1 Introduction

1.1 Context and overview

The *National Performance Report 2016–17: urban water utilities* (2017 Urban NPR) supports the commitments made by States and Territories under the National Water Initiative (NWI) to report publicly and independently on the performance of water utilities.[3]

The 2017 Urban NPR compares the performance of 79 utilities and councils (utilities) and 5 bulk water authorities providing urban water services to over 20 million people[4] across Australia. It is produced by the Bureau of Meteorology (the Bureau), in conjunction with State and Territory governments and the Water Services Association of Australia.

This Part A of the report provides commentary and analysis for key indicators that apply to retail/distribution utilities (the major urban centre analysis in Chapter 2 includes performance data for bulk water suppliers). Part B of the report contains data for the full set of 182 indicators that are reported on by urban water utilities and bulk water suppliers for all reporting years.

The analysis and commentary provides a context for each indicator, discusses changes in reporting methodologies, and highlights trends within and/or between different utility groups. The utilities are grouped according to their number of connections as explained in 'A guide to this report'.

The commentary and analysis in the 2017 Urban NPR is not intended to be a comprehensive explanation of every reported indicator. It provides some of the more apparent trends or differences between years and utilities. Most of the information is sourced from publicly available documents—annual reports, regulatory decisions, and utility websites.

1.2 Reporting

The 79 utilities and 5 bulk water authorities contributing data to the 2017 Urban NPR are listed in Appendix C. A summary of utility type by jurisdiction is shown in Table 1.1.

In the 2017 Urban NPR, Goldenfields Water reported as single water business. Historically, it reported as two businesses: a bulk water authority and a water reticulation business.

Financial and pricing data for a number of New South Wales utilities was not available at the time of publication and is not included in this report. These utilities were Central Coast Council, Dubbo Regional Council, Goldenfields Water County Council, Goulburn Mulwaree Council, MidCoast Council and Queanbeyan–Palerang Regional Council.

Seventy of the 79 utilities included in this report provide both reticulated water supply and sewerage services. The remaining utilities provide only water supply or sewerage services. In summary the report includes data for:

- 70 utilities providing water supply and sewerage services
- 5 utilities providing only water supply
- 4 utilities providing only sewerage
- 5 bulk water authorities.

3 National Water Initiative Clauses 75–76
4 Australian Bureau of Statistics, *Australian Demographic Statistics*, March quarter 2017

Table 1.1 Reporting in the 2017 Urban NPR by utility size group, and jurisdiction

Jurisdiction	Bulk	Major	Large	Medium	Small	Total
Australian Capital Territory		1				1
New South Wales	2	3		13	12	30
Northern Territory			1		1	2
Queensland	2	4	4	5	6	21
South Australia		1				1
Tasmania		1				1
Victoria	1	4	6	5	1	17
Western Australia		1		1	9	11
Total	**5**	**15**	**11**	**24**	**29**	**84**

1.3 Locations of utilities

The administrative boundaries of all utilities reporting data for the 2017 Urban NPR are shown in Figure 1.1. Further details about the utilities are available from their respective websites.

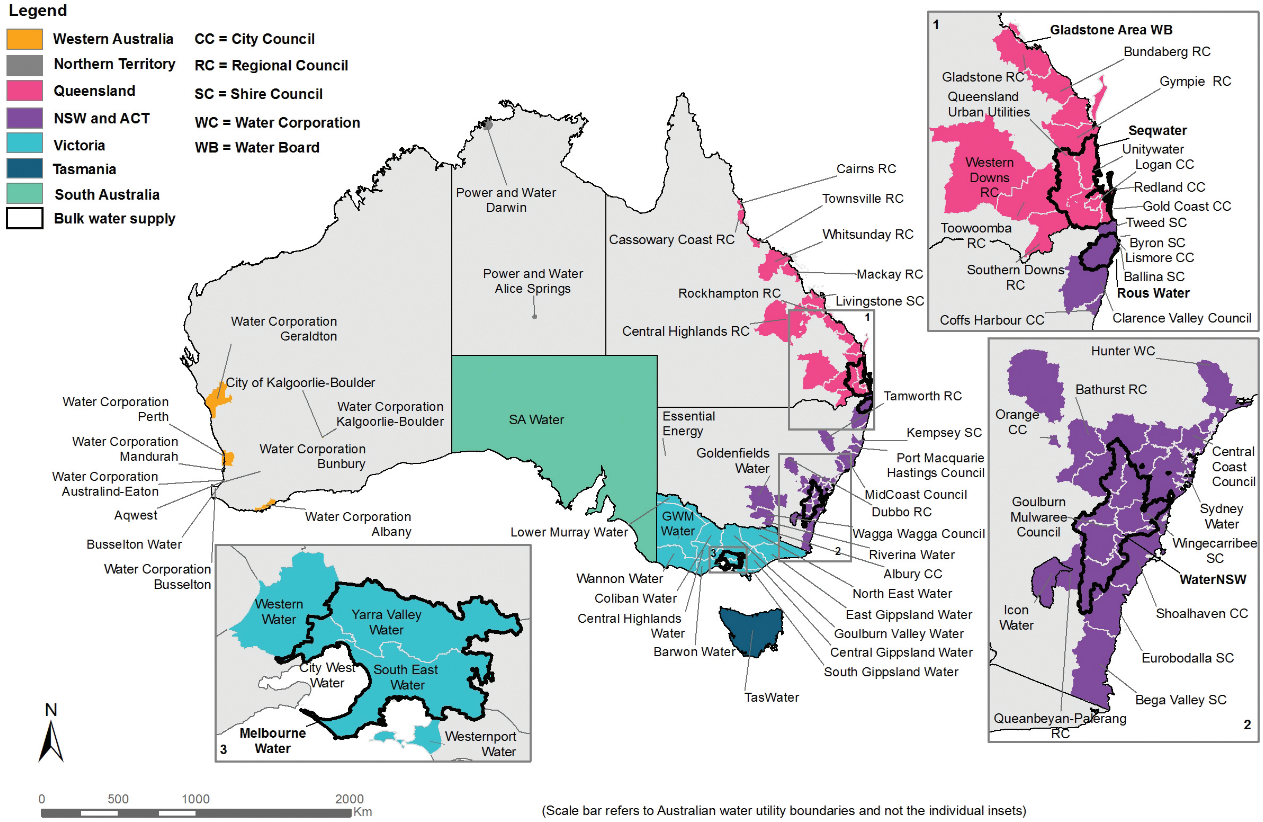

Figure 1.1 The administrative boundaries of all utilities reporting data for 2016–17

1.4 Key drivers

This section discusses some of the key drivers of water utility performance presented in the 2017 Urban NPR including rainfall, temperature, utility size, and sources of water.

Other factors affecting performance, including network density, soil types, the age and condition of infrastructure, and government policy and regulation are not discussed.

1.4.1 Rainfall

Rainfall can affect the performance results of utilities in many ways. These include:

- Significant droughts with prolonged periods of low rainfall can stress urban water supply systems. Depending on the severity of the drought, security of the system and availability of climate-resilient water sources (e.g. desalinated or recycled water) may cause the utility to impose water restrictions to conserve water, and assure continuity of the water supply.
- Wet or dry conditions can affect demand for outdoor watering, resulting in a change in urban water and recycled water supplied to residents, councils, and parklands used for outdoor leisure activities (e.g. golf courses)[5]. Changes in water consumption affect the revenue collected by utilities, their profitability, and the strength of their water-usage pricing signal.
- Wet or dry conditions can also affect decisions about which water sources to use (W1–W7). For example, persistent dry conditions can trigger thresholds for production from desalination plants or for the use of particular groundwater or recycled water sources, affecting the operating costs of utilities (F11, F12, F13).
- Increased rainfall can result in infiltration of water into sewer systems, which can increase the volume of sewage to be pumped and treated, increasing the operating costs of utilities (F12, F13) and also greenhouse gas emissions from sewage (E12). Additional rainfall and sewer infiltration can also result in additional sewer overflows—especially during heavy rainfall.
- Extreme wet, or dry conditions can cause expansion and shrinking of reactive clay soils in some parts of Australia. This can result in ground movement causing an increase in water or sewer main breaks (A8, A14)—especially when conditions fluctuate rapidly from wet-to-dry or dry-to-wet. In periods of more consistent rainfall, the soils maintain more even moisture levels, resulting in less ground movement.

5 See indicators W12 for residential water supplied and W26 for recycled water

Figure 1.2 shows how rainfall has varied from the long-term average across Australia over the past eight years (i.e. white=average; blue=above average; and red=below average).

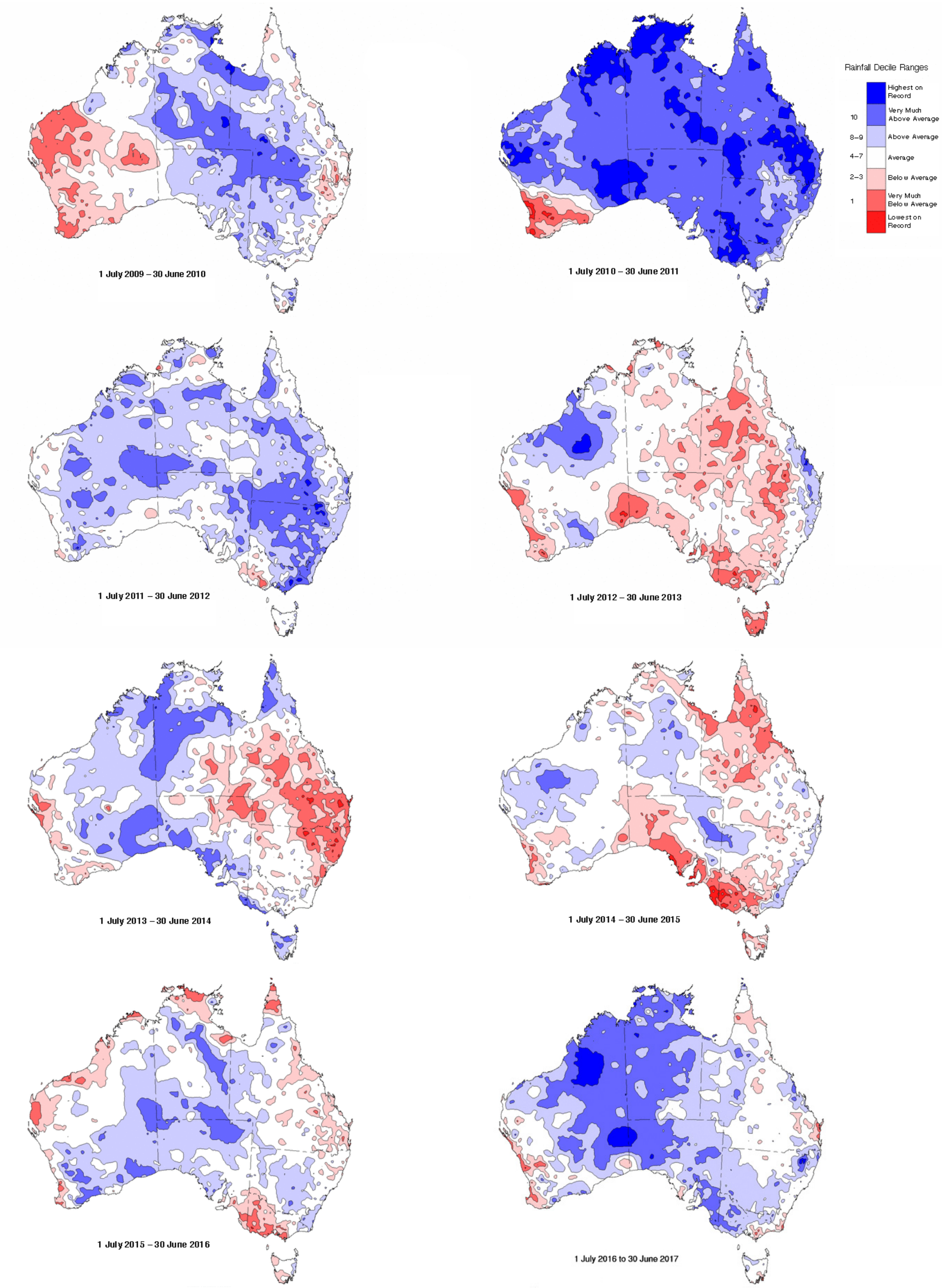

Figure 1.2 Australian 12-month rainfall deciles[6] from 2009–10 to 2016–17

6 Decile 1 means the lowest 10 per cent of records, decile 2 the next lowest 10 per cent, and so on, up to decile 10, the highest 10 per cent of records

Winter 2016

Australia's second wettest winter on record saw a national area-average rainfall of 116.3 mm. All States recorded above-average (long-term 1961–1990) rainfall, with the highest area-averaged rainfall recorded in Tasmania (638.5 mm). The highest departure from the average was observed in Queensland, which was the second highest on record (172 per cent), followed by the Northern Territory (138 per cent).

July rainfall was above to very much above average over most of northern Australia, a large area of Western Australia, western and southeastern South Australia, most of Victoria, Tasmania and much of southern New South Wales.

August rainfall totals for all States and Territories, except Victoria and Tasmania, were above the long-term average.

Spring 2016

The national area-averaged rainfall for Spring was 26 per cent above average. However, rainfall varied considerably over the country and it was generally drier than average in the country's southwest and northeast. Spring was wetter than average across much of the southeast and interior, and the Northern Territory.

Much of the rain over the interior and southeast fell during September. For Australia as a whole, September rainfall was 195 per cent above average, and the second-wettest on record. These very much above average rainfalls resulted in a number of significant floods in Victoria, Queensland, New South Wales, Tasmania and South Australia. Despite record falls extending from the Top End to western Queensland, and across the southeastern mainland, Western Australia received below-average September rainfall.

Summer 2016–17

Rainfall for summer 2016–17 was the fourth highest on record for Australia as a whole, and was 49 per cent above average for the season. Western Australia, the Northern Territory and South Australia observed above to very much above average rainfall. New South Wales experienced a dry summer with a below-average rainfall (34 per cent).

December was the wettest on record for South Australia and third wettest for Western Australia and the Northern Territory. Below-average state-based totals were recorded in Queensland, New South Wales and Victoria.

January rainfall was above-average across the western two-thirds of the country and western half of Queensland, and below-average for the east of Victoria and southern coast of New South Wales. February rainfall was close to average across Australia, with above-average rainfall recorded in Western Australia and the Northern Territory, and below-average for Queensland, New South Wales, Tasmania and South Australia.

Autumn 2017

Autumn 2017 was wetter than average for the east coast, western Victoria and parts of Western Australia. Western Tasmania, western Queensland and eastern Northern Territory, and western parts of Western Australia were drier than average for this period.

March rainfall was slightly above-average across the country and in the highest ten per cent of historical observations along the east coast due to Tropical Cyclone *Debbie*. Above-average rainfall was recorded for New South Wales, Queensland and Western Australia. Below-average rainfall was recorded in South Australia, Tasmania, the Northern Territory and Victoria.

Nationally, rainfall for Australia during April was slightly below-average, however there were marked differences in the rainfall received over different parts of the country. April was wetter-than-average in the far north of the Northern Territory, and in a large band that extended from northwestern Western Australia, down through South Australia and into western parts of New South Wales and Victoria. South Australia had its tenth-wettest April on record, with a large area receiving more than 400 per cent of its April average rainfall.

Winter 2017

June was the second-driest on record for Australia as a whole, with rainfall 62 per cent below the long-term mean, and the driest on record for large areas of southern Australia. Significantly above-average rainfall fell on the east coast between Sydney and Brisbane.

1.4.2 Temperature

There are many relationships between temperature and the performance of utilities including:

- Demand and temperature, particularly residential and non-residential outdoor demand. Increased temperature, in prolonged periods above long-term averages, can result in increased potable and recycled water (W12, W26, W27) supply to residents, councils, and parklands used for outdoor leisure activities (e.g. golf courses). Changes in water consumption affect the revenue collected by water utilities, their profitability (F3, F24), and the strength of their water-usage pricing signal (F4).
- Hot weather can increase the risk of bushfires, resulting in the deployment of resources to protect water supply catchments and mitigate the impacts of a bushfire. Emergency deployments can affect the operating expenditure of a utility (F11, F12, F13). When responding to a bushfire event, temporary water restrictions may be put in place to ensure the availability of supply, and meet firefighting requirements during extreme fire weather. These restrictions can impact on the volume of water supplied by a utility and affect its operating cost and revenue. A burnt catchment can impact water supply due to water quality issues, which may require water storage to be suspended for some time.
- Extended periods of heat or cold can impact on the quality of water sources and supplies and affect decisions about which water sources are used (W1–W7) and the level of the treatment required. For example, a heatwave contributes to the decline in dissolved oxygen levels in a waterbody and can trigger the need to supply water from an alternative source, or increase water treatment, which affects the operating costs of a utility (F11, F12, F13).
- Changes in temperature can affect the quality of treated water. Biological processes are particularly sensitive to extremes of heat or cold, and rapid fluctuations in temperature. These events can have consequences for the quality of water supplied (H indicators) the need for treatment, and the operational costs of a utility (F11, F12, F13).
- Extended hot conditions give rise to dry soil conditions. Consequently, many trees will seek out moisture and their roots can enter the sewer system, causing blockages and breaks (A14, A15) and increase water main breaks (A8).

Winter 2016

Winter 2016 was Australia's fourth-warmest on record for minimum temperatures and equal sixth-warmest for mean temperatures. For Queensland, area-averaged minimum temperatures were the second highest on record, 2.36 °C above average. Australia's fifth warmest July was recorded in 2016 with the area-averaged minimum temperature 1.59 °C above the average. August mean temperature was 0.44 °C above average nationally, with maximum and minimum temperatures warmer than average.

Spring 2016

Spring mean temperatures for Australia were equal to the long-term average, and the mean maximum temperatures slightly below average. The area-averaged maximum temperatures were lower than the long-term mean for all States and the Northern Territory, except Western Australia. The minimum temperatures for most States and Territories were either warmer than average, or close to average, with only South Australia recording well below the long-term average.

Australia's mean temperature for September was near average with the maximum temperature cooler than average, and the minimum temperature warmer than average. For October, national mean, maximum and minimum temperatures were below average. The national mean temperature for November was warmer than average.

Summer 2016–17

The Australian summer was warmer than average across eastern Australia, and cooler than average across the northwest. For New South Wales both the mean maximum, and overall mean temperatures were the warmest on record, and the mean minimum was the second highest on record for summer.

The national mean temperature for January was above-average. The national mean minimum temperature was also above-average and was the third warmest on record. All states and the Northern Territory recorded warmer January nights. February's mean temperature were above average, with exceptional warmth in Queensland and New South Wales.

Autumn 2017

The mean temperature for Autumn was above average for Australia. All states except Western Australia and the Northern Territory ranked amongst the warmest ten autumns on record for mean temperatures. Queensland, Victoria and Tasmania recorded top ten autumns on record for minimum temperatures.

March was exceptionally warm, with the third warmest national mean temperature on record, and warmer than average temperatures for all States and Territories. Temperatures for April were relatively less extreme, with mean temperatures above average across Australia. May followed with an above-average mean national temperature.

Winter 2017

Daytime temperatures were above to very much above average over the majority of the country, with the seventh warmest June on record.

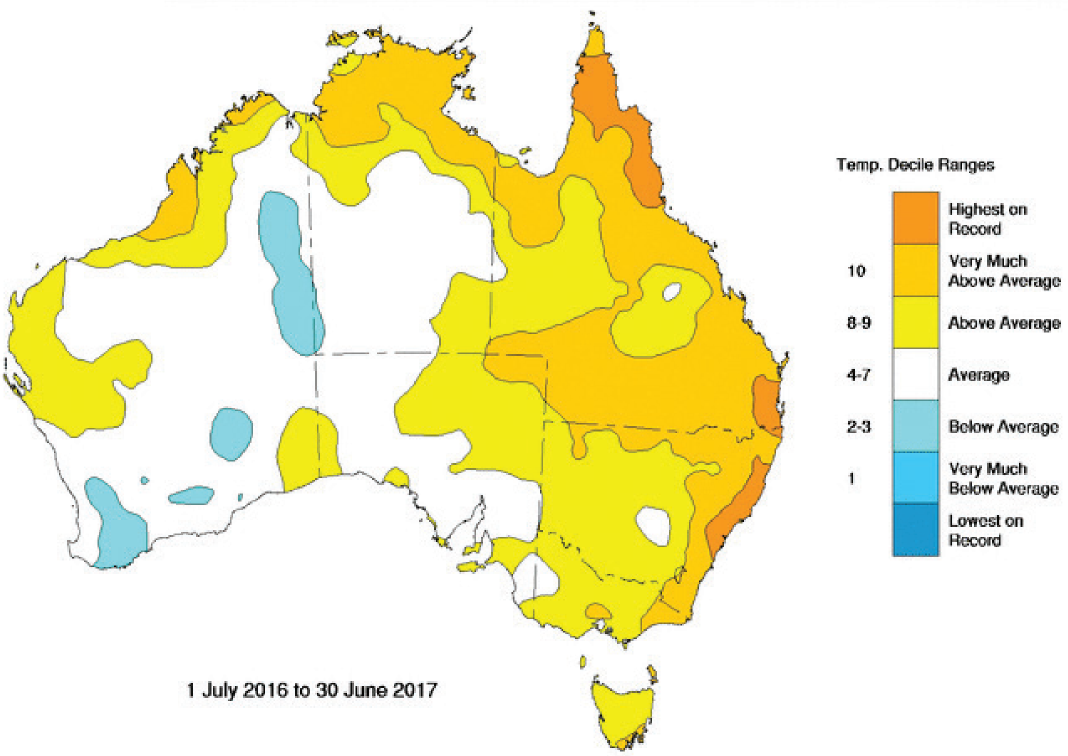

Figure 1.3 Australian 12–month maximum temperature deciles[7] for 2016–17

1.4.3 Utility size

While many factors influence performance, there is a relationship between the size of the utility's customer base (in terms of the number of connections) and its performance on a number of indicators. This relationship may be causal, coincidental, or due to a related matter (e.g. larger utilities are subject to price regulation while many smaller utilities are not).

7 Decile 1 means the lowest 10 per cent of records, decile 2 the next lowest 10 per cent, and so on, up to decile 10, the highest 10 per cent of records

1.4.4 Sources of water

Two important drivers of performance are the sources of water used by a utility, and the geographical relationship between the source and the urban centre it supplies. The combination and interaction of these drivers serve to create wide variations in engineering, operations, and social challenges for each utility across the country.

The sources of water available to a utility are an important driver of a number of key performance indicators. For example, the cost of treating water to an acceptable standard and supplying it to users affects the revenue collected by water utilities, their profitability (F3, F24), and the strength of their water-usage pricing signal (F4).

Traditionally, Australians have relied on surface and, to a lesser extent, groundwater sources to meet their urban consumptive needs. Increased demand driven by factors such as population growth and changes to the reliability of existing sources[8] have resulted in a need to further develop water supply sources to ensure supply is maintained. Financial, environmental, and social considerations mean a reduced number of opportunities exist to develop more of these traditional supply sources. As a result, utilities and bulk water authorities across the country are developing non-traditional (alternative) supply sources such as desalination and recycling, while continuing to explore options for stormwater and rainwater harvesting.

This diversification has important consequences for the performance of urban water utilities. It impacts upon how much it costs to treat water to an acceptable standard and supply multiple water types to end-users while meeting regulatory requirements.

For example, water from a storage in a protected (or 'closed') catchment is typically of a higher quality than that of an 'open' catchment and therefore requires less treatment, hence reducing the cost of supply. Groundwater sources can also vary significantly. The type and depth of an aquifer as well as the quality of the water it contains both have a significant impact on the extraction and treatment of the water. Urban water users supplied from recycled sources typically require a dual-pipe supply system to separate the recycled water from potable water and thereby incur a greater infrastructure cost.

Figure 1.4 a and 1.4 b shows the breakdown of sourced water for each State and Territory for utilities reporting in a given year. These charts show all results for all reporting utilities for each year. Therefore, care should be taken when comparing the total source water volumes between years. Additionally, differing interpretations of the definition of water sourced from recycling (W4) have most likely led to the under-reporting of these volumes.

By definition, W4 only includes the volume of recycled water supplied that is directly substituted for potable supply. This means if recycled water was not available, potable water was used to meet demand. Due to this issue, the total volume of recycled water supplied (W26) is preferred, and will replace W4 in future Urban NPR reporting.

Figures 1.4 a and 1.4 b show:

- Water sourced from surface water (W1)[9] is the dominant water source in all States and Territories except Western Australia, where most of the water is sourced from the desalination of marine water (W3.1) and groundwater (W2).
- The importance of desalination (W3.1) as a reliable source of water continues to increase for Western Australia, showing an increase from 138,645 ML in 2015–16 to 149,823 ML in 2016–17 due to constraints on traditional water sources. Desalinated water represents 47 per cent of the State's total water sourced and 50 per cent of Perth's.
- South Australia commenced using desalinated water in 2011–12, and has utilised this source in years of below average rainfall and/or decreased flows in the Murray Darling. With above average rainfall in 2016–17 water sourced from desalination was only 2 per cent of the total water sourced for the State.
- Victoria sourced water from its desalination plant for the first time in 2016–17—a total of 46,209 ML was produced from the State's Victorian Desalination Plant.
- Desalination in New South Wales and Queensland remains minimal, with plants operating in maintenance or 'standby' modes.

8 Predominantly driven by water quality and climatic variability
9 From rivers, streams and dams

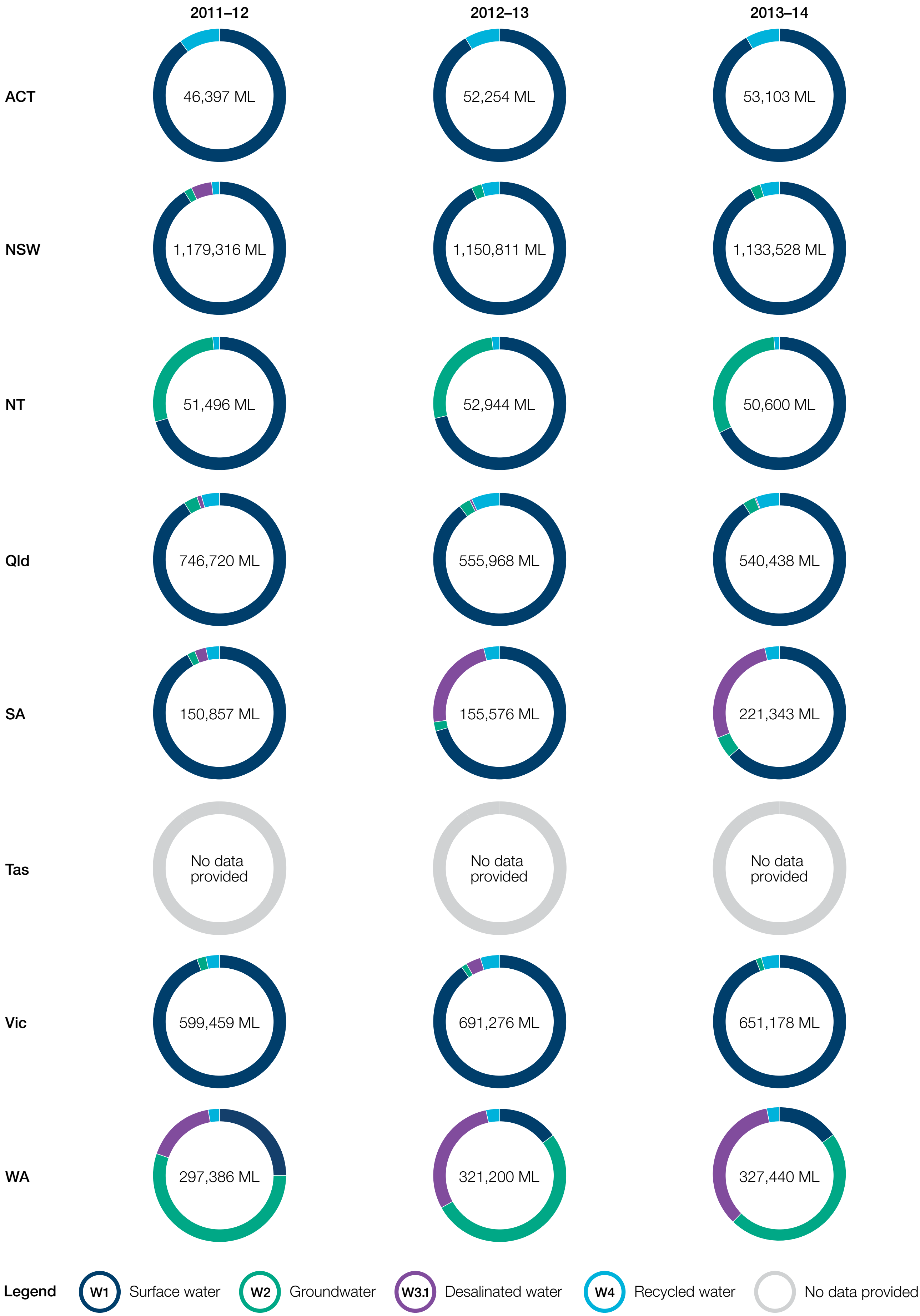

Figure 1.4a Water source breakdown (W1, W2, W3.1, W4) in each State and Territory, 2011–12 to 2013–14

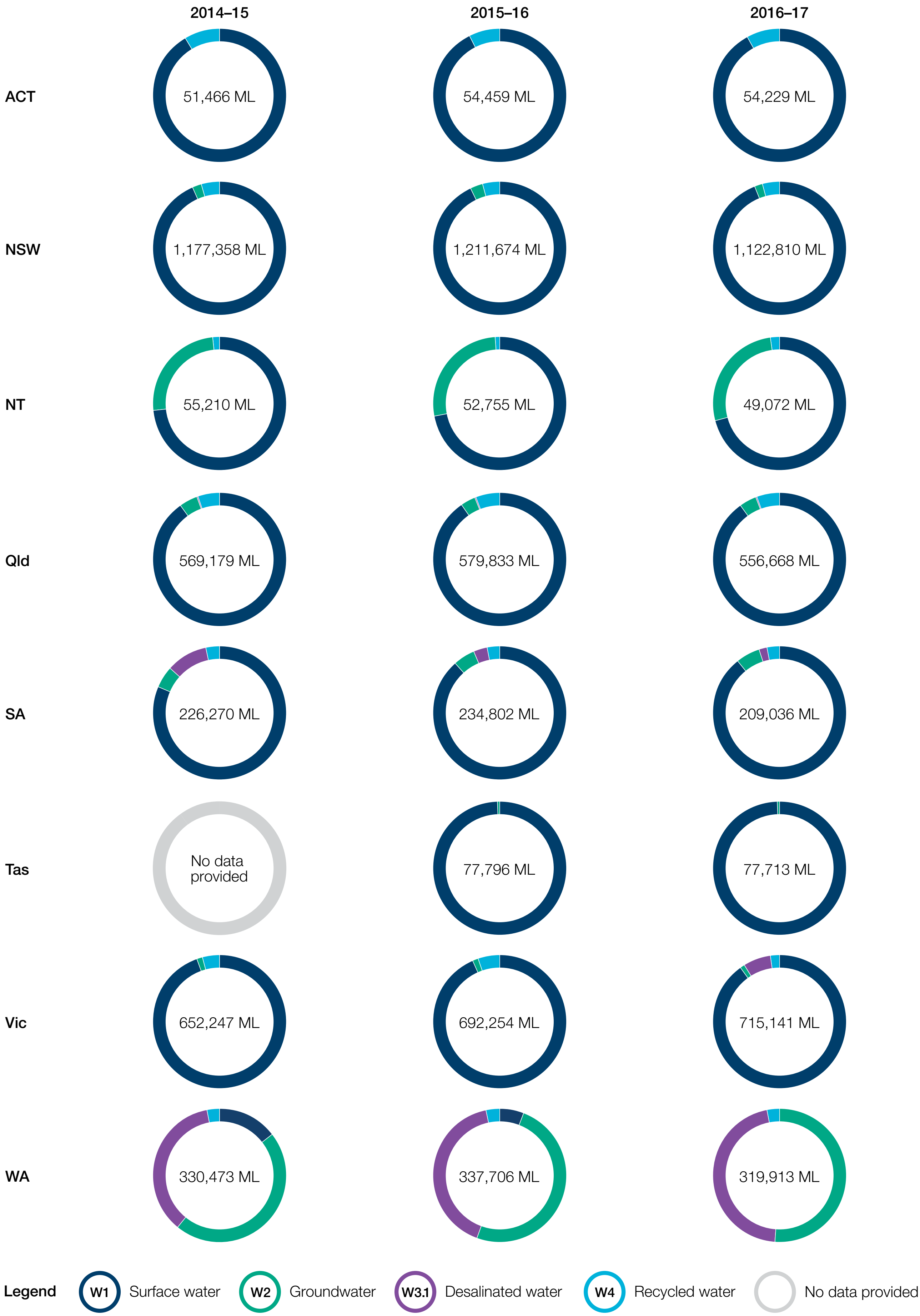

Figure 1.4b Water source breakdown (W1, W2, W3.1, W4) in each State and Territory, 2014–15 to 2016–17