

2 Drivers of performance

This chapter discusses some of the key drivers of water utility performance results presented in the *2014 Urban NPR*. Rainfall, temperature, utility size, and sources of water are discussed. Many other factors that also affect the results, including network density, soil types, the age and condition of infrastructure, and Government policy and regulation, are not discussed.

As discussed in chapter 1, section 1.4, historical time-series information is not uniform for all indicators in this chapter. To ensure that a reasonable comparison can be made of median values through time, the criterion for determining the number of years in the time series is that there are at least 50% of utilities reporting in the previous year of the series compared to the current reporting year of 2013–14.

2.1 Rainfall

Figure 2.1 shows how rainfall has varied from the long-term average across Australia over the past nine years: white shows 'average'; blue shows 'above-average'; and red shows 'below-average' rainfall. Weather conditions have been extremely variable over this period in both the average rainfall over time and the distribution of rainfall within each year.

In 2013–14, rainfall across much of northwestern New South Wales and southern and central Queensland were below or very much below the long-term average, with some pockets recording their lowest rainfall on record. Of particular note was the re-emergence of dry conditions across many of the major east coast urban centres, including Brisbane and Sydney, as well as many of the larger eastern coastal and inland centres, including Port Macquarie, Tamworth, Coffs Harbour, Grafton, and Lismore, and also the Gold Coast and Sunshine Coast.

Drier-than-average conditions continued to persist in the west and southwest of Australia in the 2013–14 year. These conditions are consistent with observed rainfall trends showing a long-term decrease in rainfall in the southwest, in particular winter rainfalls which have declined by 17% since 1970 (Bureau 2015a). Reduced rainfall in the southwest has impacted heavily on streamflow. In the far southwest, streamflow has decreased by over 50% since the mid-1970s. The decline has impacted significantly on surface water storages operated by WA Water Corporation (WC) and has driven WC's ongoing investment in diversified water supply sources.

In 2013–14, average to above-average rainfall conditions returned across much of northern, central, and southern Australia, including the coastal fringes of southwestern Victoria and Tasmania. These regions include a number of major cities and urban centres, notably Darwin, Adelaide, Port Augusta, Whyalla, Warrnambool, and Launceston.

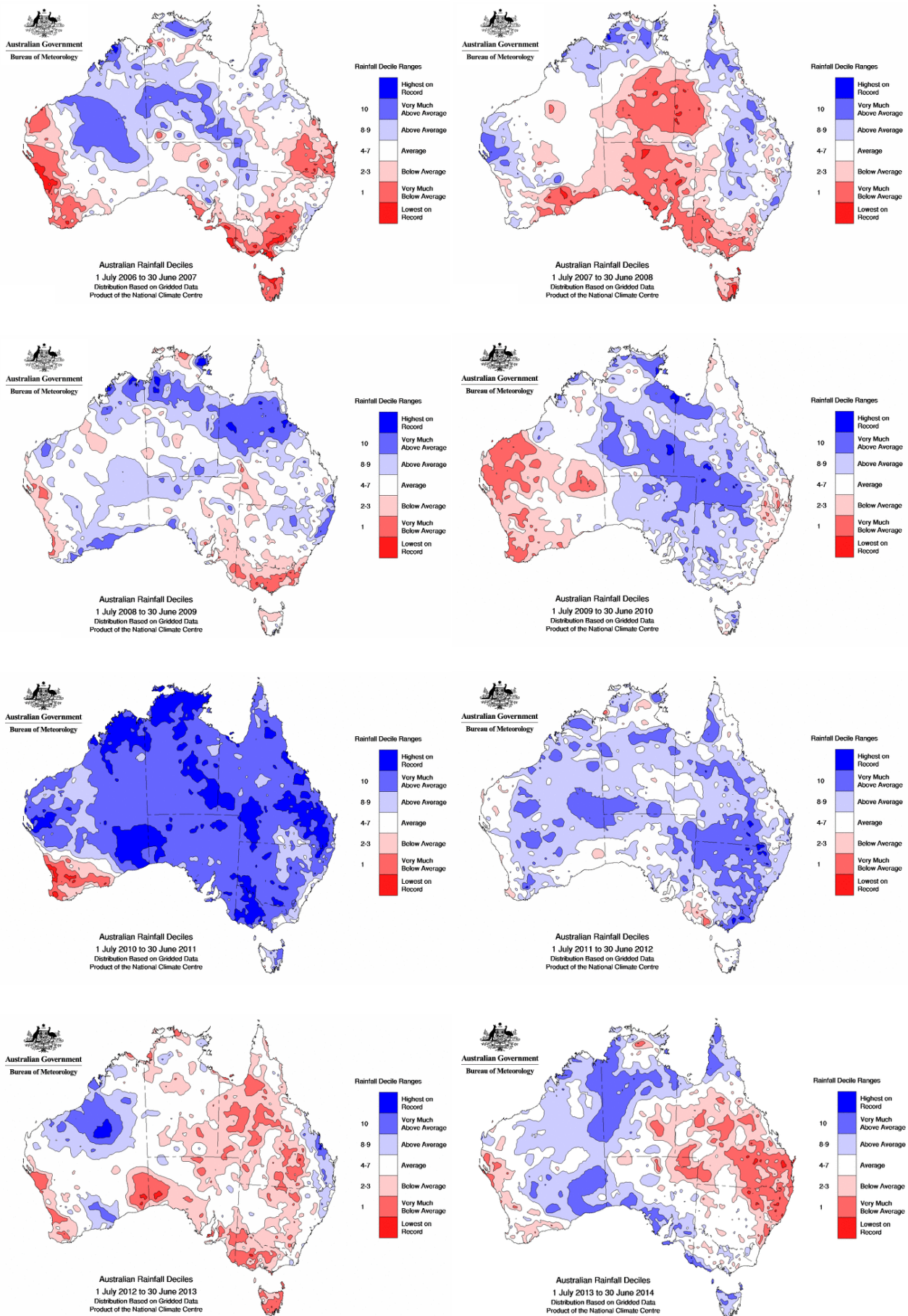


Figure 2.1 Australian 12-month rainfall deciles, 2006–07 to 2013–14

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, the security of the system, and the availability of climate-independent water sources (such as desalination or recycled water), the utility may need to impose water restrictions in order 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 golf courses (indicators W12, W26, and W27 relate to residential water supplied and recycled water). Changes in water consumption affect the revenue collected by water utilities, their profitability (F24, F3), and the strength of their water usage pricing signal (F4).
- 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. This can increase the volume of sewage to be pumped and treated, increasing the operating costs of utilities (F12 and F13) and also greenhouse gas emissions from sewage (E12). Additional rainfall and sewer infiltration can also result in additional sewer overflows (E13). This is especially the case during heavy rainfall.
- Extreme wet or dry conditions can cause expansion and shrinking of reactive clay soils in some parts of Australia, resulting in ground movements that can cause an increase in water or sewer main breaks (A8, A14, A15). This is especially the case when conditions fluctuate rapidly from wet to dry or vice versa. In periods of more even rainfall, the soils maintain more even moisture levels, resulting in less ground movement.

2.2 Temperature

State of the climate 2014 (Bureau 2015a) notes that seven of Australia's ten warmest years on record have occurred in the 13 years since 2002. Only one cooler-than-average year has occurred in the past decade (2011) and the 10-year mean temperature for 2005–2014 was 0.55 °C above-average, the highest on record (Bureau 2015a).

The 2013–14 reporting period saw above-average temperature conditions across the majority of Australia (Figure 2.2). Straddling the warmest and third warmest years since national temperature records began in 1910, the 2013–14 period saw average maximum and minimum temperatures well above the long-term means for much of the country (Bureau 2013, 2015a).

Heatwaves and warm spells, important because of their impacts on water use, affected central and eastern Australia from late December 2013 to early January 2014. In addition, southeast Australia experienced prolonged periods of above-average temperatures during mid-January, as well as the second half of May 2014 when much of Australia experienced significant extended warmer conditions.

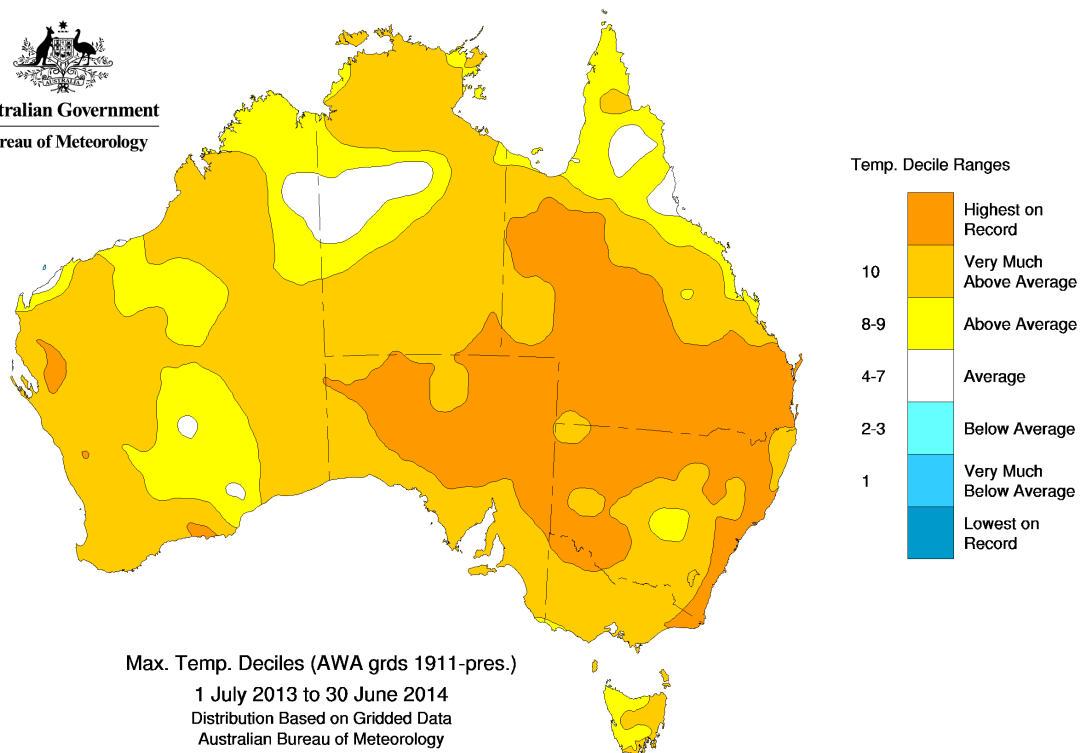


Figure 2.2 Australian 12-month maximum temperature deciles for 2013–14

The many relationships between temperature and the performance of utilities include:

- There is a relationship between demand and temperature, in particular residential and non-residential outdoor demand. Increased temperature, in particular prolonged periods above long-term averages, can result in increased potable and recycled water supplied to residents, councils, and golf courses (indicators W12, W26 and W27 relate to residential water supplied and recycled water). Changes in water consumption affect the revenue collected by water utilities, their profitability (F24, F3), and the strength of their water-usage pricing signal (F4).
- Hot weather can increase the risk of bushfires. This risk can result in the deployment of resources to protect water supply catchments and mitigate the impacts of a bushfire should it occur. Such deployments can affect the operating expenditure of a utility (F11, F12, F13), in particular if responding to an actual bushfire event. In addition, temporary water restrictions that ensure the availability of supply to meet firefighting requirements can be implemented during extreme fire weather. Such restrictions can impact on the volume of water supplied by a utility and in turn affect their operating cost and revenue.
- Extended periods of heat or cold can impact the quality of water sources and supplies and therefore affect decisions about which water sources to be used (W1–W7) and the treatment required. For example, a heatwave contributes to the decline in dissolved oxygen levels within a water body and can trigger the need to supply water from an alternative source or increase the cost of treatment, in turn affecting the operating costs of utilities (F11, F12, F13).
- There is a relationship between temperature and the quality of treated water. In particular, biological processes are sensitive to extremes of heat or cold as well as rapid fluctuations in temperature. Such events can have important consequences for the quality of water supplied (H indicators), the effluent discharged (E4, E5, E7), and the operational costs of a utility (F11, F12, F13).
- Extended hot conditions give rise to dry soil conditions. Consequently, many plant species will seek out moisture, and their roots can enter the sewer system causing blockages and/or breaks (A14, A15), as well as increasing water main breaks (A8).

2.3 Utility size

While many factors influence performance, there appears to be a relationship between the size of the utility's customer base 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).

The following charts show apparent relationships between utility size and the following factors:

- Complaints (per 1,000 properties):** Historically, the two groups of utilities that service in excess of 50,000 properties have received significantly fewer complaints than the other two size groups. Recently, however, this difference has become less pronounced because of a decline in the number of complaints against smaller utilities (Figure 2.3). Individual utility comparisons for complaints are included in chapter 6, section 6.2.1.

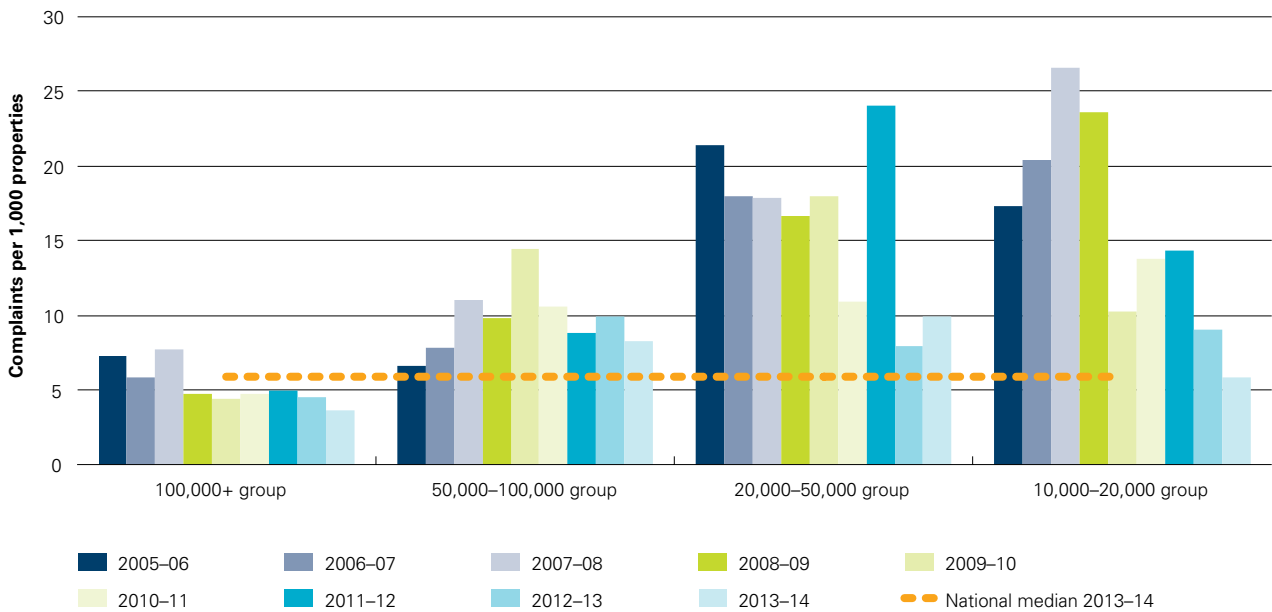


Figure 2.3 C13—Median total water and sewerage complaints per 1,000 properties, 2005–06 to 2013–14, for each utility group

Net profit after tax (NPAT) ratio: The median values for NPAT ratios for utilities with more than 100,000 properties are notably higher than for all other utility groups across the whole time series (Figure 2.4). Individual utility comparisons for NPAT are included in Chapter 5, section. 5.4.

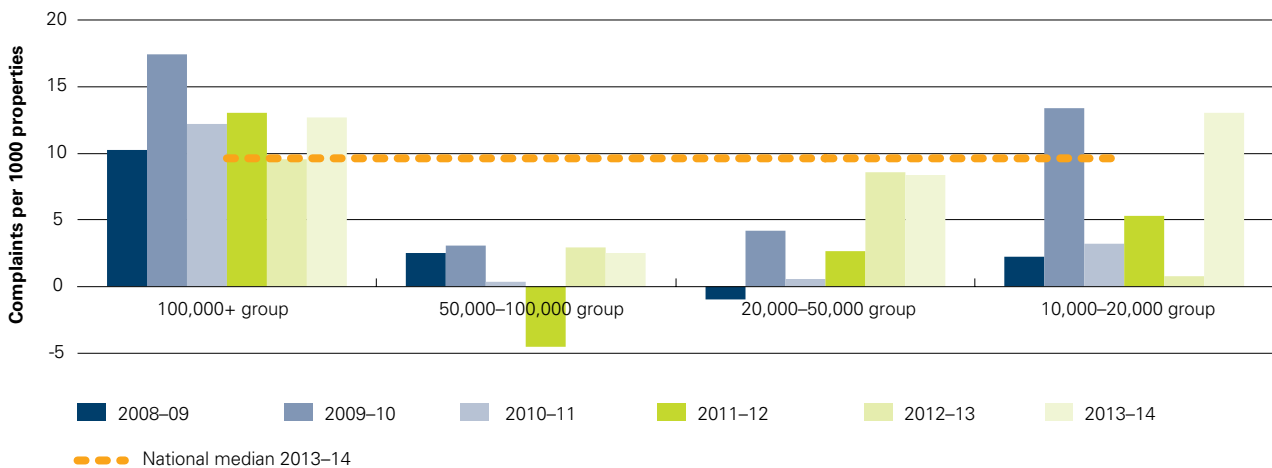


Figure 2.4 F30—Median NPAT ratio, 2008–09 to 2013–14

Net debt to equity ratio: The two larger utility size groups have relatively higher debt compared to equity than the national median (the 100,000+ size group significantly so), while the other two size groups are below the median (Figure 2.5).

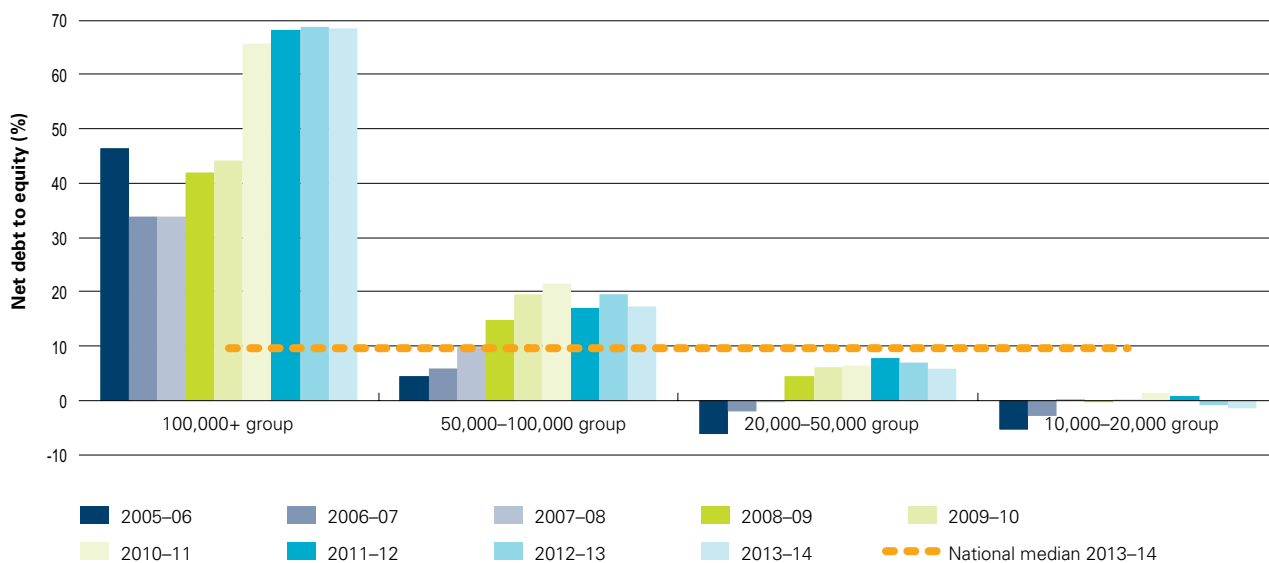


Figure 2.5 F22—Median net debt to equity ratio, 2008–09 to 2013–14, for each utility group

2.4 Sources of water

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

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 (predominantly driven by water quality and climatic variability), 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 suppliers across the country are developing non-traditional (alternative) supply sources such as desalination and recycling, as well as continuing to explore options for stormwater and rainwater harvesting.

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

For example, water from a dam 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 all have a significant impact on the extraction and treatment of the water. Water from recycled sources typically requires a dual-pipe supply system to separate it from potable water, representing a greater infrastructure cost.

Figure 2.6 shows the breakdown of sourced water for each State and Territory for the five years from 2009–10 to 2013–14. The charts show the following:

- Water sourced from surface water (W1), from rivers, streams, and dams, is the dominant water source in all States and Territories except Western Australia, where most of the water supplied is sourced from groundwater (W2).
- The importance of desalination (W3) as a reliable source of water continues to grow, in particular for the States of Western Australia and South Australia, where constraints on traditional water sources have driven diversification. In 2013–14, desalination within the two States supplied 35% and 28% respectively of the reported total water sourced. This is up from 30% and 23% in 2012–13.

- Reliance on desalination in other States and Territories remains sporadic, with neither New South Wales nor Victorian utilities sourcing any water from their desalination plants in 2013–14. Similarly, Queensland sourced less than 1% of its total water from desalination sources because of the availability of surface water.
- With the exception of Queensland, the volume of water sourced from recycling, on the basis of a percentage of total water sourced, remained consistent with 2012–13. Despite the dryer than average conditions experienced in southeast Queensland the reported 2% decline in recycled water sourced is consistent with the strong position of surface water resource in the region.

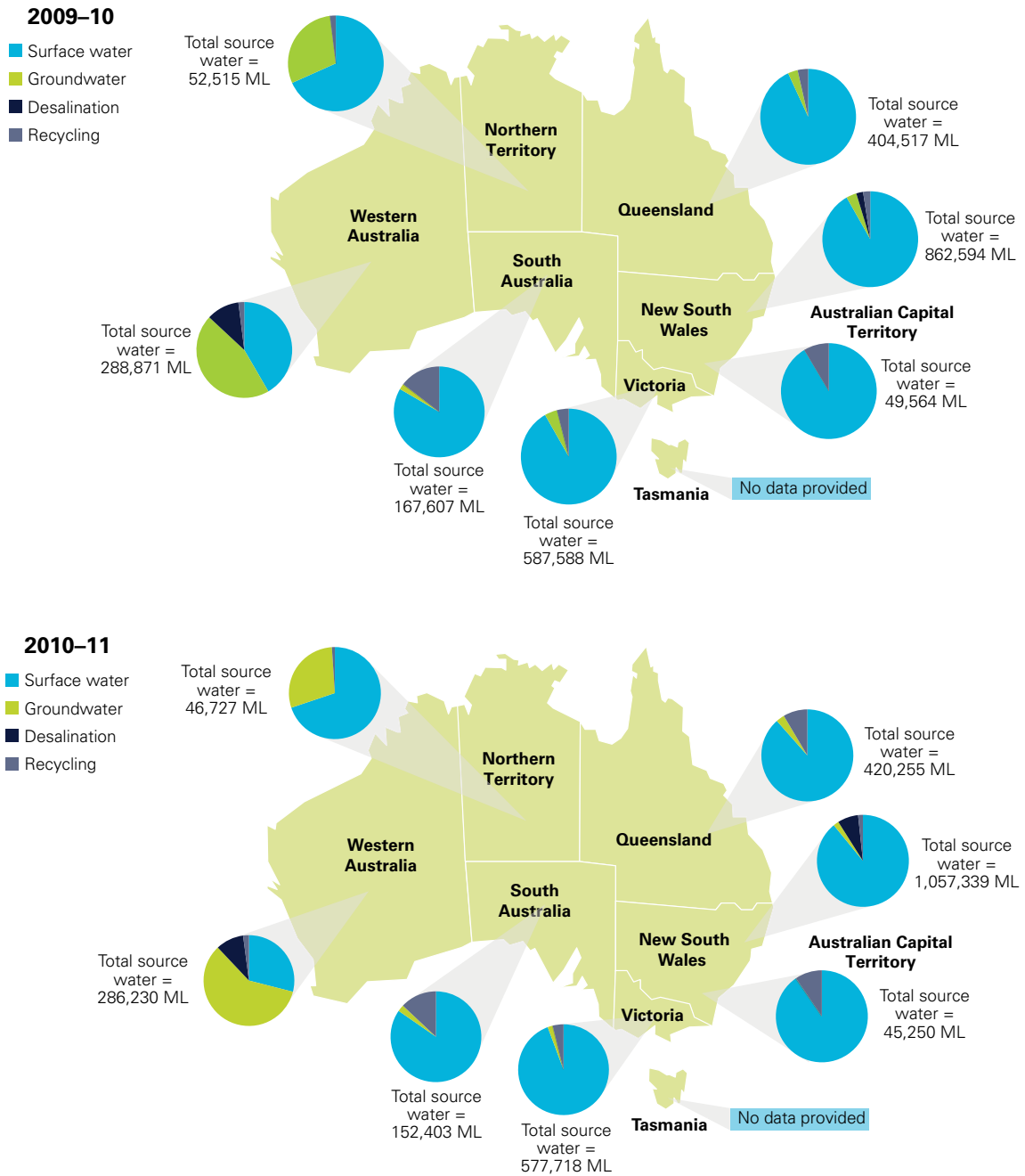


Figure 2.6 Water source breakdown (W1, W2, W3, W4) in each State and Territory, 2009–10 to 2013–14

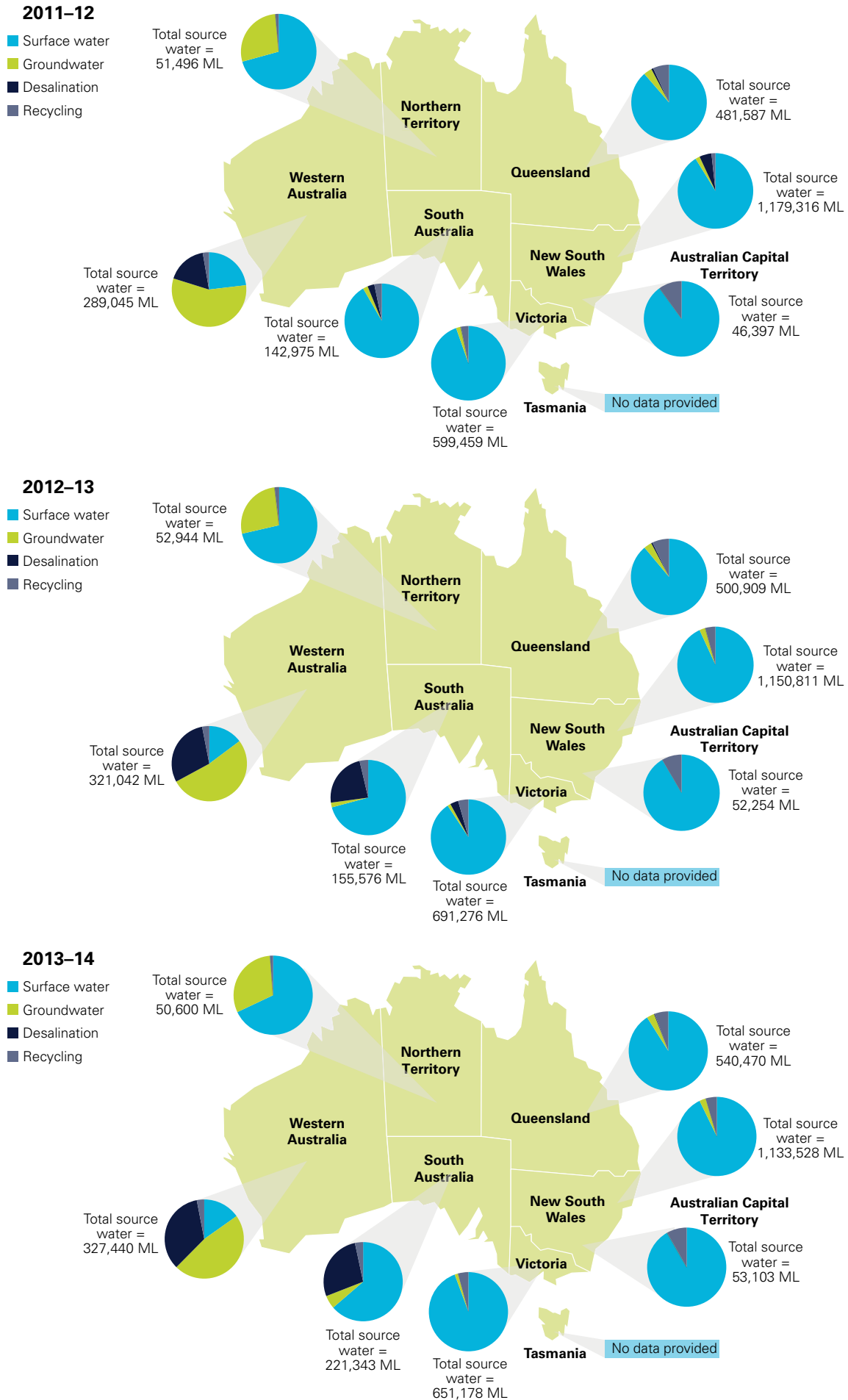


Figure 2.6 Water source breakdown (W1, W2, W3, W4) in each State and Territory, 2009-10 to 2013-14 (continued)