the ESC in March 2019 found that there was clear evidence that PREMO was successful in giving stronger emphasis to customer engagement for most water businesses (Farrier Swier Consulting 2019, p. 21).

Queensland

The Queensland Government reported that:

- a Guide to Cultural Engagement for Water Planning, for internal use by water planners when developing water plans, was prepared in response to recommendations arising from a review of the Cape York, Condamine and Balonne, Border Rivers and Moonie

water planning processes. The Guide provides a state-wide approach to ensure Indigenous participation in water planning processes

- the Department of Environment and Science had coordinated several Aboriginal Waterway Assessments with the Aboriginal Nations of the Queensland Murray–Darling Basin, with the information provided from the Aboriginal Nations through this process considered and included in developing Environmental Values and Water Quality Objectives under the Environmental Protection (Water and Wetland Biodiversity) Policy 2019
- consultations on a range of non-urban water measurement policy proposals were undertaken in late 2019 across Queensland. 324 submissions were received from stakeholders on the proposals. Feedback from these submissions had a number of complexities that need to be further addressed before finalising these policies. Strong feedback was also received that there should be further consultation with stakeholders before the policies were finalised. The current intent is to deliver a final policy sometime in 2021
- it had funded the Queensland Council of Social Services (QCOSS) via the former Department of Natural Resources, Mining and Energy (DNRME) under a grant agreement to provide input on low income consumer issues related to energy and water across Queensland. QCOSS has focussed their water activities to date largely within South East Queensland. The existing agreement with QCOSS has been extended and will expire in September 2023.

The Commission also notes that:

- the former DNRME has continued to operate its standing Water Engagement Forum across this period. Its role is to enable the Department to communicate on a regular basis (monthly) with its major stakeholders with a policy interest in water matters.

South Australia

The South Australian Government reported that:

- through the development of South Australia’s Water Resource Plans, relationships with Murray–Darling Basin First Nations have been strengthened. A Statement of Commitment has underpinned work with Ngarrindjeri on the development of Water Resource Plans and engagement is undertaken with SA MLDRIN which also includes the River Murray Mallee Aboriginal Corporation (RMMAC) and the Peramangk Nation. Engagement also occurs directly with the RMMAC in accordance with the River Murray and Crown Lands Indigenous Land Use Agreement. First Nations Water Coordinators were funded until 30 June 2020 to further build Nations’ capacity in providing input into water resource planning in the Murray–Darling region to assist South Australia meet the requirements of the Basin Plan. Building on this precedent where appropriate, the challenge now is to improve the levels of engagement on water planning with other First Nations in other parts of the State.

-
- community partnership arrangements were actively pursued as part of programs such as the Healthy Coorong Healthy Basin (HCHB) project, South Australian Riverland Floodplains Integrated Infrastructure Program (SARFIIP) and The Living Murray (TLM) program. Arrangements for SARFIIP and TLM are fundamentally the same as 2017 with separate First Nations partnerships and community reference or advisory type partnerships being maintained. HCHB is a new program and formal partnerships for collaboration and delivery have been established with the Ngarrindjeri Aboriginal Corporation (NAC) and the South East Aboriginal Focus group to work alongside a broader community partnership program that has also been established
 - NRM reforms through the new Landscape South Australia Act 2019 further strengthened community involvement in decision making, while maintaining consultation requirements where changes affect water rights. Regional Landscape Boards will support local communities and land managers to be directly responsible for managing their region's natural resources, including water
 - SA's River Murray communities were engaged to develop a water sharing framework, recognising that there will be times when water availability is low, and the provision of water will need to be prioritised. A water advisory committee and key stakeholders co-developed this framework, which now guides allocation decisions for the River Murray and is incorporated in the River Murray Prescribed Watercourse Water Allocation Plan. Allocation announcements and water availability are made publicly available on the Department for Environment and Water website.

Western Australia

The Western Australian Government, while advising that there had been no changes to its community partnership arrangements since 2017, reported that:

- the Waterwise Perth Action Plan was launched late in 2019 to set the direction to transition Perth to become a leading waterwise city by 2030. The Plan is part of the State Government's commitment to respond to the impacts of climate change and sets a plan for the next two years as a foundation for successive plans needed to achieve a water wise Perth by 2030. It was developed following engagement and collaboration from over 50 organisations and over 200 stakeholders
- in 2019, the Aboriginal Water and Environment Advisory Group was established to facilitate engagement with Aboriginal groups on issues of interest to Aboriginal people.

Tasmania

The Tasmanian Government, while advising that there had been no changes to its community partnership arrangements since 2017, reported that:

- in October 2020, its draft Rural Water Use Strategy was released for public comment

-
- its Generic Principles for Water Management Planning were reviewed in 2018 which resulted in draft new Guiding Principles for Water Management Planning being released for broad stakeholder comment. Following this process, revised Guiding Principles for Water Management Planning were formally adopted by the Tasmanian Government in September 2018, noting that these Principles specifically commit the Government to engage with the Tasmanian Aboriginal community in relation to water management planning activities
 - its review of the Great Forester River Catchment Water Management Plan commenced in 2018 and has progressed through to the statutory consultation phase following intensive workshopping with the Great Forester River Catchment Water Management Plan Consultative Group. As part of this, there has been consultation with members of the Tasmanian Aboriginal community who have connection to the Great Forester River Catchment
 - its review of the Lakes Sorell and Crescent Water Management Plan and the Mersey Water Management Plan had commenced, involving intensive workshopping with key community and organisational stakeholders
 - its development of four Water Management Statements to provide clearer information on water management arrangements for stakeholders and the community, including for the Duck, Swan, North Esk and Shannon River catchments had commenced.

Northern Territory

The Northern Territory Government, while advising that there had been no changes to its community partnership arrangements since 2017, reported that:

- the Northern Territory Water Regulatory Reform Directions Paper, released in October 2018 (outlining proposed reforms to the NT's water resource regulatory framework) underwent a 5-month period of public consultation (to March 2019), after which a series of further policy and position papers on specific reform proposals were commissioned for further consultation
- its water advisory committees (which have Aboriginal members) continued to contribute to the development of water allocation plans
- continued engagement on country also contributed to the planning process helping to improve water literacy, co-design Aboriginal engagement in water planning and seek advice on environmental and cultural values and their water management requirements.

ACT

The ACT Government reported that:

- it had continued to work with its communities on a range of water efficiency, water saving awareness programs as well as funding a number of community groups, in particular the three catchment management groups across the Territory

-
- community partnerships were a key theme of the ACT's water strategy: Striking the Balance, being a crucial underpinning of its Implementation Planning processes and actions
 - community partnerships were used extensively as a tool in the development and implementation of the 20 Healthy Waterways projects under the auspices of its Catchment Action Implementation Plan 2016–2021
 - its Healthy Waterways H2OK program utilises partnership and engagement processes to work with various Canberra and Queanbeyan communities to reduce rubbish and nutrients entering stormwater systems
 - in preparing its Water Resource Plans, it undertook considerable consultation and ongoing engagement with the Ngunnawal nation recognised by the ACT Government (in 2009) as the relevant Traditional Custodians in the Territory and surrounding region. Consultation was facilitated by the Indigenous officers that work in the Environment Directorate. In all, there were over 50 workshops and meetings with the ACT's Indigenous Communities in preparing the water resource plans
 - it had successfully undertaken an Aboriginal Waterways Assessment process with support from the MDBA from the United Ngunnawal Elders Council to identify waterway sites of cultural significance across the ACT and assess their value and uses
 - it had also undertaken engagement to recognise and develop a system of cultural water rights for ACT's indigenous communities
 - its 2013 environmental flow guidelines were reviewed and revised in 2018--19 by the Institute for Applied Ecology (University of Canberra) supported by a community consultation process.

The Commission's view

As described earlier, the obligations on States and Territories arising from sections 95 and 96 of the NWI relate to consultation with, and provision of information to stakeholders on certain matters addressed in the NWI's Water Access Entitlements and Planning Framework element.

In relation to section 95, jurisdictions provided the Commission with feedback on their consultation efforts sufficient to show that all jurisdictions had sought to improve the scale and quality of their consultation and engagement with communities and Aboriginal and Torres Strait Islander people. However, inquiry participants expressed a range of concerns through submissions and meetings about the adequacy and effectiveness of some consultation and engagement processes undertaken since 2017, particularly within the Murray-Darling Basin (box 8.1). A synthesis of this is captured in Sefton et al.(2020, p. 1):

Across the [Murray–Darling] Basin trust in governments — particularly federal and state — to deliver good long-term policy and support rural and regional communities has been severely diminished. This fall in trust has resulted from a failure to adequately include people in

conversations about government policy and their future, especially those who have not been on the upside of change.

In relation to section 96, there is insufficient feedback from jurisdictions on their information provision efforts over the past three years to enable the Commission to make a fully informed assessment of whether these efforts meet the requirements of section 96. On this matter, as with consultation, the Commission observes a range of concerns raised in submissions, and other inquiries and reviews about the adequacy and effectiveness of some information provision efforts undertaken since 2017, particularly within the Murray-Darling Basin (box 8.1).

For instance, there are concerns that important and relevant information is not always made publicly available (IWF, sub. 30, p. 9; EDO, sub. 54, pp. 9–11). And in their report on the 2018–19 fish deaths event on the Lower Darling, Vertessy et al. (2019, p. 30) found that Lower Darling communities had conveyed scepticism and a lack of trust in the information being used by system managers to make decisions about river operations and management.

As a case study, the management of the 2020 Northern Basin First Flush event also provides examples where information was poorly communicated and shared. An Independent Panel Assessment of the management of the event found that there was a lack of transparency and poor communication in that:

- information was not released prior to the event
- systems to communicate information during the event were inadequate
- there were delays in information being published after the event
- where information was available, the manner of publication was not conducive to improving the community's understanding of how water was being managed.

Drawing from the information available to it on consultation and engagement, and information provision efforts since 2017, the Commission observes that, for both water resource management and water services provision going forward, all Australian governments should further build their capacity and capability to:

- undertake effective, thorough and well-informed community consultation and engagement and
- provide water information that is publicly available, accessible, credible and well communicated.

Improvement in practice is needed. Communities increasingly expect to be actively engaged by governments when reform proposals are presented. This expectation will continue to grow as governments and communities respond to the water management challenges posed by climate change and population growth.

Box 8.1 Examples of inadequate and ineffective practice

Inquiry participants, and other Inquiries and reviews identified several instances of inadequate and ineffective consultation and engagement, and information provision over the past three years.

Review of NSW Water Sharing Plans

The Commission was advised by the office of the Interim Inspector General of Murray Darling Basin Water Resources of a significant number of complaints regarding the NSW Department of Planning, Industry and Environment's consultation process in developing the next iteration of NSW Water Sharing Plans (Interim Inspector General of Murray Darling Basin Water Resources, pers. comm., 30 June 2020).

Government processes have failed to sufficiently consult with, engage and/or empower community members and stakeholders to contribute to and participate in water reform. This has resulted in a significant erosion of trust and confidence in water reform decisions and processes. The recent NSW water sharing plan review process is a good example of this. This can be contrasted with the previous Land and Water Management Plan program, which are often described as the leading example of effective community water reform process and decision making. Nevertheless, a commitment by all governments to improved community engagement in water reform is required. (Sunrice/RGA, sub. 82, p. 3)

NSW Water rural water infrastructure engagement

A combined MDBA/Water NSW 20-year Infrastructure Options Plan is a good example of poor processes and failure to acknowledge the need for collaboration and involvement in early planning for stakeholder involvement and consultation ... Consultation was subsequently described by NSW Government – Water NSW as being comprehensive, yet stakeholder feedback was limited to one meeting with little or no details provided. (MVPD, sub. 101, p. 22 and 23)

2020 Northern Basin First Flush event

There was a strong unmet demand for information about the event as it unfolded and after it was over. Adequate resources were not put aside to meet this demand. Delays in publishing information allowed speculation about extraction, impacts and outcomes of the event to become de facto truths, and promoted views of mistrust, secrecy and mismanagement. (Craik and Claydon 2020, p. 6)

Environmental watering

There is still a strong need for the CEWO to develop a more transparent and structured engagement approach so that all Nations are informed of options to participate and influence planning. (MLDRIN, sub. 105, p. 6)

Aboriginal and Torres Strait Islander engagement

The NSW Aboriginal Land Council stated that 'there are limited opportunities for Aboriginal people to influence water management' (NSW ALC, sub. 96, p. 2). The Council similarly observed in a submission to the Commission's 2018 assessment of the Basin Plan that Land Councils in NSW had not been properly engaged in processes to develop water resource plans, and that engagement generally occurred 'at very short notice and not on the basis of free, prior and informed consent' (PC 2018a, pp. 207–8).

There remains urgent concerns and deep suspicion regarding the development of [MDB] Supply Measure infrastructure projects. Current engagement and planning processes are grossly inadequate to address these concerns. (MLDRIN, sub. 105, p. 12)

In NSW a series of new dam projects have highlighted deficiencies in First Nations consultation. Despite an announcement that pre-construction works on the Wyangala Dam wall-raising project will commence in October 2020, the NSW Government has not undertaken any meaningful consultation with Wiradjuri and other First Nations. (MLDRIN, sub. 105, p. 12)

Effective engagement practice will continue to play a crucial enabling role in the design and implementation of reforms across the water sector and in managing growing community expectations.

However for assessment purposes, taking into consideration the information available to it on recent jurisdictional performance in meeting the requirements of sections 95 and 96 of the NWI, the Commission considers that community consultation and engagement processes undertaken by Australian governments on water management matters since 2017 have largely achieved the relevant NWI requirements, in that they have provided various opportunities to communities and stakeholders to express their views in a range of processes.

For the reasons outlined previously, the Commission is unable to make a fully informed judgement on whether all Australian Governments have continued (as assessed in 2017) to largely achieve the NWI requirement to provide information to support decision making to support these processes; and take steps to respond to stakeholder concerns and document outcomes from these processes.

8.2 Assistance for structural adjustment

The NWI recognised that significant adjustment issues affecting water access entitlement holders and communities may arise from reductions in water availability caused by the reforms committed to through the agreement.⁴ In response, the States and Territories agreed to consult with affected water users, communities and associated industries on possible responses to address these impacts, taking into account factors including:

- possible trade-offs between higher reliability and lower absolute amounts of water
- the fact that water users have benefited from using the resource in the past
- the scale of the changes sought and the speed with which they are to be implemented (including consideration of previous changes in water availability)
- the risk assignment framework set out in the NWI.

The Australian Government committed to considering assistance for regions on a case by case basis either in consultation with the States and Territories or on its own initiative.

In 2017, the Commission found that programs and measures to assist with adjustment issues had been largely focused on water recovery measures in the Murray–Darling Basin (MDB). By 2019, the Australian Government had spent \$6.7 billion purchasing water and investing in water-saving infrastructure. In addition, \$189 million had been provided through structural adjustment programs to support communities in adjusting to reduced water availability (PC 2018a, p. 35). The aim of investing in water-saving infrastructure was ‘to minimise any adverse impact of water recovery as a result of the Basin Plan, as well as increasing the sustainability of irrigated agriculture across the Basin’ (DAWR 2017b, p. 6).

⁴ NWI paragraph 97.

Governments in Western Australia, Tasmania, the Northern Territory and the ACT had not reported any significant adjustment issues due to water reform that had necessitated assistance for communities or water entitlement holders.

Developments since 2017

States and Territories have reported no new programs aimed at assisting communities in adjusting to reduced water availability where it has resulted from reform.

In May 2018 the Australian Government announced the MDB Economic Development Program (the program) as part of the Basin Plan Commitments Package. The objective of the program is to assist eligible communities to undertake economic development projects to respond to the impact of water recovery activities under the Basin Plan. Desired outcomes for communities include the strengthening and diversification of local economies, enhanced resilience and increased employment opportunities. Round 1 of the program was launched on 31 January 2019 for 15 Basin communities identified as most impacted by water recovery activities. In March 2019, a total of 42 projects across these communities were approved for funding of up to \$24.36 million (GST exclusive) through to 2021-22. Round 2 was launched on 20 November 2019 and provides up to \$15 million (GST exclusive) of funding through to 2022–2023 to 31 Basin communities. These communities include those:

- identified as being moderately impacted by Basin Plan water recovery activities
- included due to the proposed acquisition of water entitlements in the lower Darling and Barwon–Darling, including A Class licences (part of the Australian Government’s response to the final report of the Independent Assessment of the 2018–19 Fish Deaths in the Lower Darling)
- with small impacts from water recovery and included due to 2019 federal election commitments.

The Australian Government anticipates commencing the evaluation and review phase of the program during the 2021–22 financial year.

The Commission notes that in 2020 the Australian Government committed to not undertaking any further water purchases to meet Basin Plan commitments. The Australian Government will continue to prioritise investment in water-saving infrastructure to achieve the water recovery required under the Basin Plan (DAWE 2020b).

The Commission’s view

Water recovery policies in the MDB have been designed, and re-designed, with adjustment costs in mind. Implementation has been slowed, and while buybacks from entitlement holders at market rates were common for earlier phases of implementation, the Australian Government has now committed to not undertaking any further water purchases.

This approach follows concerns — reflected by participants to this inquiry — about poor socioeconomic outcomes in communities where water was recovered predominantly through buybacks rather than infrastructure subsidies. For example, the National Irrigators Council (sub. 13, p. 8) stated that:

The record, thus far, of addressing significant adjustment issues via the Basin Plan experience, is mixed and in cases where recovery has been primarily through buy back, it has been very poor ... [and that] what the [NWI] agreement and subsequent implementation could do is more fully recognise the flow on benefits of irrigated agriculture for communities.

And AgForce (sub. 24, p. 7) recommended that:

Water recovery approaches in the Murray Darling Basin need to avoid and minimise socioeconomic impacts as of primary importance, alongside any consideration of cost-effectiveness.

Ruling out buybacks is inconsistent with NWI commitments for water recovery measures. Jurisdictions committed to considering all options — assessing their socio-economic costs and benefits and to choose measures ‘primarily on the basis of cost-effectiveness, and with a view to managing socio-economic impacts’.^{5,6}

The Commission endorses the current requirements of the NWI to consider all options for water recovery and has provided advice on how a revised NWI could include better guidance on promoting effective adjustment (SP H *Rural*).

With respect to the Australian Government’s new Murray–Darling Basin Economic Development Program, the Commission notes that it aims to support rather than impede adjustment, and the Commission encourages the Australian Government to undertake a rigorous and robust evaluation of outcomes as the program proceeds. For past programs, there has been insufficient evidence to conclude whether direct adjustment assistance measures have been effective, undermining community confidence in the value of these measures.

Clear evidence of improved outcomes from monitoring and evaluation of the new Murray–Darling Basin Economic Development Program would help to inform future policy design and restore confidence in communities that adjustment assistance can be well targeted and effective.

In conclusion, there has been progress in some areas of policy related to adjustment (such as the commitment by the Australian Government to monitoring and evaluation for the Murray–Darling Basin Economic Development Program), however other policy changes have potentially undermined this progress. Jurisdictions that do not demonstrate that their chosen approach for water recovery is based primarily on cost-effectiveness, are not meeting the requirements of the NWI, and this may have impacts on the adjustment process. Going

⁵ NWI paragraph 79(ii)(c).

⁶ Cost-effectiveness is not defined in the NWI. In the Murray–Darling Basin Plan: Five-year assessment (PC 2018), cost-effectiveness was defined as minimising the budgetary cost of achieving an objective.

forward, governments need to demonstrate that their adjustment approaches are more cost effective than other options.

That said, the current adjustment provisions in the NWI provide limited guidance on what are appropriate actions and so jurisdictions have largely achieved the current NWI adjustment requirements. Progress in monitoring and evaluation of adjustment assistant measures should remain a key priority for jurisdictions. SP H *Rural* discusses how a renewed NWI could better support adjustment to reduced water availability resulting from reform.

References

- ABS (Australian Bureau of Statistics) 2019a, *Integrated Water Accounts for the Canberra region, 2013-14 to 2016-17*, www.abs.gov.au/statistics/environment/environmental-management/integrated-water-accounts-canberra-region/latest-release (accessed 6 November 2020).
- 2019b, *Regional Population Growth, Australia, 2018-19*, Cat. no. 3218.0, Canberra.
- ACCC (Australian Competition and Consumer Commission) 2016, *Review of the Water Charge Rules: Final Advice*, Canberra.
- 2017, *Submission to the Productivity Commission's National Water Reform Inquiry*, Submission no. 28, Canberra.
- 2019, *Water Charge Rules*, www.accc.gov.au/regulated-infrastructure/water/water-charge-rules (accessed 19 October 2020).
- 2020a, *Murray-Darling Basin Water Markets Inquiry*, Interim report, Canberra.
- 2020b, *Water Monitoring Report 2018-19*, Canberra.
- Access Canberra 2020, *Water Resources public registers*, www.accesscanberra.act.gov.au/app/services/epa-water-search#/ (accessed 16 October 2020).
- Aither 2017, *MDBA Expenditure Review: A Review of MDBA Expenditure and Cost Sharing in New South Wales*, Final Report, prepared for the Independent Pricing and Regulatory Tribunal.
- 2019, *National Performance Reporting Framework for Urban Water Utilities: A Review of the NPR Framework*, Melbourne.
- and DG Consulting 2018, *Effectiveness of Victoria's water markets*, Final Report prepared for the Victorian Department of Environment, Land, Water and Planning.
- Alluvium 2020, *Independent Review of Progress of the NSW Water Reform Action Plan and related NSW Water Reform Commitments*, Final Report to the Department of Planning, Industry, Environment - Water.
- ANAO (Australian National Audit Office) 2014, *Administration of the Improving Water Information Program*, 18, Canberra.
- Aqwest 2019, *Water Quality Report 2019*, Western Australia.
- Australian Government 2020a, *Business Research and Innovation Initiative (BRII): MJA Waterflow*, www.business.gov.au/Grants-and-Programs/Business-Research-and-Innovation-Initiative/Customer-stories/MJA-Waterflow (accessed 20 October 2020).
- 2020b, *Murray-Darling Water and Environment Research Program - Research Prospectus 2020*.

-
- BOM (Bureau of Meteorology) 2016, *Improving Water Information Programme Progress Report: Advances in Water Information Made By the Bureau of Meteorology in 2015*.
- 2017, *Outcomes of the Interagency Review into Providing Water Information to the Commonwealth*, Canberra.
- 2018, *Urban National Performance Report Framework Review*, www.bom.gov.au/water/npr/framework-review/index.shtml (accessed 13 October 2020).
- 2020a, *BOM Water Markets Dashboard*, www.bom.gov.au/water/dashboards/#/water-markets/national/state/at?s=National (accessed 20 August 2020).
- 2020b, *Integrated water accounts for the Canberra region, 2013–14 to 2016–17*, www.bom.gov.au/water/nwa/2018/canberra-integrated-pilot/index.shtml (accessed 16 October 2020).
- 2020c, *National Performance Report 2018-19: Urban Water Utilities*, Melbourne.
- 2020d, *National Performance Reporting Indicator Review*, www.bom.gov.au/water/npr/indicator-review.shtml (accessed 26 October 2020).
- BRC (Dumaresq-Barwon Border Rivers Commission) 2019, *Dumaresq-Barwon Border Rivers Commission Annual Report 2018-19*.
- Building Queensland 2017, *Detailed Business Case: Lower Fitzroy River Infrastructure Project*, Brisbane.
- Burrell, M., Moss, P., Petrovic, J., Ali, A., Nicholls, D. and Ching, M. 2020, *General Purpose Water Accounting Report 2018-19: Macquarie Catchment*, Department of Planning, Industry and Environment (NSW).
- Business Queensland 2020a, *Processing times for water trades*, www.business.qld.gov.au/industries/mining-energy-water/water/water-markets/processing-times (accessed 18 December 2020).
- 2020b, *Water management fees in Queensland*, www.business.qld.gov.au/industries/mining-energy-water/water/authorisations/fees (accessed 18 November 2020).
- Busselton Water 2020, *Annual Water Quality Report 2019-20*, Busselton.
- BW (Barwon Water) 2020, *Annual Report 2020*, Victoria.
- Byron, N. 2017, *Review of the Commonwealth Environmental Water Holder's Operations and Business Processes*, Natural Capital Economics.
- Carey, A. 2018, 'Government won't turn on \$750m pipeline despite dry spring forecast', *The Age*.
- Centrefarm 2020, *Examples of Consultancies*, <https://centrefarm.com/consultancy> (accessed 12 November 2020).
- COAG (Council of Australian Governments) 2008, *COAG Work Program on Water - November 2008 - Agreed Actions*, Canberra.

-
- 2012, *National Framework for Compliance and Enforcement Systems for Water Resource Management*, Canberra.
- Commissioner for Sustainability and the Environment (ACT) 2018, *The Heroic and the Dammed - Lower Cotter Catchment Restoration Evaluation*, Canberra.
- Conran, P. 2020, *Review of COAG Councils and Ministerial Forums, Report to National Cabinet*, Australian Government, Department of the Prime Minister and Cabinet, Canberra.
- Craik, W. and Claydon, G. 2020, *Independent Panel Assessment of the Management of the 2020 Northern Basin First Flush Event: Final Report*.
- CW (Coliban Water) 2019, *Annual Report 2019*, Victoria.
- 2020, *Annual Report 2020*, Victoria.
- DAWE (Department of Agriculture, Water and the Environment) nd, *Aquatic ecosystems toolkit*, www.environment.gov.au/water/cewo/monitoring/aquatic-ecosystems-toolkit (accessed 9 November 2020a).
- nd, *Monitoring, Evaluation and Research*, www.environment.gov.au/water/cewo/monitoring (accessed 28 October 2020b).
- 2019, *Ecosystem Accounts*, <https://eea.environment.gov.au/accounts/ecosystem-accounts> (accessed 21 October 2020).
- 2020a, *Agreements on the use of Commonwealth environmental water*, www.environment.gov.au/water/cewo/publications/agreements-use-commonwealth-environmental-water (accessed 18 November 2020).
- 2020b, *Australian Government Water Purchasing in the Murray-Darling Basin*, www.agriculture.gov.au/water/markets/commonwealth-water-mdb (accessed 12 November 2020).
- 2020c, *Experimental ecosystem accounting project in the Gunbower-Koondrook-Perricoota Forest Icon Site*.
- 2020d, *Great Artesian Basin Sustainability Initiative*, www.agriculture.gov.au/water/national/great-artesian-basin/great-artesian-basin-sustainability-initiative (accessed 2 November 2020).
- 2020e, *Lake Eyre Basin Intergovernmental Agreement*, www.agriculture.gov.au/water/national/lake-eyre-basin/agreement (accessed 2 November 2020).
- 2020f, *National Partnership Agreement on Implementing Water Reform in the Murray-Darling Basin: Milestone Assessments for the Year Ending 30 June 2019*.
- DAWR (Department of Agriculture and Water Resources) 2009, *National Framework for Non-Urban Water Metering: Policy paper*.
- 2017a, *NWI module: Engaging Indigenous peoples in water planning and management*.

-
- 2017b, *Submission to the House of Representatives Standing Committee: Inquiry into Water Use Efficiency in Australian Agriculture*.
- DELWP (Vic) (Department of Environment, Land, Water and Planning (Vic)) 2019a, *Closing the Loop Report - Water Market Transparency*.
- 2019b, *Fourth Tranche of the Environmental Contribution*, Water and catchments, www.water.vic.gov.au/planning-and-entitlements/environmental-contributions/fourth-tranche-of-the-environmental-contribution (accessed 4 November 2020).
- 2019c, *Healthy Waterways and Catchments, Progress Snapshot*.
- 2019d, *Our Catchments, Our Communities*, www.water.vic.gov.au/waterways-and-catchments/our-catchments/our-catchments-our-communities (accessed 28 October 2020).
- 2019e, *Victorian Water Register - 10 Year Strategy 2019-2028*.
- 2019f, *Water market app now available*, www.water.vic.gov.au/media-releases/2019/water-market-app-now-available (accessed 15 October 2020).
- 2019g, *What is the Victorian Water and Climate Initiative?*
- 2020a, *Action Status Report: Water for Victoria*.
- 2020b, *Allocation Trade Prices*, Dashboard, <https://waterregister.vic.gov.au/water-trading/market-insights/allocation-trade-prices#AvailWaterDashboard> (accessed 20 October 2020).
- 2020c, *Available water by owner type*, Dashboard, <https://waterregister.vic.gov.au/water-availability-and-use/available-water-by-owner-type#AvailWaterDashboard> (accessed 20 October 2020).
- 2020d, *Long-Term Water Resource Assessment for Southern Victoria*.
- 2020e, *Monitoring Water for the Environment in Victoria VEFMAP Stage 6 Results 2016-2020*.
- 2020f, *Trade opportunities*, <https://waterregister.vic.gov.au/water-trading/market-insights/trade-opportunities> (accessed 20 October 2020).
- 2020g, *Victorian Water Register*, <http://waterregister.vic.gov.au/> (accessed 28 August 2017).
- 2020h, *Water Community and Country: Victoria's Aboriginal Water Program*.
- DENR (NT) (Department of Environment and Natural Resources (NT)) 2018, *Western Davenport Water Allocation Plan 2018-2021*, Northern Territory.
- 2020a, *Processing Water Extraction Licence Applications policy*, Darwin.
- 2020b, *Recovery of Unused Licensed Water Entitlements Policy*.
- 2020c, *Trading Licensed Water Entitlements Policy*, 21 June.
- 2020d, *Water Licensing Portal*, <https://denr.nt.gov.au/land-resource-management/water-resources/water-licensing-portal> (accessed 24 August 2017).

-
- 2020e, *Water trade register*, <https://denr.nt.gov.au/water/water-information-systems/water-trade-register> (accessed 16 October 2020).
- Department of Employment, Small Business and Training (Qld) 2020, *Industry Skills Advisors*, <https://desbt.qld.gov.au/training/employers/engage-government/industry-engagement-framework/industry-skills-advisors> (accessed 16 December 2020).
- DES (Qld) (Department of Environment and Science (Qld)) 2020, *Environmental Flows Assessment Program (EFAP)*, <https://wetlandinfo.des.qld.gov.au/wetlands/assessment/monitoring/current-and-future-monitoring/environmental-flows-assessment-program.html> (accessed 3 November 2020).
- DEW (SA) (Department for Environment and Water (SA)) 2020, *Border Groundwaters Agreement – South Australia-Victoria*, www.environment.sa.gov.au/topics/water/resources/border-groundwaters-agreement (accessed 15 December 2020).
- DEWNR (SA) (Department of Environment, Water and Natural Resources (SA)) nd, *Release of Unallocated Water Policy*.
- DHHS (Vic) (Department of Health and Human Services (Vic)) 2018, *Annual report on drinking water quality in Victoria 2016-17*.
- 2019, *Annual report on drinking water quality in Victoria 2017-18*.
- 2020a, *Annual report on drinking water quality in Victoria 2018-19: Responding to climate change*.
- 2020b, *Drinking water legislation*, www2.health.vic.gov.au/public-health/water/drinking-water-in-victoria/drinking-water-legislation (accessed 11 November 2020).
- DLGRMA (Qld) (Department of Local Government, Racing and Multicultural Affairs) 2020, *Indigenous Councils Critical Infrastructure Program (ICCIP)*, www.dlgrma.qld.gov.au/local-government/grants/current-programs/indigenous-councils-critical-infrastructure-program (accessed 4 November 2020).
- DNRM (Qld) (Department of Natural Resources and Mines (Qld)) 2017, *Independent Audit of Queensland Non-Urban Water Measurement and Compliance*, www.dnrme.qld.gov.au/land-water/initiatives/water-measurement-compliance-audit (accessed 22 November 2017).
- 2018, *Queensland Annual Environmental Watering Priorities 2017–2018 Implementing the Murray–Darling Basin Plan*.
- DNRME (Qld) (Department of Natural Resources and Mines (Qld)) 2020a, *Annual Report 2019-20*.
- 2018, *Local council water suppliers outside South East Queensland*, www.business.qld.gov.au/industries/mining-energy-water/water/industry-infrastructure/pricing/bulk-water/local-council-suppliers (accessed 9 November 2020).
- 2019a, *2018-2019 Annual Report*, Annual Report Series.
- 2019b, *Queensland bulk water opportunities statement - 2018-19 Program update*.

-
- 2019c, *Rural water management program: Proposals for strengthening non-urban water measurement*, Consultation Paper.
 - 2020b, *Assessing demand for water: Guidance for project proponents*, Brisbane.
 - 2020c, *Program to improve the measurement of overland flow*, www.dnr.me.qld.gov.au/land-water/initiatives/rural-water-futures/projects/measurement-overland-flow (accessed 4 November 2020).
 - 2020d, *Rural Water Management Program Progress and Performance Report*.
 - DOH (NSW) (Department of Health (NSW)) 2020a, *Drinking water and public health*, www.health.nsw.gov.au/environment/water/Pages/drinking-water-and-public-health.aspx (accessed 10 November 2020).
 - 2020b, *Drinking water in Sydney*, www.health.nsw.gov.au/environment/water/Pages/drinkwater-syd.aspx (accessed 10 November 2020).
 - 2020c, *Drinking Water in the Hunter*, www.health.nsw.gov.au/environment/water/Pages/drinkwater-hunter.aspx (accessed 10 November 2020).
 - DOH (NT) (Department of Health (NT)) 2019, *Guidelines for private water suppliers*.
 - 2011, *Memorandum of Understanding between the Department of Health and Power and Water Corporation for Drinking Water*.
 - DOH (WA) (Department of Health (WA)) 2020, *Drinking water in Western Australia*, https://healthywa.wa.gov.au/Articles/A_E/Drinking-water-in-Western-Australia (accessed 11 November 2020).
 - DOI (NSW) (Department of Industry (NSW)) 2018a, *Applying the High Ecological Value Aquatic Ecosystem (HEVAE) Framework for Riverine Ecosystems*.
 - 2018b, *NSW Floodplain Harvesting Policy*.
 - 2018c, *NSW Healthy Floodplains project*, Fact Sheet.
 - DOW (WA) (Department of Water (WA)) 2011, *Water allocation planning in Western Australia: A guide to our process*.
 - DPI (NSW) (Department of Primary Industries (NSW)) 2017, *Strategy for the controlled allocation of groundwater*.
 - 2020, *Benchmarking Cotton Water Productivity*, www.dpi.nsw.gov.au/agriculture/water/research-and-development/benchmarking-cotton-water-productivity (accessed 18 November 2020).
 - DPIE (NSW) (Department of Planning, Industry and Environment (NSW)) 2018, *Groundwater WAL exemptions for 3ML and Botany Sands*, www.industry.nsw.gov.au/natural-resources-access-regulator/licensing-and-approvals/groundwater-wal (accessed 12 November 2020).
 - 2019a, *A River Styles database for NSW*.
 - 2019b, *Floodplain Harvesting Action Plan*, Parramatta.

-
- 2020a, *About the Safe and Secure Water Program - Water in New South Wales*, www.industry.nsw.gov.au/water/water-utilities/infrastructure-programs/safe-and-secure-water-program/about (accessed 21 October 2020).
- 2020b, *Better Management of Environmental Water, Final report*.
- 2020c, *Change to trade of Domestic and Stock (Stock) licence allocations due to the drought*, www.industry.nsw.gov.au/water/licensing-trade/trade/reasons-for-decision (accessed 19 October 2020).
- 2020d, *Draft Regional Water Strategy: Lachlan Strategy*.
- 2020e, *Have your say on what information about water ownership and water trading is made public in NSW*, www.industry.nsw.gov.au/water/licensing-trade/trade/have-your-say (accessed 3 December 2020).
- 2020f, *Long term water plans*, www.environment.nsw.gov.au/topics/water/water-for-the-environment/planning-and-reporting/long-term-water-plans (accessed 11 November 2020).
- 2020g, *LWU performance monitoring data and reports*, www.industry.nsw.gov.au/water/water-utilities/lwu-performance-monitoring-data (accessed 10 November 2020).
- 2020h, *Macquarie valley floodplain*, www.industry.nsw.gov.au/water/plans-programs/healthy-floodplains-project/plans/macquarie (accessed 22 January 2021).
- 2020i, *Non-urban water metering in NSW: What water users need to know*, August.
- 2020j, *NSW Non-Urban Water Metering Policy*, November.
- 2020k, *NSW Water Register*, www.water.nsw.gov.au/water-licensing/registers (accessed 11 November 2020).
- DPIPWE (Tas) (Department of Primary Industries, Parks, Water and Environment (Tas)) 2014, *Tasmanian Standard for Non-Urban Water Meters*, Hobart.
- 2018, *Water Management Planning: Guiding Principles for the Development of Statutory Water Management Plans in Tasmania*, Water Resources Policy, September, #2018/1.
- 2020a, *Draft Rural Water Use Strategy*, October, Hobart.
- 2020b, *Rural Water Use Strategy: Position Paper*, Water and Marine Resources Division, Hobart.
- 2020c, *Surface Water Allocation Decision Framework (Amended 2020)*.
- 2020d, *Water Entitlement Search*, [https://wrt.tas.gov.au/wist/ui?command=content&pageSequenceNo=4&click=\[1\].Name#fopt](https://wrt.tas.gov.au/wist/ui?command=content&pageSequenceNo=4&click=[1].Name#fopt) (accessed 24 August 2017).
- DRDMW (Qld) and DES (Qld) (Department of Regional Development, Manufacturing and Water and Department of Environment and Science (Qld)) 2020, *Water Planning Science Plan*, Queensland Government.

-
- DWE (Department of Water and Energy) 2007, *Best Practice Management of Water Supply and Sewerage: Guidelines*.
- DWER (WA) (Department of Water and Environmental Regulation (WA)) 2018a, *Water licensing fees*, <https://water.wa.gov.au/licensing/water-licensing-fees> (accessed 18 November 2020).
- 2018b, *Water licensing fees FAQs*, <https://water.wa.gov.au/licensing/water-licensing-fees/water-licensing-fees-faqs> (accessed 18 November 2020).
- 2019a, *Discussion Paper on cost recovery for the Department of Water and Environmental Regulation*, <https://dwer.wa.gov.au/consultation/costrecovery> (accessed 18 November 2020).
- 2019b, *Measuring the Taking of Water*.
- 2019c, *Upper Collie, Water Allocation Plan, Evaluation Statement 2009-2017*, Perth.
- 2020a, *Derby groundwater allocation plan: for public comment*.
- 2020b, *Managing water in the Fitzroy River Catchment*, Discussion paper for stakeholder consultation.
- 2020c, *Water Register*, www.water.wa.gov.au/maps-and-data/maps/water-register (accessed 1 October 2020).
- 2020d, *Water services*, www.water.wa.gov.au/licensing/water-licensing/water-services (accessed 11 November 2020).
- EPA (Vic) (Environment Protection Authority (Vic)) 2018, *State Environment Protection Policy (Waters)*, www.epa.vic.gov.au/about-epa/laws/legislation-regulations-and-policies/water-legislation (accessed 21 October 2020).
- ERA (WA) (Economic Regulation Authority (WA)) 2017, *Inquiry into the Efficient Costs and Tariffs of the Water Corporation, Aqwest and Busselton Water*, Final Report, Perth.
- ESC (Essential Services Commission) 2016, *Melbourne Water Price Review: Final Decision*.
- 2018a, *City West Water Determination 1 July 2018 - 30 June 2023*.
- 2018b, *South East Water Determination 1 July 2018 - 30 June 2023*.
- 2018c, *Yarra Valley Water Determination 1 July 2018 - 30 June 2023*.
- ESCOSA (Essential Services Commission of South Australia) 2020, *SA Water Regulatory Determination 2020 - Final Determination: Statement of reasons*, Adelaide.
- Farrier Swier Consulting 2019, *Victoria's water sector: The PREMO model for economic regulation*, Independent Review, 28 March, p. 74, www.esc.vic.gov.au/sites/default/files/documents/victorias-water-sector-the-premo-model-for-economic%20regulation-20190411.pdf (accessed 28 January 2021).
- Gillespie Economics 2020, *IPART - Consultant report by Gillespie Economics - Assessment of Hunter Water and Sydney Water Customer Willingness to Pay Surveys - January 2020*,

-
- www.ipart.nsw.gov.au/Home/Industries/Water/Reviews/Metro-Pricing/Prices-for-Sydney-Water-Corporation-from-1-July-2020/24-Mar-2020-Consultant-report-by-Gillespie-Economics/Consultant-report-by-Gillespie-Economics-Assessment-of-Hunter-Water-and-Sydney-Water-Customer-Willingness-to-Pay-Surveys-January-2020 (accessed 15 January 2021).
- Goesch, T., Legg, P. and Donoghoe, M. 2020, *Murray-Darling Basin water markets: trends and drivers 2002-03 to 2018-19*, ABARES Research Report 20.5.
- Government of SA (Government of South Australia) 2012, *SA Policy Statement: Policy on the Implementation of Unbundling Water Rights in South Australia*, Adelaide.
- Government of Western Australia 2019, *Remote Aboriginal communities get water service upgrade*, www.mediastatements.wa.gov.au/Pages/McGowan/2019/03/Remote-Aboriginal-communities-get-water-service-upgrade.aspx (accessed 13 October 2020).
- 2020, *Aboriginal communities to receive \$38.9 million water service upgrades*, www.mediastatements.wa.gov.au/Pages/McGowan/2020/08/Aboriginal-communities-to-receive-38-point-9-million-dollar-water-service-upgrades.aspx (accessed 4 November 2020).
- Gupta, M., Westwood, T., Legg, P. and Hughes, N. 2020, *MDB water market data*, March, Technical Report 20.2, Australian Bureau of Agricultural and Resource Economics and Sciences.
- Hunter Water 2020, *Water Quality Summary - June 2020*.
- IA (Infrastructure Australia) 2015, *Assessment Brief - Tasmanian Irrigation Tranche 2*, Sydney.
- 2017, *Project Evaluation Summary - Myalup-Wellington Water Project*, Sydney.
- 2018, *Project Evaluation Summary - Lower Fitzroy River Infrastructure Project*, Sydney.
- 2020, *Stage 2 Haughton Pipeline Project: Project business case evaluation summary*, Sydney.
- Icon Water 2018, *Source Water Strategy 2018-2030*.
- 2020, *Drinking Water Quality Report 2019-20*.
- ICRC (Independent Competition and Regulatory Commission) 2018, *Regulated water and sewerage services: 2018 - 2023*.
- IGWC (Interim Inspector-General of Water Compliance) 2020, *Home | Interim Inspector General of Water Compliance*, www.igwc.gov.au/ (accessed 7 December 2020).
- IIGMDB (Interim Inspector-General of Murray-Darling Basin Water Resources) 2020, *Impact of Lower Inflows on State Shares Under the Murray–Darling Basin Agreement*, Canberra.
- IPART (Independent Pricing and Regulatory Tribunal) 2020a, *Final Report: Review of Prices for Hunter Water Corporation: from 1 July 2020*, Sydney.

-
- 2020b, *Review of Prices for Sydney Water from 1 July 2020 Final Report*, June, Sydney.
- 2020c, *Review of prices for Water NSW Greater Sydney from 1 July 2020*, Final Report, Sydney.
- 2020d, *Review of Water Management Prices from 1 July 2021 - Issues Paper*.
- Jacobs Australia 2019, *Stage 2 Haughton Pipeline Duplication Project: Detailed Business Case*, Report to Australian Department of Infrastructure, Regional Development and Cities, South Brisbane.
- KPMG 2016, *Evaluation Report for the National Framework for Compliance and Enforcement Systems for Water Resource Management*, March, Department of Agriculture and Water Resources, Canberra.
- Macpherson, E. 2017, ‘Beyond recognition: Lessons from Chile for allocating Indigenous water rights in Australia’, *UNSW Law Journal*, vol. 40, no. 3, pp. 1130–1169.
- Matthews, K. 2017a, *Independent Investigation into NSW Water Management and Compliance: Advice on Implementation*, New South Wales.
- 2017b, *Independent Investigation into NSW Water Management and Compliance: Interim Report*, New South Wales.
- McCormack, M., Turnbull, M., Littleproud, D. and Canavan, M. 2018, *Backing Central Queensland with funding for Rookwood Weir*, <https://minister.infrastructure.gov.au/mccormack/media-release/backing-central-queensland-funding-rookwood-weir> (accessed 20 November 2020).
- MDBA (Murray-Darling Basin Authority) 2017a, *Basin Plan Water Resource Plan Requirements Position Statement 1M WRP imposing obligations*.
- 2017b, *The Murray-Darling Basin Water Compliance Review*, Canberra.
- 2018a, *Basin Environmental Watering Priorities 2018-19*, www.mdba.gov.au/sites/default/files/pubs/e-water-priorities-2018-19.pdf (accessed 28 October 2020).
- 2018b, *Icon Site Condition - The Living Murray*, Canberra.
- 2018c, *Sustainable Diversion Limit Reporting and Compliance Framework*, 37/18, Canberra.
- 2018d, *Water resource plans*.
- 2019a, *Basin Environmental Watering Priorities 2019-20*, www.mdba.gov.au/sites/default/files/pubs/e-water-priorities-2019-20_0.pdf (accessed 28 October 2020).
- 2019b, *Basin-wide Environmental Watering Strategy, second edition*, Canberra.
- 2019c, *Best Practice Guidelines for Minimum Metering Thresholds*, Guidelines agreed between the governments of New South Wales, Victoria, Queensland, South Australia, Australian Capital Territory and the Australian Government, Canberra.

-
- 2019d, *Bulk water trade adjustments trials*, www.mdba.gov.au/managing-water/water-markets-trade/interstate-water-trade/bulk-water-trade-adjustments-trials (accessed 14 October 2020).
- 2019e, *Compliance Priorities 2019-20*, Canberra.
- 2019f, *First Nations People participation in environmental watering*, 56/19, Canberra.
- 2019g, *Murray-Darling Basin Compliance Compact Assurance Report 2019*, December, Canberra.
- 2019h, *Review of the Basin-wide environmental watering strategy*, www.mdba.gov.au/sites/default/files/pubs/review-basin-wide-ewatering-strategy-august-2019.pdf (accessed 28 October 2020).
- 2019i, *Rivers, the veins of our country: Ten case studies of First Nations involvement in managing water for the environment in the Murray-Darling Basin, 2018-19*, www.mdba.gov.au/sites/default/files/pubs/rivers,%20the%20veins%20of%20our%20country_1.pdf (accessed 2 November 2020).
- 2020a, *2019-20 Compliance Priorities: Statement of Performance*, 30/20, Canberra.
- 2020b, *Basin Environmental Watering Priorities 2020-21*, www.mdba.gov.au/sites/default/files/pubs/e-water-priorities-2020-21.pdf (accessed 28 October 2020).
- 2020c, *Basin Plan 2020 Evaluation*, Canberra.
- 2020d, *Sustainable diversion limit (SDL) accounting framework improvement strategy 2020-2025*, Canberra.
- 2020e, *Transition Period Water Take Report 2018-19*, Report on Cap Compliance and Transitional SDL Accounting, 38/20, Canberra.
- MJA (Marsden Jacob Associates) 2019, *Allocation trade review- summary report*, July, Victorian Environmental Water Holder.
- Morrison, S. 2020, *National Cabinet Media Statement*, www.pm.gov.au/media/national-cabinet-3 (accessed 24 December 2020).
- NMI and DIIS (National Measurement Institute and Department of Industry, Innovation and Science (Cth)) 2019, *Regulator Performance Framework, Self-Assessment Report 2018-2019*, National Measurement Institution.
- Northern Territory Government 2018, *Northern Territory Water Regulatory Reform Directions Paper*.
- 2019, *10 Year Infrastructure Plan 2019-2028 - Annual Review*, Palmerston.
- NRC (NSW) (Natural Resources Commission (NSW)) 2018a, *Review of the water sharing plan for the Bellinger River Area Unregulated and Alluvial Water Sources 2008*, Final Report, NSW Government, Sydney.
- 2018b, *Review of the water sharing plan for the Border Rivers Regulated River water source 2009*, Final Report, NSW Government, Sydney.

-
- 2018c, *Review of the water sharing plan for the Great Artesian Basin groundwater water source 2008*, Final Report, NSW Government, Sydney.
- 2019, *Review of the Water Sharing Plan for the Barwon Darling Unregulated and Alluvial Water Sources 2012*, Final Report, NSW Government, Sydney.
- 2020a, *Review of the Water Sharing Plan for the Central Coast Unregulated Water Sources 2009*, Final Report, NSW Government, Sydney.
- 2020b, *Review of the Water Sharing Plan for the Coffs Harbour Area Unregulated and Alluvial Water Sources 2009*, Final Report, NSW Government, Sydney.
- 2020c, *Review of the Water Sharing Plan for the Hunter Unregulated and Alluvial Water Sources 2009*, Final Report, NSW Government, Sydney.
- 2020d, *Review of the Water Sharing Plan for the Lower North Coast Unregulated and Alluvial Water Sources 2009*, Final Report, NSW Government, Sydney.
- 2020e, *Review of the Water Sharing Plan for the Peel Valley Regulated, Unregulated, Alluvium and Fractured Rock Water Sources 2010*, Final Report, NSW Government, Sydney.
- NRMMC (Natural Resource Management Ministerial Council) 2010, *National Water Initiative Pricing Principles*.
- NSW Government 2017, *Securing our water: NSW Government water reform action plan*, New South Wales.
- NSW Ombudsman 2017, *Investigation into Water Compliance and Enforcement 2007-17*, New South Wales.
- NWC (National Water Commission) 2011, *The National Water Initiative — Securing Australia's Water Future: 2011 Assessment*, Canberra.
- 2014, *Australia's Water Blueprint: National Reform Assessment 2014*, Canberra.
- NWGA (National Water Grid Authority) 2020a, *About the National Water Grid Authority*, www.nationalwatergrid.gov.au/about (accessed 3 August 2020).
- 2020b, *National Water Infrastructure Investment Policy Framework*, Canberra.
- 2020c, *Status of the 22 National Water Infrastructure Development Fund (NWIDF) capital projects (as at 11 November 2020)*, Canberra.
- OGIA (Qld) (Office of Groundwater Impact Assessment (Qld)) 2019, *Underground Water Impact Report for the Surat Cumulative Management Area*, Department of Natural Resources, Mines and Energy (Qld).
- OTTER (Office of the Tasmanian Economic Regulator) 2018, *2018 Water and Sewerage Price Determination Investigation Final Report*, Hobart.
- Owens, L.W. 2019, *A Balanced Bargain*, Adelaide.
- PC (Productivity Commission) 2017, *National Water Reform*, Report no. 87, Canberra.
- 2018a, *Murray-Darling Basin Plan: Five-year Assessment*, Report no. 90, Canberra.

-
- 2018b, *Murray-Darling Basin Plan: Five-year Assessment - Draft Report*, Canberra.
- Pearson, D. 2020, *Compliance and Enforcement Review: DELWP and delegated water corporations' responsibilities within the Water Act 1989*, Summary Overview Report prepared for the Minister for Water, June, Melbourne.
- Pitt, K. (Minister for R., Water and Northern Australia) 2020, *New chapter in Murray Darling Basin Plan centres on communities* | Ministers, Media Release, <https://minister.awe.gov.au/pitt/media-release/new-chapter-mdbp> (accessed 7 December 2020).
- PowerWater (Power and Water Corporation) 2018, *Drinking water quality report 2018*, Northern Territory, pp. 41–47.
- 2019, *Statement of Corporate Intent*, Northern Territory.
- QAO (Queensland Audit Office) 2020, *Local government entities: 2018-19 results of financial audits*, Brisbane.
- QCA (Queensland Competition Authority) 2018, *Seqwater Bulk Water Price Review 2018-21: Final Report*, March, Brisbane.
- 2020a, *Rural irrigation Price Review 2020-24, Part B: Sunwater*, Final Report, January, Brisbane.
- 2020b, *Rural irrigation Price Review 2020-24, Part C: Seqwater*, Final Report, January, Brisbane.
- Queensland Government 2015, *Minister's Performance Assessment Report Water Resource (Great Artesian Basin) Plan 2006 and Great Artesian Basin Resource Operations Plan 2007*, Department of Natural Resources and Mines, Brisbane.
- 2018a, *Queensland Competition Authority Regulation 2018: Subordinate Legislation No. 125*.
- 2018b, *Stop price shocks with fairer SEQ water bill*, <https://statements.qld.gov.au/statements/84649> (accessed 23 December 2020).
- 2018c, *Water Allocations Register*, www.business.qld.gov.au/industries/mining-energy-water/water/water-markets/register (accessed 16 October 2020).
- 2019a, *Queensland water and sewerage service provider key performance indicator data*, www.data.qld.gov.au/dataset/water-and-sewerage-service-provider-qld-key-performance-indicator-data (accessed 6 November 2020).
- 2019b, *Water entitlement viewer*, www.business.qld.gov.au/industries/mining-energy-water/water/maps-data/water-entitlement-viewer (accessed 16 October 2020).
- 2020a, *Market Information*, www.business.qld.gov.au/industries/mining-energy-water/water/water-markets/market-information (accessed 16 October 2020).
- 2020b, *Reporting requirements for water service providers*, www.business.qld.gov.au/industries/mining-energy-water/water/industry-infrastructure/industry-regulation/performance-reporting/requirements (accessed 23 December 2020).

Queensland Health 2020, *Drinking water*, www.health.qld.gov.au/public-health/industry-environment/environment-land-water/water/quality/drinking (accessed 11 November 2020).

Queensland Labor 2020, *Media Release: Just Add Cheaper Water - Growing Agriculture in Queensland*, www.annastaciapalaszczuk.com.au/media-releases/just-add-cheaper-water-growing-agriculture-in-queensland/ (accessed 4 January 2021).

Robison, J., Cosens, B., Jackson, S., Leonard, K. and McCool, D. 2017, *Indigenous Water Justice*.

SA Government (South Australian Government) 2020a, *Landscape South Australia: Regulations Explanatory Paper*.

——— 2020b, *Water Licence & Permit Register*, WaterConnect, www.waterconnect.sa.gov.au/Systems/WLPR/Pages/Default.aspx (accessed 16 October 2020).

——— 2020c, *Water Management Solutions: Reforming our water licensing business and delivering a modern online Water Register*, www.waterconnect.sa.gov.au:80/Water-Management/Licences-and-Permits/Water-Management-Solutions/SitePages/Home.aspx (accessed 16 October 2020).

——— 2020d, *Water Trading in South Australia*, www.waterconnect.sa.gov.au:80/Systems/WTR/Pages/Default.aspx (accessed 16 October 2020).

SA Health 2020, *Providing safe drinking water: SA Health*, www.sahealth.sa.gov.au/wps/wcm/connect/public+content/sa+health+internet/public+health/water+quality/providing+safe+drinking+water/providing+safe+drinking+water (accessed 24 February 2020).

SA Water 2019, *Annual Report 2018-19*.

Sanders, O., Hughes, N. and Gupta, M. 2019, *Measuring water market prices: Statistical methods for interpreting water trade data*, February, Research Report 19.1, Australian Bureau of Agricultural and Resource Economics and Sciences.

Sefton, R., Peterson, D., Woods, R., Kassebaum, A., McKenzie, D., Simpson, B. and Ramsay, M. 2020, *Panel report: Independent assessment of social and economic conditions in the Basin - Draft Report*, Melbourne.

State of Victoria 2020, *Non-urban Water Metering in Northern Victoria - Annual Implementation Report 2020*, Department of Environment, Land, Water and Planning.

TasWater 2018, *Price and Service Plan 3: 2018-21*, Hobart.

——— 2019, *Annual Drinking Water Quality Report 2018-19: Section A - Summary*, Hobart.

——— 2020a, *Fact sheet: water quality. From catchment to tap, making your drinking water safe*, www.taswater.com.au/ArticleDocuments/477/Fact%20sheet%20water%20quality.pdf.aspx (accessed 11 November 2020).

——— 2020b, *Water and Sewerage charges*, www.taswater.com.au/Your-Account/Water-and-Sewerage-

-
- Charges#:~:text=The%20price%20increase%20listed%20above,years%20to%2030%20June%202021. (accessed 15 November 2020).
- TI (Tasmanian Irrigation Pty Limited) 2020a, *About Tasmanian Irrigation*, www.tasmanianirrigation.com.au/about-tasmanian-irrigation (accessed 18 November 2020).
- 2020b, *Irrigation Rights: entitlement to an annual volume in an irrigations scheme*, <https://app.powerbi.com/view?r=eyJrIjoiNWFKOWM1ZTYtNTJhZC00ZDkxLTliZTYtMzliYmEwNGVhZjRhIiwidCI6IjBlNWFiMWFmLTExYWUtNDE2Yy1hNmMxLTlmYmNhOTJjMTZkNiJ9> (accessed 16 October 2020).
- 2020c, *Sorell (South East Stage 3) Irrigation District, Charge rates: 2020-21*, www.tasmanianirrigation.com.au/source-assets/map-data/south-east-stage-3-sorell/Annual-Charges-2020-21_SEIS3.pdf (accessed 18 November 2020).
- 2020d, *Trading overview*, <https://app.powerbi.com/view?r=eyJrIjoiNzJmYmI3ODQtMTdkZi00YzYwLWJiNmUtODhkNGViZDM1NmY3IiwidCI6IjBlNWFiMWFmLTExYWUtNDE2Yy1hNmMxLTlmYmNhOTJjMTZkNiJ9> (accessed 16 October 2020).
- Tropical Public Health Service (Cairns) 2019, *Tropical Public Health News*, p. 9.
- Utilities Commission (Northern Territory) 2020, *Water and sewerage retail pricing*.
- Vertessy, R., Barma, D., Baumgartner, L., Mitrovic, S., Sheldon, F. and Bond, N. 2019, *Independent Assessment of the 2018-19 Fish Deaths in the Lower Darling*.
- VEWH (Victorian Environmental Water Holder) 2019a, *Annual Report 2018-19*, Melbourne.
- 2019b, *Reflections: Water for the Environment in Victoria 2018-19*, Melbourne.
- Victorian Government 2017, *Applied Aquatic Ecology Research Hub Strategic Plan 2017-2020*, Melbourne.
- Victorian Water Register 2018, *Improvements to online allocation trade processing*, <https://waterregister.vic.gov.au/about/news/233-improvements-to-online-allocation-trade-processing> (accessed 14 December 2020).
- 2020, *Where can I trade?*, <https://waterregister.vic.gov.au/TradingRules2019/> (accessed 14 December 2020).
- Water Corporation 2019a, *Annual Report 2018-19*, Perth.
- 2019b, *Drinking Water Quality: Annual Report 2018-19*, Perth, p. 7.
- 2020a, *Annual Report 2019-20*, Perth.
- 2020b, *Drinking water quality*, www.watercorporation.com.au/About-us/Our-performance/Drinking-water-quality (accessed 11 November 2020).
- WaterNSW 2018, *20 Year Infrastructure Options Study - Rural Valleys*, Summary Report, Parramatta.

-
- 2020, *Wyangala Dam Wall Raising*, www.waternsw.com.au/projects/new-dams-for-nsw/wyangala-dam (accessed 27 January 2021).
- WELS Regulator (Water Efficiency Labelling Scheme Regulator) 2020, *2020 independent review of the WELS scheme*, www.waterrating.gov.au/news/2020-independent-review-wels-scheme (accessed 18 November 2020).
- Wheeler, S.A., Loch, A., Crase, L., Young, M. and Grafton, R.Q. 2017, ‘Developing a water market readiness assessment framework’, *Journal of Hydrology*, vol. 552, pp. 807–820.
- , Zuo, A., Xu, Y., Haensch, J. and Seidl, C. 2020, *Water Market Literature Review and Empirical Analysis*, 29 May, Prepared for the Australian Competition and Consumer Commission (ACCC), The University of Adelaide.
- Whittle, L., Galeano, D., Hughes, N., Gupta, M., Legg, P., Westwood, T., Jackson, T. and Hatfield-Dodds, S. 2020, *Economic Effects of Water Recovery in the Murray-Darling Basin*, Issue no. 7, Australian Bureau of Agricultural and Resource Economics and Sciences.
- YVW (Yarra Valley Water) 2017, *Citizens Jury to help determine water services and pricing*, www.yvw.com.au/about-us/news-room/citizens-jury-help-determine-water-services-and-pricing (accessed 26 November 2020).