1 Introduction

1.1 Context and overview

This *National performance report 2018–19: urban water utilities* (2019 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.[2]

The 2019 Urban NPR compares the performance of 80 utilities and councils (utilities) and five bulk water authorities providing urban water and sewerage services to over 23 million people 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.

Part A of this report provides commentary and analysis for key indicators that apply to retail and distribution utilities (the major urban centre analysis in Chapter 2 includes performance data for bulk water suppliers). Part B of this report contains data for the full set of 166 indicators that are reported on by urban water utilities and bulk water authorities for all reporting years.

The analysis and commentary provide a context for each indicator, discuss changes in reporting methodologies, and highlight trends within and/or between different utility groups. The utilities are grouped according to the number of properties they are connected to, as explained in 'A guide to this report'.

The commentary and analysis in this 2019 Urban NPR are not intended to be a comprehensive explanation of every reported indicator. They present some of the more apparent trends or differences between years and utilities. Most of the information is sourced from publicly available sources, such as annual reports, regulatory decisions, and utility websites.

1.2 Reporting

The 85 utilities contributing data to the 2019 Urban NPR (including five bulk water authorities) are listed in Appendix C. A summary of utility type by jurisdiction is shown in Table 1.1.

Seventy-one of the 85 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:

- 71 utilities providing water supply and sewerage services;
- five utilities providing only water supply services;
- four utilities providing only sewerage services; and
- five bulk water authorities.

[2] National Water Initiative Clauses 75–76

Table 1.1 Utilities reporting in the 2019 Urban NPR by size group and jurisdiction.

Jurisdiction	Bulk	Major	Large	Medium	Small	Total
Australian Capital Territory		1				1
New South Wales	2	3		12	13	30
Northern Territory			1		1	2
Queensland	2	4	4	5	7	22
South Australia		1				1
Tasmania		1				1
Victoria	1	4	5	5	2	17
Western Australia		1		1	9	11
Total	**5**	**15**	**10**	**23**	**32**	**85**

1.3 Locations of utilities

The administrative boundaries of all utilities reporting data for the 2019 Urban NPR are shown in Figure 1.1. Further details about the utilities are available from the relevant utility websites.

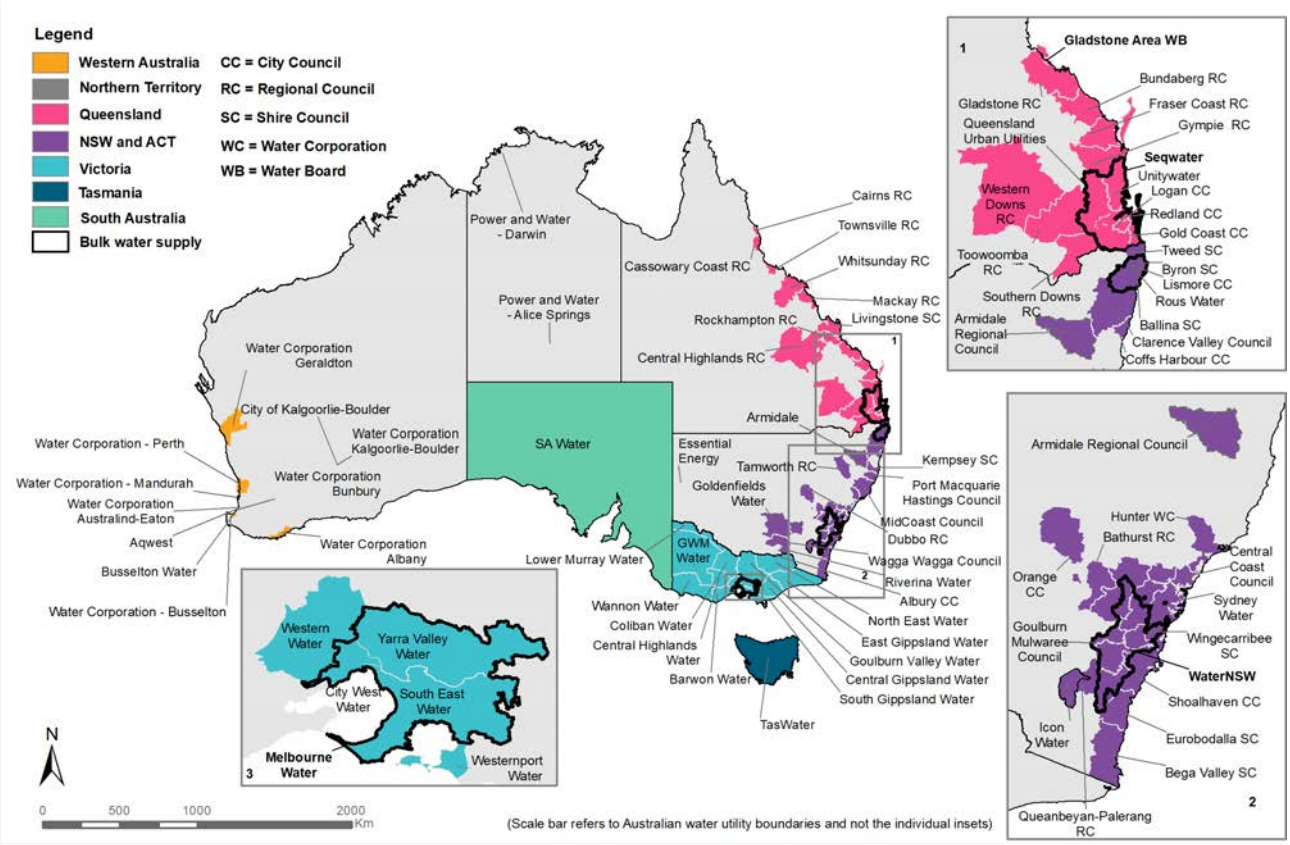

Figure 1.1 The administrative boundaries of all utilities reporting data for 2018–19.

1.4 Key drivers

Key drivers of water utility performance presented in the 2019 Urban NPR include rainfall, temperature, utility size, and sources of water.

Other factors—network density, soil types, the age and condition of infrastructure, and government policy and regulation—also affect performance but are not discussed.

1.4.1 Rainfall

Rainfall can affect utility performance in many ways.

- 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 (for example, desalinated or recycled water), the utility may 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 the volume of urban water and recycled water supplied to residents, councils, and parklands used for outdoor leisure activities such as golf courses (Water resource indicators W12, W26). 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 affect decisions about the water sources used (Water resource indicators W1–W7). Persistent dry conditions can trigger thresholds for production from desalination plants and the use of particular groundwater and recycled water sources, which affect the operating costs of utilities (Finance indicators F11–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 (Finance indicators F12, F13) and also greenhouse gas emissions from sewage (Environment indicator 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 (Asset indicators 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.

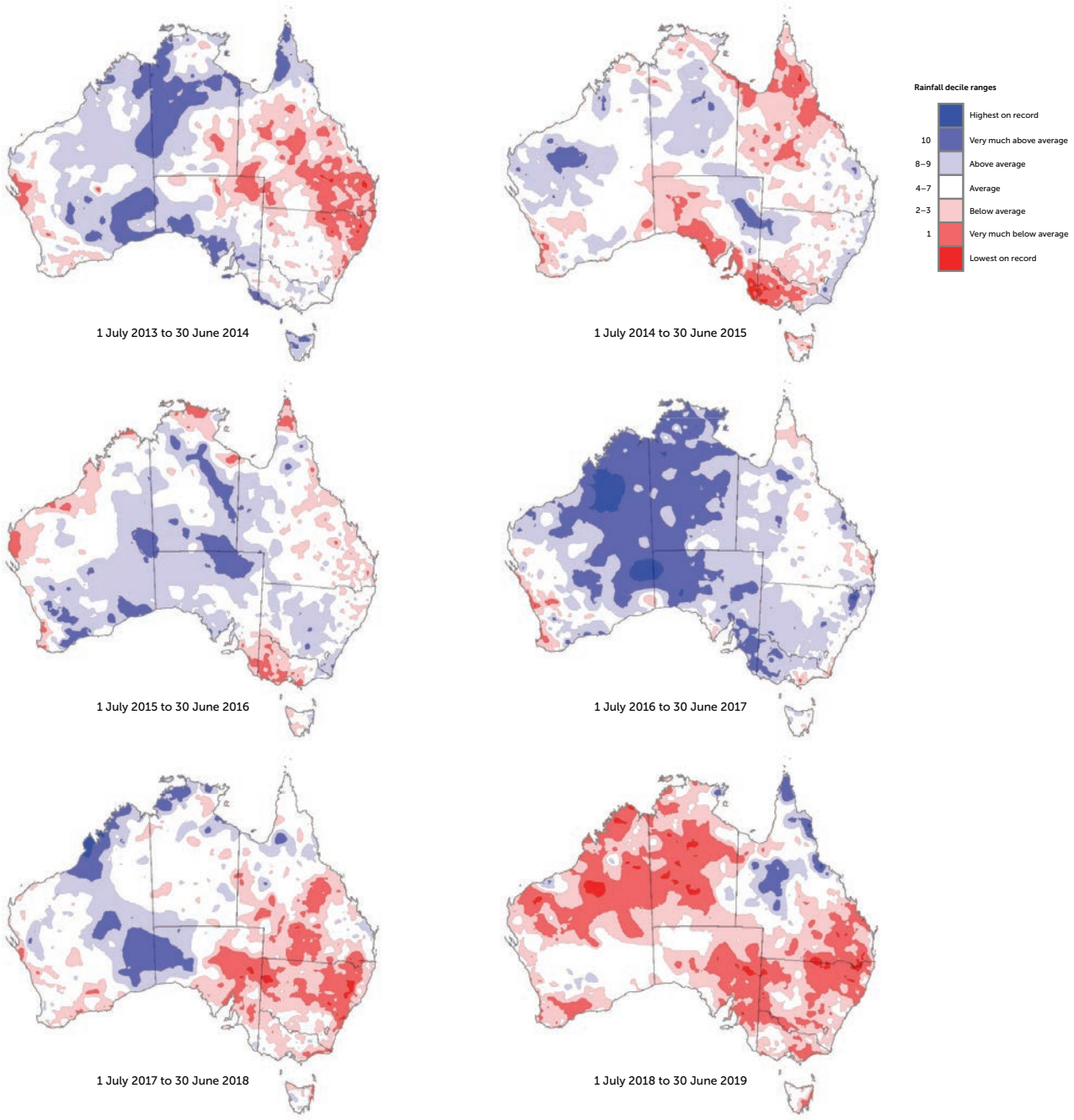

Figure 1.2 Australian 12-month rainfall deciles from 2013–14 to 2018–19.

Decile 1 is the group with 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.

Figure 1.2 shows most of Australia, except for northern Queensland, experienced below to very-much-below-average rainfall in 2018–19. This followed a similarly dry year in 2017–18 for southeastern Australia. More details on rainfall received in each season during 2018–19 are provided on page 14.

Winter 2018

Winter rainfall was the fourteenth-driest on record, with an average national rainfall of 42.9 mm and most Australian States and Territories recording below-average rainfall. The exception was Tasmania which recorded 23 per cent above its mean winter rainfall. The dry winter came on the back of long-term rainfall deficiencies for large parts of eastern Australia. Winter rain-bearing systems were weaker and less frequent than usual, and high-pressure systems were dominant over southern Australia for several months. This led to clear skies, warm days and very little rainfall across much of eastern Australia.

Tasmania, the only State to receive above-average rainfall, experienced westerly winds and cold fronts which dominated during July and August.

The most notable rainfall event was towards the end of winter when a complex area of low pressure moved across drought-affected areas of inland Queensland and New South Wales, producing moderate falls over southern Queensland and parts of northern and central New South Wales. These rainfall events slightly eased rainfall deficiencies in these areas.

Spring 2018

The spring rainfall (68.5 mm) was near average for Australia. September was exceptionally dry for Australia; the driest September on record. October and November received slightly more than average rainfall for the nation overall. However, rainfall for individual States and Territories varied greatly over the season: Victoria and Tasmania experienced below-average rainfall, the ninth and eighth lowest on record, respectively; South Australia was average; while Western Australia and the Northern Territory experienced above-average rainfall. Queensland and New South Wales also experienced below-average rainfall.

Summer 2018–19

The average national rainfall for summer was 142.7 mm, the seventh lowest on record and lowest since 1982–83, despite very heavy rain in parts of northern Queensland in late January and early February 2019, and storm activity which brought rain to Sydney, Melbourne and Canberra in November and December 2018.

The Northern Territory, Western Australia, and New South Wales recorded very low rainfall. The Northern Territory was fourth lowest on record, Western Australia fifth lowest on record and lowest since 2004–05, and New South Wales tenth lowest on record and lowest since 1984–85.

Autumn 2019

The average national rainfall for autumn was 94.3 mm, 22 per cent below the long-term average.

All States and Territories experienced below-average rainfall except for Queensland, which received rain from two tropical cyclones in March.

Winter 2019

Rainfall for winter was below to very much below average for most of Australia, with the exception of western Tasmania, parts of southern Victoria and an area of central Queensland which were above average. Nationally, it was the ninth-lowest winter rainfall on record (36.4 mm) and the lowest since 2002.

1.4.2 Temperature

There are many relationships between temperature and utility performance.

- Temperature can influence demand, particularly residential and non-residential outdoor demand. Prolonged periods of above-average temperatures can result in increased potable and recycled water (Water resource indicators W12, W26, W27) supply to residents, councils, and parklands used for outdoor leisure activities such as golf courses. Changes in water consumption affect the revenue collected by water utilities, their profitability (Finance indicators F3, F24), and the strength of their water-usage pricing signal (Finance indicator F4).

- Hot weather can increase the risk of bushfires, resulting in resources being deployed to protect water supply catchments and mitigate the impacts of a bushfire. Emergency deployments can affect operating expenditure (Finance indicators F11–F13). When responding to a bushfire, temporary water restrictions may be put in place to ensure the availability of supply and to meet firefighting requirements during extreme fire weather. These restrictions can affect the volume of water supplied by a utility and its operating cost and revenue. Poor water quality in a burnt catchment can affect water available for supply.
- Extended periods of heat or cold can affect the quality of water sources and supply, and thus decisions about water sources used (Water resource indicators W1–W7) and the level of the treatment required. For example, a heatwave can contribute 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 utilities (Finance indicators F11–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 (Health indicators H1–H5) and the need for treatment, which affects the operational costs of a utility (Finance indicators F11–F13).
- Extended hot conditions cause dry soil conditions. Consequently, many trees will seek out moisture and their roots can enter the sewer system, causing blockages and breaks (Asset indicators A14, A15), as well as increasing the number of water main breaks (Asset indicator A8).

The 2018–19 year saw record high or very-much-above-average temperatures for most of Australia (Figure 1.3). More details on temperatures experienced in each season during 2018–19 are provided below.

Winter 2018

Very warm days produced warm mean temperatures for winter 2018 for Australia. All regions observed above-average mean temperatures, with those experienced in the Northern Territory, South Australia, Queensland and New South Wales falling within their ten warmest winters on record. For Australia as a whole, it was the fifth-warmest winter on record.

Daytime maximum temperatures for winter were above average for all Australian States and Territories, while mean minimum temperatures were below average except for Tasmania.

July was an exceptional month with mean maxima very much warmer than average across nearly all the mainland. The national mean maximum temperature was the second warmest on record, while mean maxima for all mainland States and Territories fell within their warmest six records for July.

Spring 2018

Spring 2018 was warm for Australia: the ninth-warmest spring on record nationally, third warmest for Queensland, seventh warmest for the Northern Territory, and equal eighth warmest for Tasmania. October was an exceptionally warm month across nearly all of the country, and Australia's fourth-warmest October on record. September and November daytime temperatures were also very warm across the tropics.

Nights were also warm for spring across most of the country. Queensland, New South Wales and the Northern Territory all experienced mean minima in their top ten warmest for spring. Very-much-above-average overnight temperatures were observed in areas of the southern interior district in Western Australia, the northwest of the Northern Territory, a large area of inland, western and southern Queensland, across the north-eastern quarter of New South Wales, and parts of coastal Tasmania.

Summer 2018–19

Summer 2018–19 was Australia's warmest summer on record, with the national mean temperature for summer 2.14 °C warmer than the average over the World Meteorological Organization standard reference periods of 1961–1990.

It was exceptionally warm across most of the country, with summer the warmest on record for New South Wales, Victoria, Western Australia, and the Northern Territory, second warmest for Tasmania and South Australia, and fourth warmest for Queensland.

Exceptional heatwaves affected large areas of Australia from early December to late January. These widespread heatwaves followed an extreme heatwave that affected the tropical Queensland coast during late November. Many records were set across summer for warm individual daily extremes and monthly average temperatures at individual locations, and for long runs of consecutive warm days.

Autumn 2019

Autumn continued the run of warmer than average temperatures, being the third warmest on record for Australia. All mainland States and Territories ranked the season among the tenth warmest on record.

Mean maximum temperatures for the month were above or very much above average across most of Australia, except for Queensland away from the south, central coast, and from the Gulf Coast to the central Peninsula. Minimum temperatures were also above to very much above average in most areas.

Record high temperatures for autumn (both maximum and minimum) were observed in Tasmania, Victoria, Western Australia, and Queensland.

Winter 2019

The national mean maximum temperature for winter was the sixth warmest on record for Australia (1.17 °C warmer than average). The mean minimum temperature for Australia was 0.26 °C warmer than average.

All States and Territories recorded above-average maximum temperatures, with Western Australia recording its second highest on record (1.64 °C above average), and New South Wales recording its fifth highest record (1.44 °C above average).

Minimum temperatures for winter 2019 were also above average for all States and Territories except South Australia, which was below average.

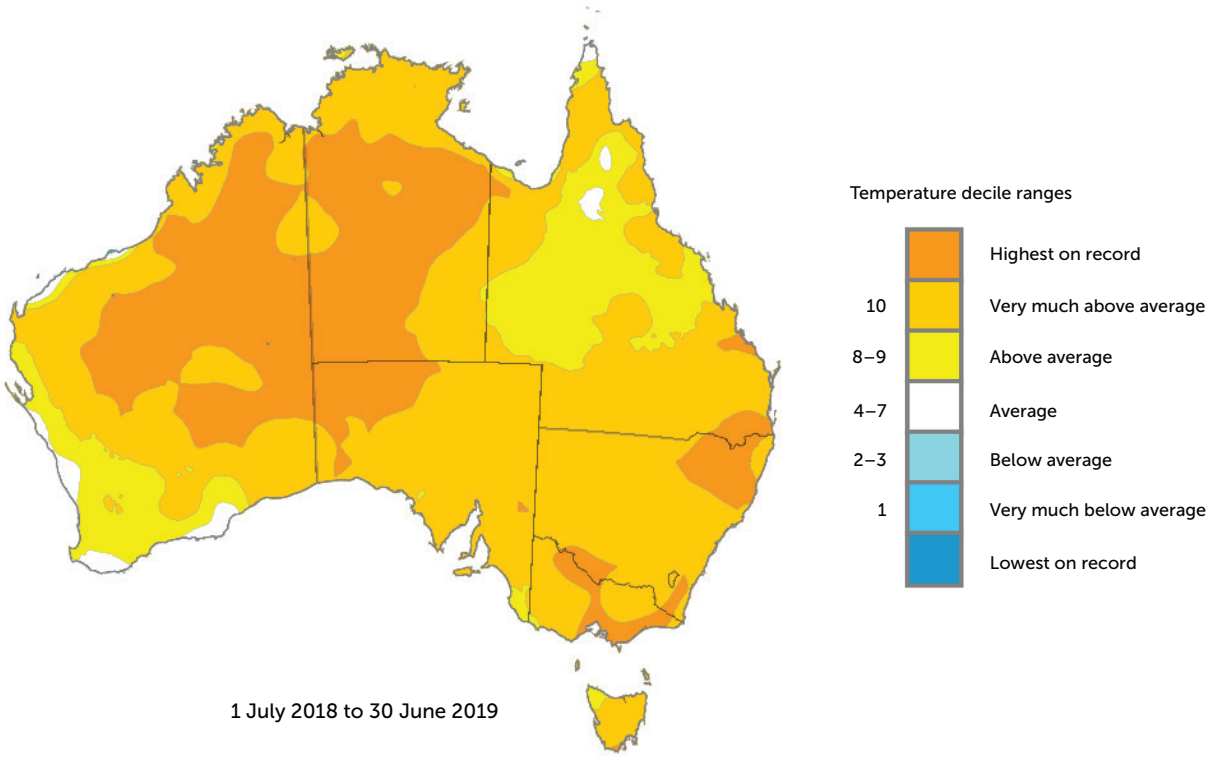

Figure 1.3 Australian 12-month maximum temperature deciles for 2018–19.

1.4.3 Utility size

The size of a utility's customer base influences its performance on a range of indicators. This relationship may be causal, coincidental, or due to a related matter (for example, larger utilities are subject to price regulation, unlike smaller utilities).

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 (Finance indicators F3, F24), and the strength of their water-usage pricing signal (Finance indicator F4).

Traditionally, Australians have relied on surface water and, to a lesser extent, groundwater to meet their urban consumption needs. The increased demand for urban water—resulting in a need to further develop and maintain ongoing water supply—is driven by many factors, including population growth and the reliability and security of existing sources (predominantly driven by water quality and climatic variability). Financial, environmental, and social factors reduce the feasibility of developing additional traditional sources of water. In response to this situation, utilities and bulk water authorities across the country are developing non-traditional supply sources—such as desalinated and recycled water—while continuing to explore options for harvesting stormwater and rainwater.

The diversification of water sources affects the performance of utilities by increasing the cost to treat water to an acceptable standard (meeting regulatory requirements) and to supply multiple water types to end users. For example, water from a 'protected' or 'closed' storage catchment is usually higher quality than water from an 'open' storage catchment and requires less treatment, which reduces the cost of supply.

The quality of water from groundwater sources varies greatly depending on the type and depth of the aquifer and has a significant impact on the extraction and treatment processes used and subsequent infrastructure and operational costs. Urban water supplied from recycled sources typically requires dual-pipe supply systems to separate recycled water from potable water, incurring greater infrastructure costs.

Figure 1.4 shows the annual supply from different sources of water, and the total supply, for utilities in each State and Territory from 2013–14 to 2018–19.

- Water sourced from surface water (that is, rivers, streams, and dams; Water resource indicator W1) is the dominant water source in all States and Territories except Western Australia, where most of the water is sourced from groundwater (Water resource indicator W2) and the desalination of marine water (Water resource indicator W3.1).
- Recycled water is represented by W26 from 2017–18, which is not directly comparable to Water resource indicator W4 used in previous years—as W26 includes environmental flows and does not explicitly include recycled water to agriculture.
- In 2018–19, total water sourced across the country from all four categories slightly decreased (0.3 per cent) despite the higher temperature and lower rainfall than last year.
- As in previous years, New South Wales' reported total water sourced was higher than that of the other States and Territories, probably reflecting the drier conditions throughout the region.
- Desalination in New South Wales recommenced for the first time since 2011–12 as a result of the large decreases in Sydney's dam levels and the need for a backup source of drinking water.

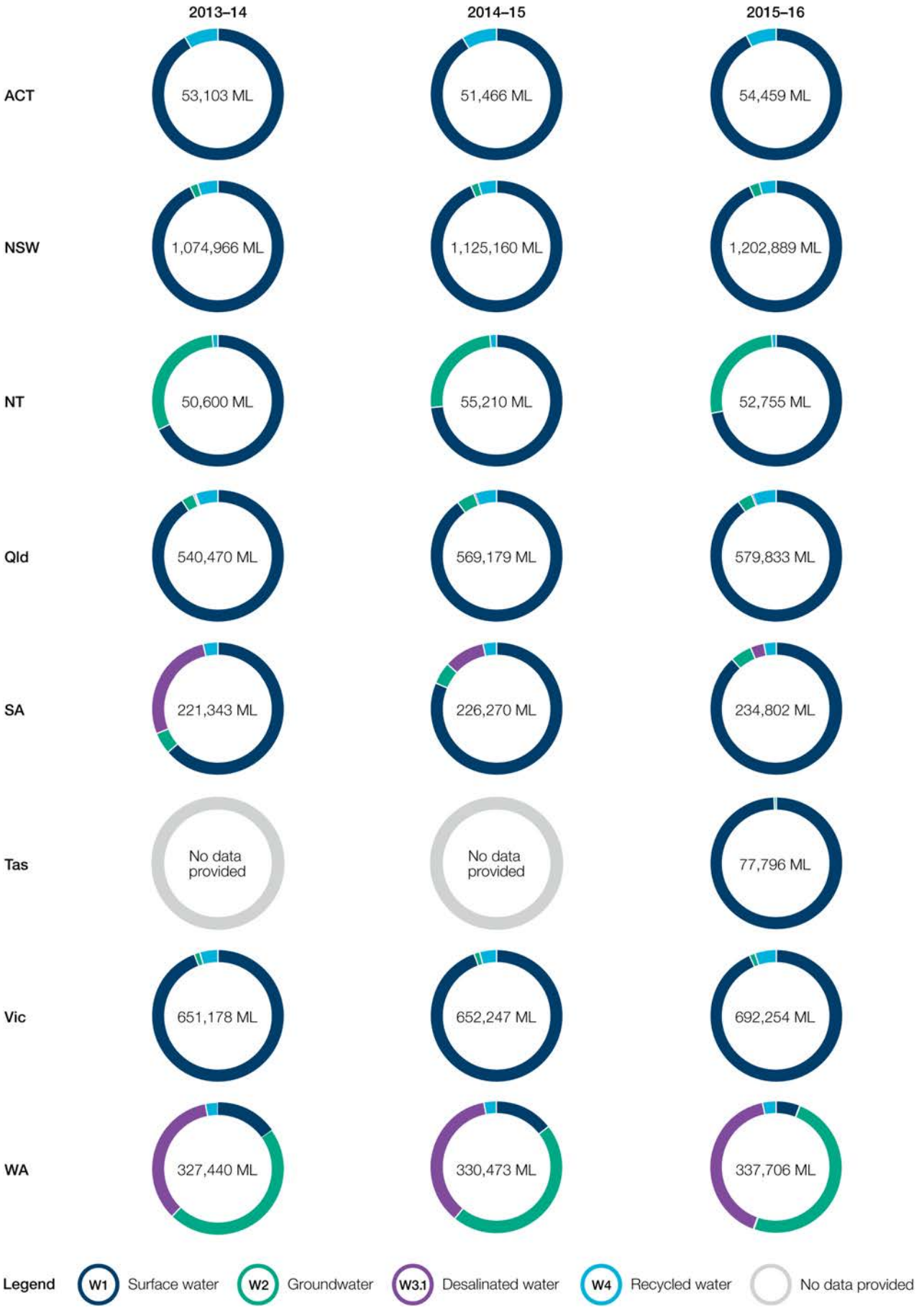

Figure 1.4a Water source breakdown (W1, W2, W3.1, W4) in each State and Territory, 2013–14 to 2015–16.

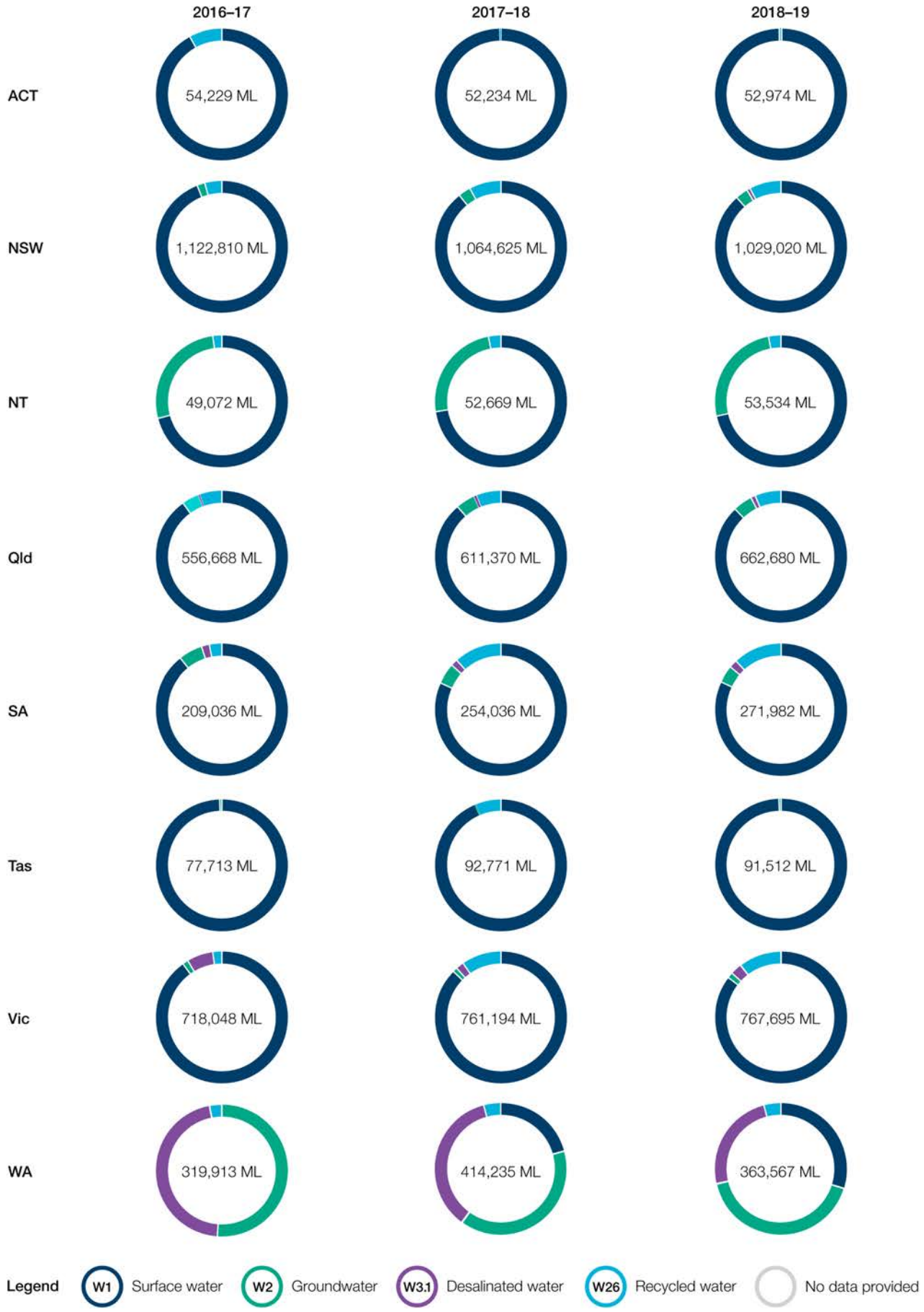

Figure 1.4b Water source breakdown (W1, W2, W3.1, W4/W26) in each State and Territory, 2016–17 to 2018–19.