Lake Eyre Basin

14 Lake Eyre Basin

14.1 Introduction

This chapter examines water resources in the Lake Eyre Basin region in 2011–12 and over recent decades. It starts with summary information on the status of water flows and stores. This is followed by descriptive information for the region including the physiographic characteristics, soil types, population, land use and climate.

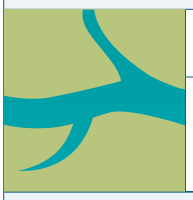
Spatial and temporal patterns in landscape water flows are presented as well as an examination of the surface and groundwater resources. The data sources and methods used in developing the diagrams and maps are listed in the Technical Supplement.

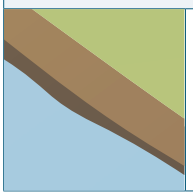
14.2 Key information

Table 14.1 gives an overview of the key components of the data and information in this chapter.

Table 14.1 Key information on water flows and groundwater quality in the Lake Eyre Basin region

Landscape water flows			
	Region average	Difference from 1911–2012 long-term annual mean	Decile ranking with respect to the 1911–2012 record
Rainfall	337 mm	+42%	9th—above average
Evapo-transpiration	327 mm	+45%	10th—very much above average
Landscape water yield	25 mm	+150%	10th—very much above average

Streamflow (at selected gauges)		
	Annual total flow:	Above average flow in three gauges in the east. Average flows on one of the gauges in the centre
	Flooding:	Major floods in the upstream part of the Cooper Creek basin, decreasing in severity downstream and some flooding in the Diamantina and Bulloo rivers

Groundwater (in selected aquifers)		
	Salinity:	Mostly non-saline (<3000 mg/L) groundwater in the north and saline (≥3000 mg/L) in the south

14.3 Description of the region

The Lake Eyre Basin region covers approximately 1.2 million km² of arid and semi-arid Central Australia. It represents 17% of the continent and stretches, north to south, from just below Mount Isa in Queensland to Marree in South Australia. From west to east, it extends from Alice Springs in the Northern Territory to Tambo and Blackall in central Queensland.

Landforms in the region mainly consist of plains, inland dunes, sand plains, floodplains, and low relief hills and plateaus. Highly variable and on average low rainfall has resulted in sparse vegetation cover and intermittent river systems. Subsections 14.3.1–14.3.4 provide more information on the topography and soils cover.

With a population of approximately 59,000, the Lake Eyre Basin accounts for less than 0.25% of the nation's total population (Australian Bureau of Statistics [ABS] 2011b).

Alice Springs is the major population centre along with a number of remote and regional centres (Figure 14.1) including Coober Pedy, Birdsville, Winton, Longreach and Peterbourough. Further discussion of the region's population distribution can be found in subsection 14.3.6.

Most of the land use within the region is for grazing and nature conservation. There are numerous dry lakes that form a substantial part of the region. Only a small patch in the far south includes some dryland agriculture.

The region's climate is generally quite arid, with rainfall much below potential evaporation. The region is driest in the northeast, but this area does receive some monsoonal rain and, although being highly variable, it can supply large amounts of water, in particular into the upper reaches of the Diamantina and Georgina rivers.

The region is divided into several major river basins. The major rivers are the Georgina, Diamantina, Thomson and Barcoo rivers and Cooper Creek, which flow from central and western Queensland into South Australia, as well as the Finke, Todd and Hugh rivers in Central Australia. These waterways all drain into Lake Eyre. The rivers and creeks are characterised by high variability and unpredictability in their flow, and high transmission losses and very low gradients.

The hydrogeology of the region is dominated by the sediments of the Great Artesian Basin with porous sandstone aquifers. This groundwater basin underlies the region from the northeast. It is one of Australia's most significant groundwater basins. There is notable extraction of groundwater for stock and domestic purposes.

Lake Eyre salt lake | iTobi (iStockphoto)

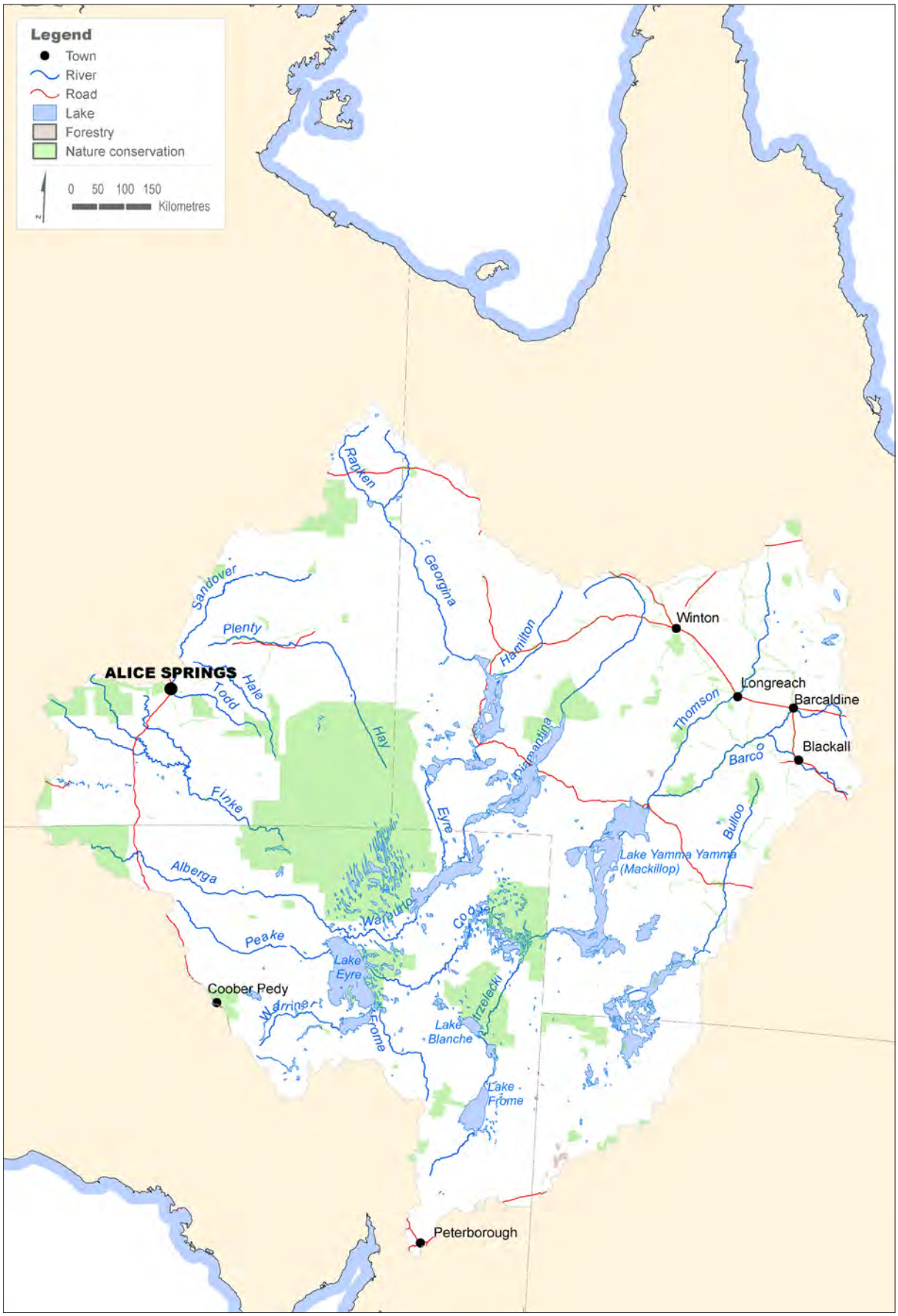


Figure 14.1 Major rivers and urban centres in the Lake Eyre Basin region

14.3.1 Physiographic characteristics

The physiographic map in Figure 14.2 indicates areas with similar landform evolutionary histories (Pain et al. 2011). These can be related back to similar geology and climatic impacts which define the extent of erosion processes. The areas have distinct physical characteristics that can influence hydrological processes.

The Lake Eyre Basin region has three such dominant physiographic provinces, namely:

- Central Lowlands (72%): undulating clay plains, sand plains with low sandstone, shale and silcrete hills;
- Central Australian Ranges (11%): ranges and hills of igneous rock, sandstone and quartzite surrounded by hardpan wash plains and some dune fields, sand and stony plains and salt lakes; and
- Barkly–Tanami Plains (10%): black clay, sand and limestone plains and sandstone rises and plateaus some with ferruginous mantles.

The remaining six provinces (see Figure 14.2) occupy only 7% of the region and contain a variety of physiographic features from plains to prominent ranges.

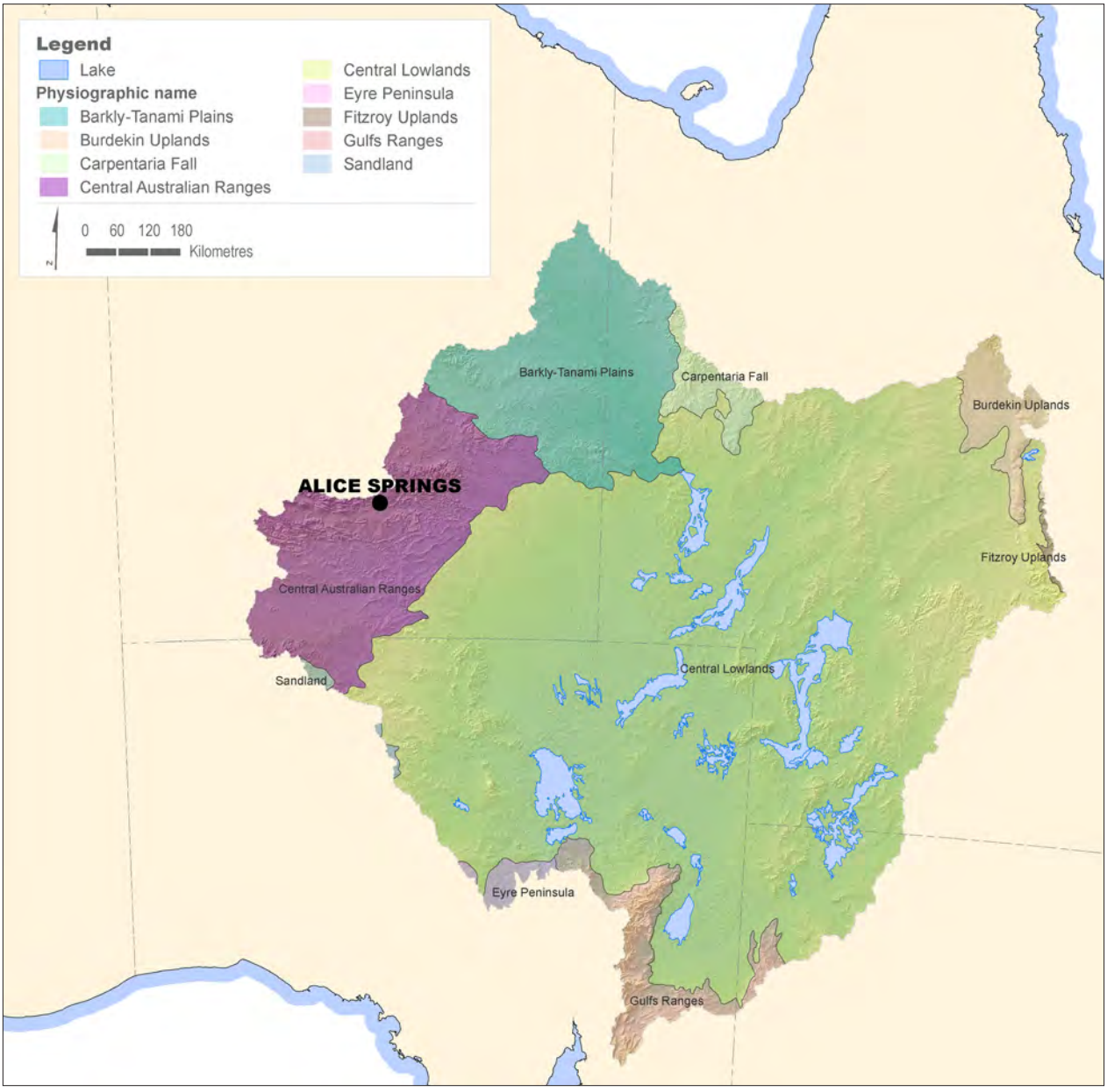


Figure 14.2 Physiographic provinces of the Lake Eyre Basin region

14.3.2 Elevation

Figure 14.3 presents ground surface elevations in the Lake Eyre Basin. Information was obtained from the Geoscience Australia website (www.ga.gov.au/topographic-mapping/digital-elevation-data.html). The region consists of enclosed river basins as the rivers do not flow to the sea. Most of the region drains into Lake Eyre, provided enough water is available to reach the lake. The lake itself is the lowest point in Australia. The bottom of the lake is 15 m below sea level and the shores are 9 m below sea level.

The major rivers that fill Lake Eyre are the Diamantina and Georgina rivers, which receive most of their (monsoonal) water on the northern mountain ranges. The water travels through Channel Country, where the landforms are typical of desert conditions. The area mainly consists of plains, inland dunes, sandplains, floodplains, and low relief hills and plateaus.

The highest mountains in the region are located around Alice Springs, with peaks exceeding 1,000 m above sea level. The northern tip of the Flinders Ranges in the south also has some high peaks close to 1,000 m above sea level (Figure 14.3).

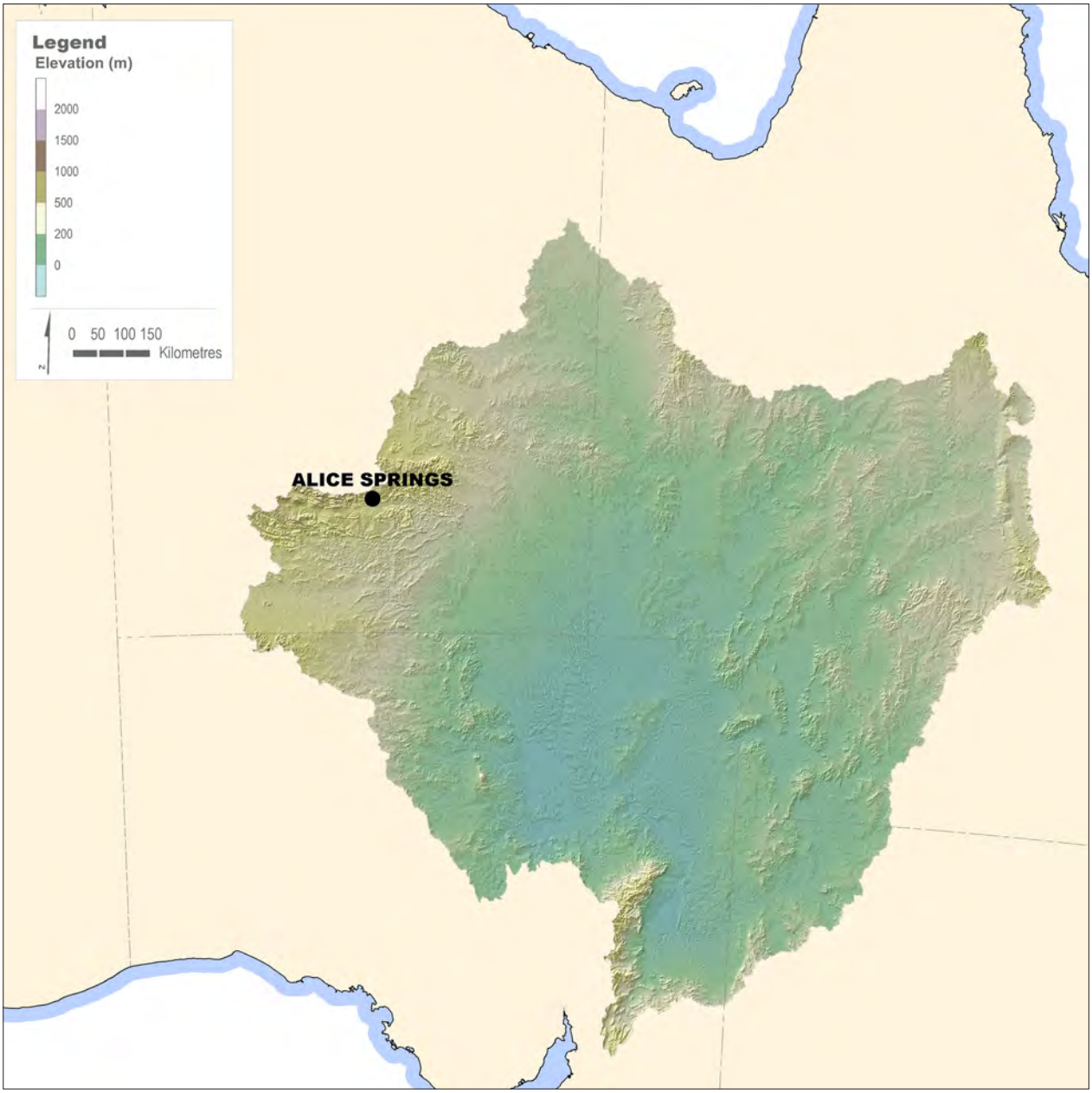


Figure 14.3 Ground surface elevations in the Lake Eyre Basin region

14.3.3 Slopes

Areas with steep slopes provide higher run-off generating potential than flat areas. The Lake Eyre basin region is generally flat, with some minor areas with steep hills (Table 14.2 and Figure 14.4). The slopes were derived from the elevation information used in the previous section.

Table 14.2 Proportions of slope classes for the region

Slope class (%)	0–0.5	0.5–1	1–5	> 5
Proportion of region (%)	61.2	20.1	16.8	1.9

The steep slopes in the map in particular highlight the Flinders Ranges in the south and the MacDonnell Ranges in the west.

The large areas of minor slopes in the centre of the region are the sand dunes of the Simpson Desert.

As can be noted in Figure 14.4, the rivers in the region run through vast areas with hardly any gradient, which means that large amounts of water are needed to make the rivers flow.

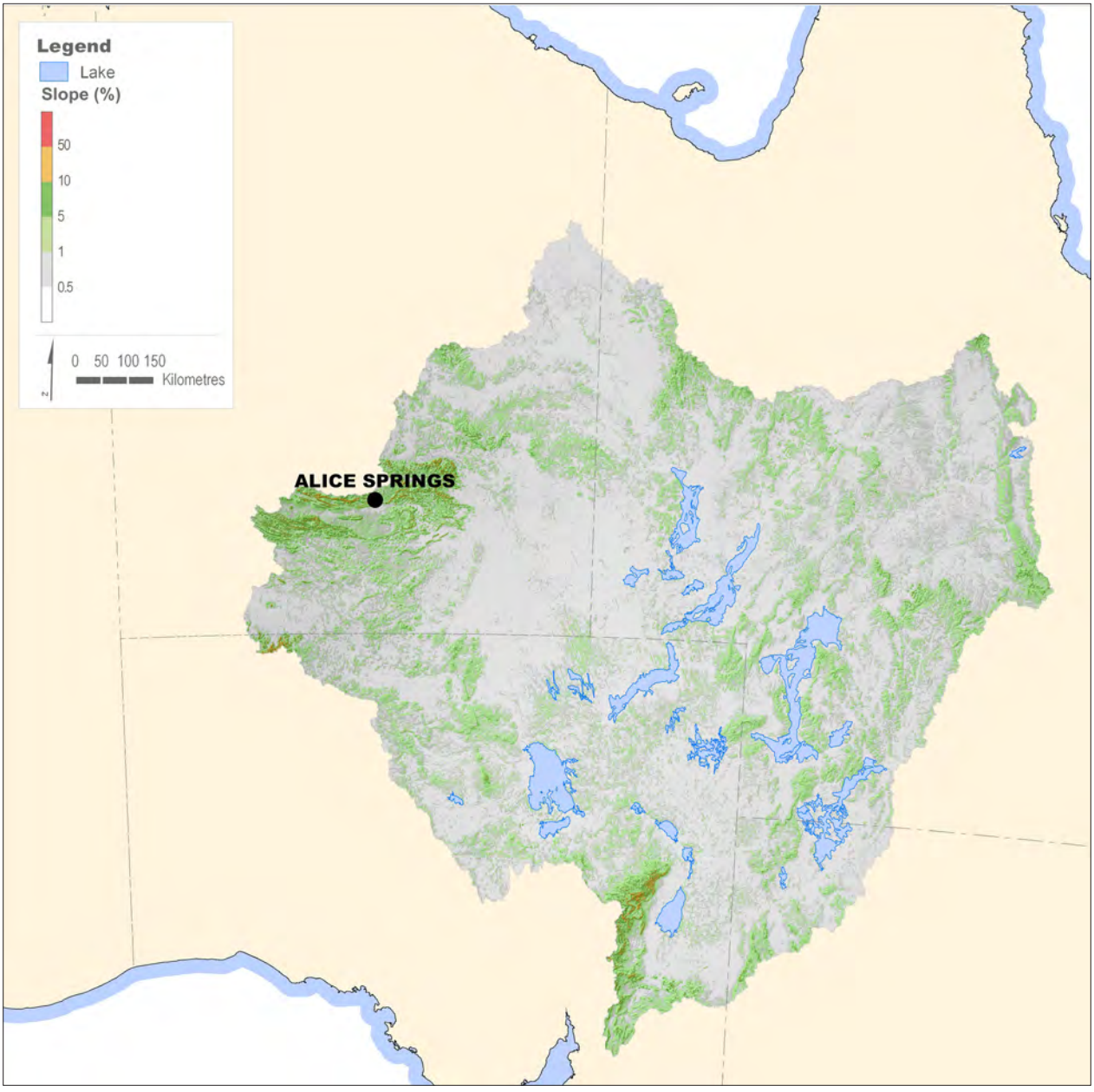


Figure 14.4 Surface slopes in the Lake Eyre Basin region

14.3.4 Soil types

Soils play an important role in the hydrological cycle by distributing water that reaches the ground. Water can be transported to rivers and lakes via the soil surface as run-off or enter the soil and provide water for plant growth as well as contributing to groundwater recharge.

The nature of these hydrological pathways and the suitability of the soils for agricultural purposes are influenced by soil types and their characteristics. Soil type information was obtained from the Australian Soil Resource Information System website (www.asris.csiro.au).

About 90% of the Lake Eyre Basin region is covered by five types of soil, namely vertosols, rudosols, kandosols, sodosols and tenosols (Figure 14.5 and Figure 14.6). The soils are common in areas used for grazing and nature conservation in this region.

Vertosols are mostly distributed in the eastern half of this region. They are clay rich soils which have a tendency to crack when dry and swell while wetting. They are highly fertile and have a large water-holding capacity. They do, however, absorb a significant amount of water before any becomes available to plants.

Rudosols are most common in the western half of the region. Rudosols as well as tenosols, which are scattered in the northwest and east of the region, are characterised by having a weak and minimal development. They show no or little change in texture and colour and are often shallow in depth. Tenosols and rudosols are low in chemical fertility and in water-holding capacity and thus their agricultural potential is low.

Kandosols are structureless soils which are often very deep (up to three metres or more), but they do not have a strongly contrasting texture and they do not contain carbonate throughout their profile. They are low in chemical fertility and are well-drained; with only moderate water-holding capacity compared with other soil types, thus they only have low to moderate agricultural potential. Kandosols are scattered across the region, except in the central part.

Sodosols are dominant in the central-west and scattered in small patches across other parts of the region. These soils have a clear texture contrast, with an impermeable sodic subsoil due to elevated sodium concentrations as well as increasing clay contents. They are susceptible to dryland salinity as well as erosion, if vegetation is removed. Sodosols are usually low in nutrient status.

The other soil types that have minimal representation in the Lake Eyre Basin region include dermosols and chromosols (1–6% of the total area).

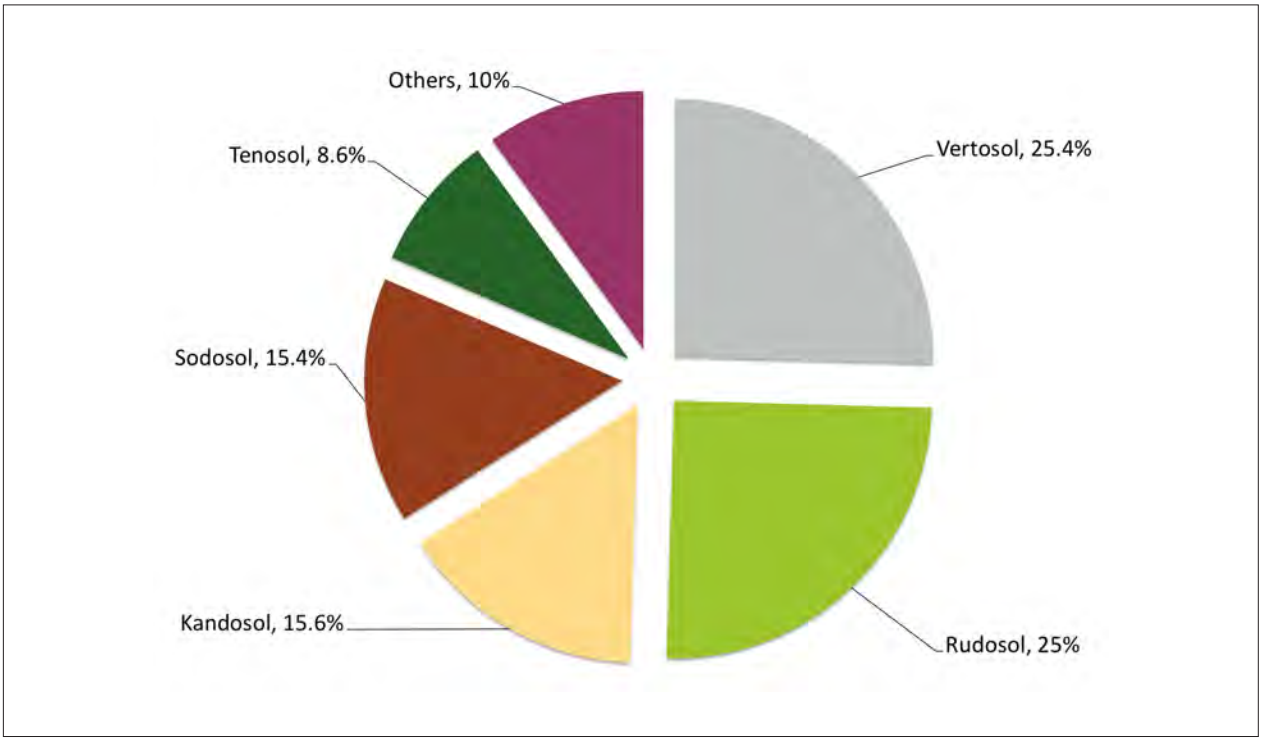


Figure 14.5 Soil type in the Lake Eyre Basin region

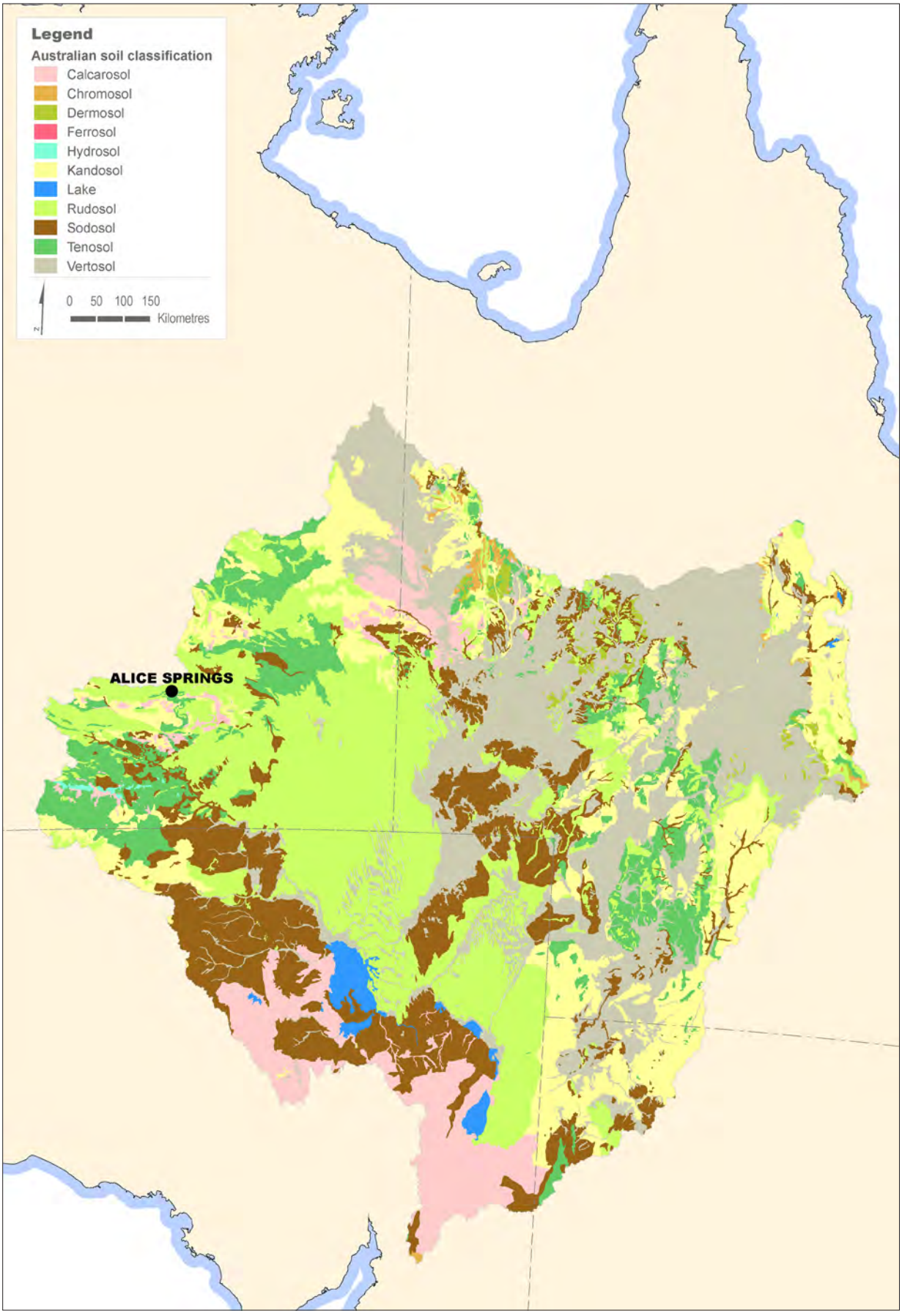


Figure 14.6 Soil type distribution in the Lake Eyre Basin region

14.3.5 Land use

Figure 14.7 presents land use in the Lake Eyre Basin region. Most of the land is used for grazing and nature conservation (data from data.daff.gov.au/anrdl/metadata_files/pa_luav4g9abl07811a00.xml).

There are numerous dry lakes which form a substantial part of the region. Only a small patch in the far south includes some dryland agriculture (Figure 14.8).

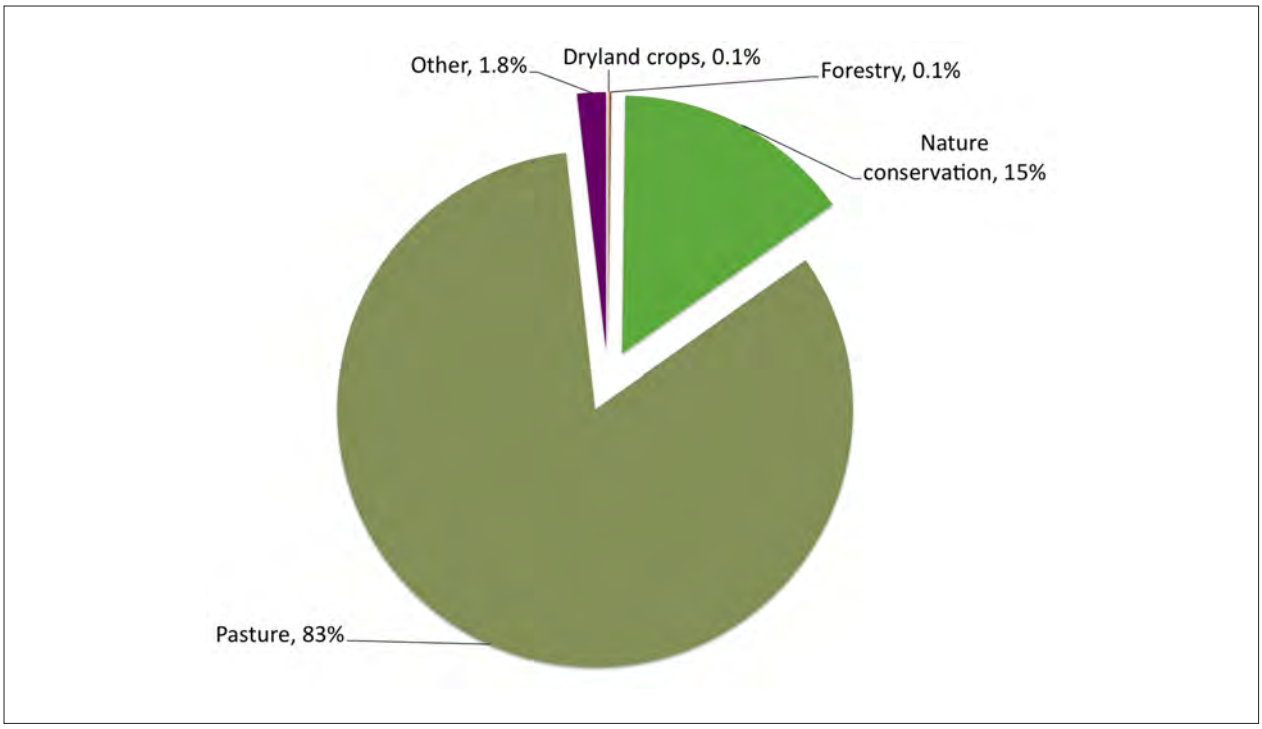


Figure 14.7 Land use in the Lake Eyre Basin region

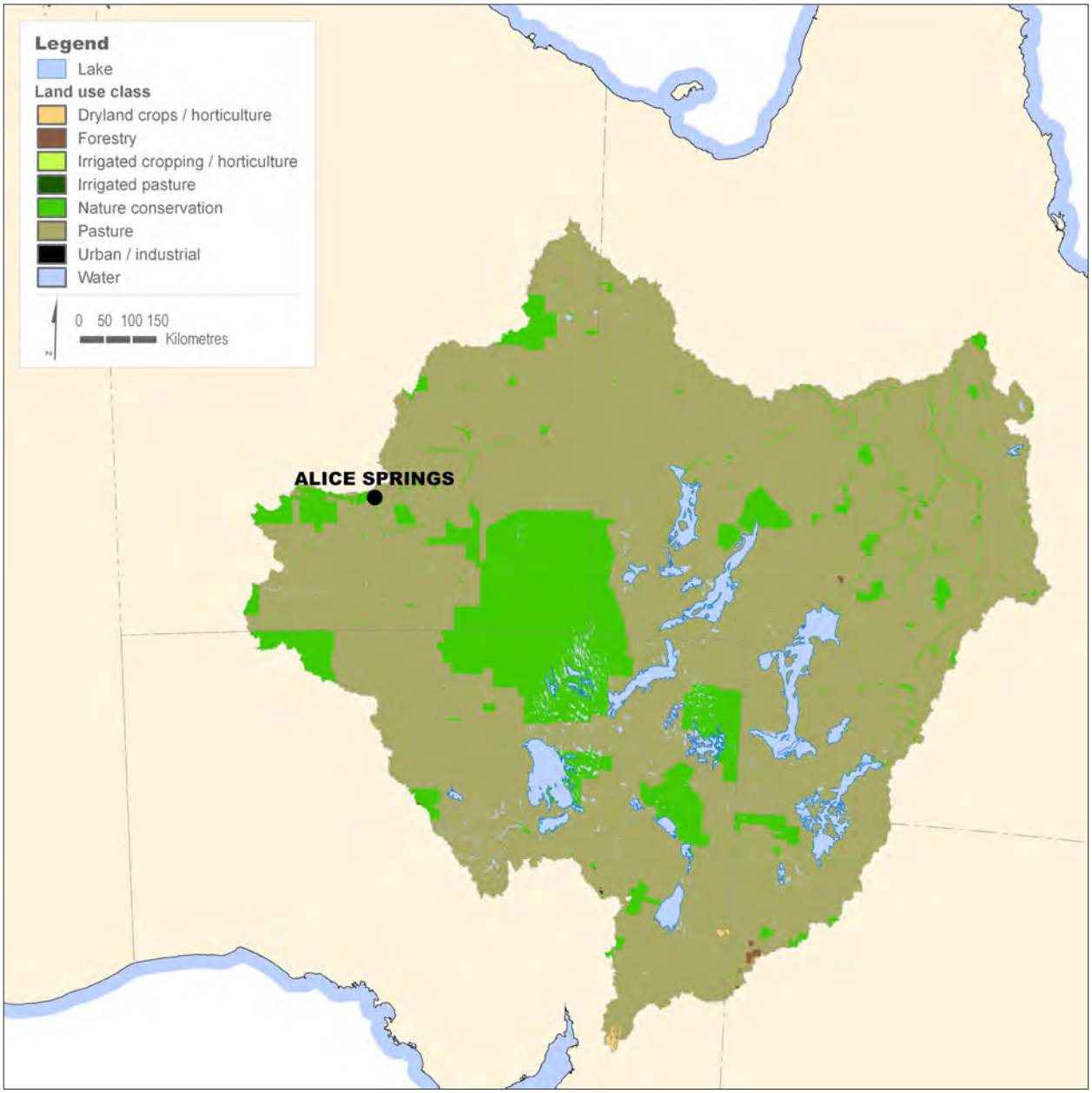


Figure 14.8 Land use distribution in the Lake Eyre Basin region

14.3.6 Population distribution

Lake Eyre Basin region is amongst the least populous areas in Australia. Figure 14.9 shows the population densities for the region and illustrates the sparse nature of its population (ABS 2011b).

Its major population centre of Alice Springs is located near its boundary in the northwest. Other remote communities are located on or near the region's borders in the south and west.

Outside of the major urban centres, mining leases, Indigenous communities and a number of small towns and settlements located adjacent to major roads account for much of its remaining population.

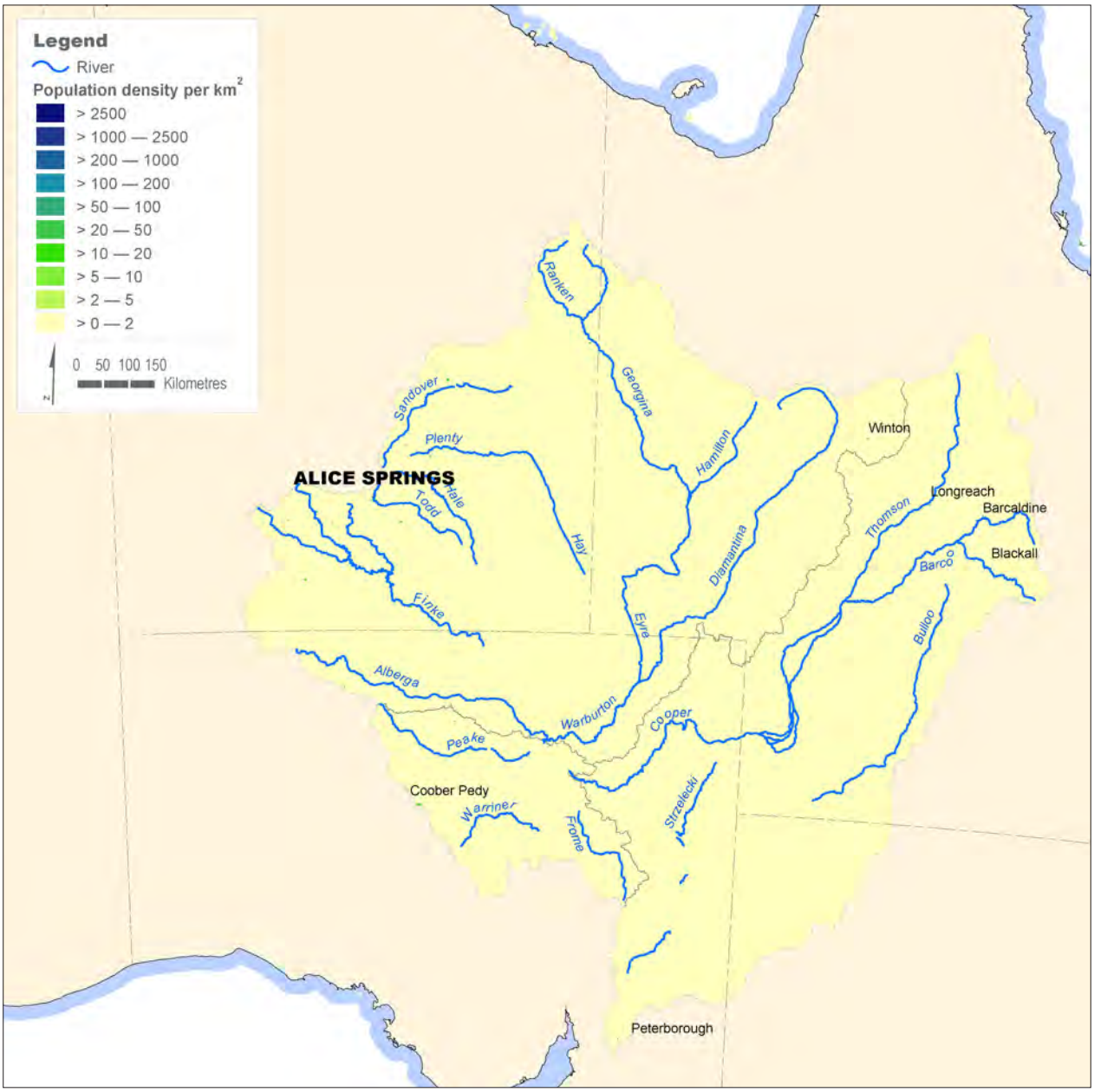


Figure 14.9 Population density and distribution in the Lake Eyre Basin region

14.3.7 Rainfall zones

The Lake Eyre Basin region's climate is arid throughout. The region receives monsoonal rain across the basin, in particular in the upper reaches of the Diamantina and Georgina rivers. Median rainfall does not exceed 650 mm per year anywhere in the region (Figure 14.10).

The region consists of one of the driest parts of the continent, with large areas in the centre not exceeding 200 mm of rainfall on average.

The far northeast has a pronounced wet season, with annual averages of about 400 mm. In the far south, some consistency in winter rainfall is present, although annual median rainfall does not exceed 500 mm.

For more information on this and other climate classifications, visit the Bureau of Meteorology's (the Bureau's) climate website: www.bom.gov.au/jsp/ncc/climate_averages/climate-classifications/index.jsp

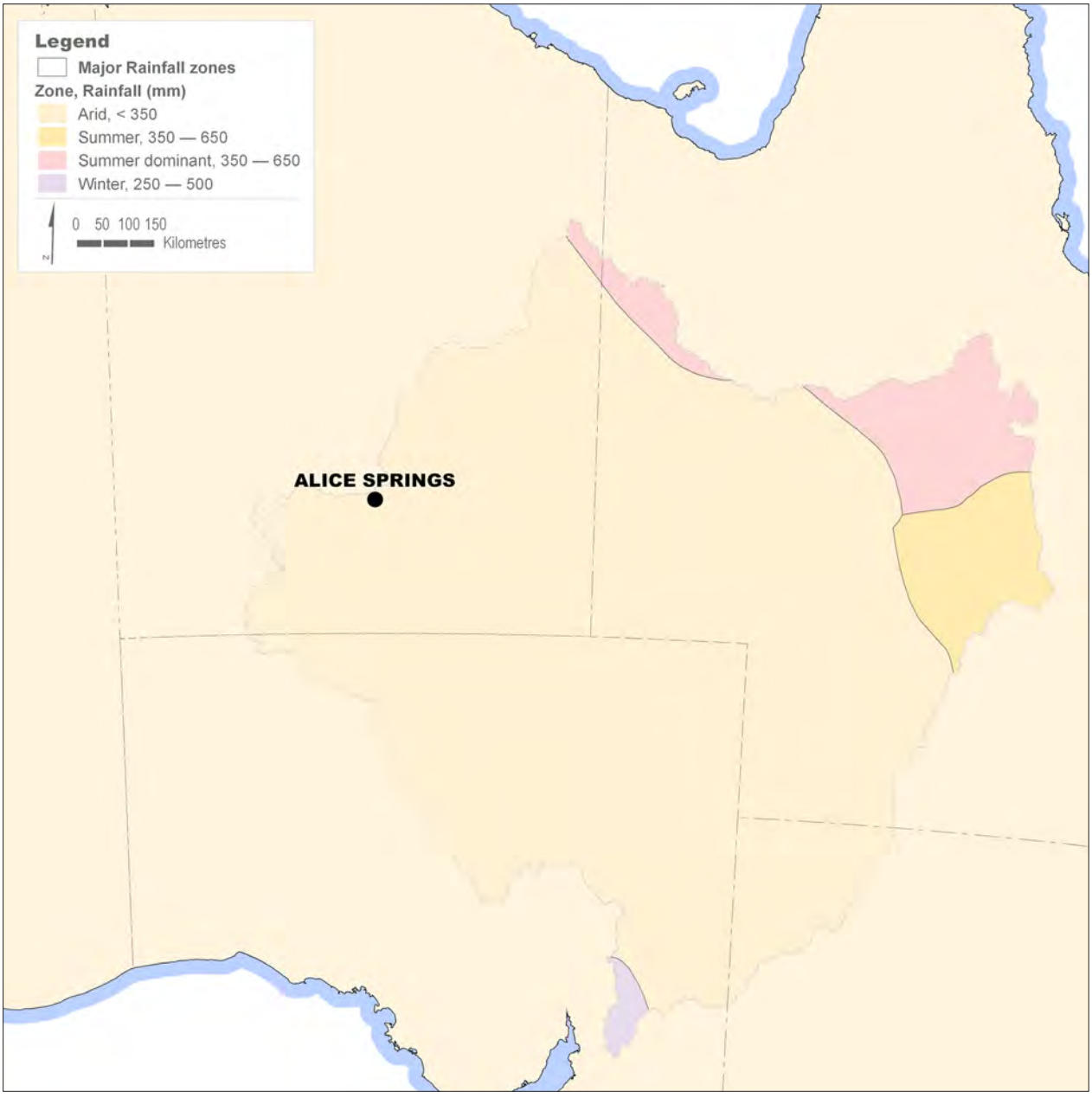


Figure 14.10 Rainfall zones in the Lake Eyre Basin region

14.3.8 Rainfall deficit

The rainfall deficit indicator, that is, rainfall minus potential evapotranspiration, gives a general impression about which parts of the region are likely to experience moisture deficits over the period of a year. The Lake Eyre Basin region has a uniform pattern of very high potential deficits over the whole region (Figure 14.11), although rainfall is highly variable from year to year.

Most of the region consists of desert land and ephemeral lakes, including Lake Eyre itself. Streamflow, often coming from the northeast as a result of monsoonal rainfall and tropical storms, occasionally feeds these lakes and forms large floodplains.

Other than grasses and some shrubs used for sparsely stocked farming, no real land use occurs in this dry landscape.

The moisture deficit does, however, provide many areas with a unique flora and fauna, mostly preserved in the many nature conservation areas in the region.

For more information on the rainfall and evapotranspiration data, see the Bureau's maps of average conditions: www.bom.gov.au/climate/averages/maps.shtml

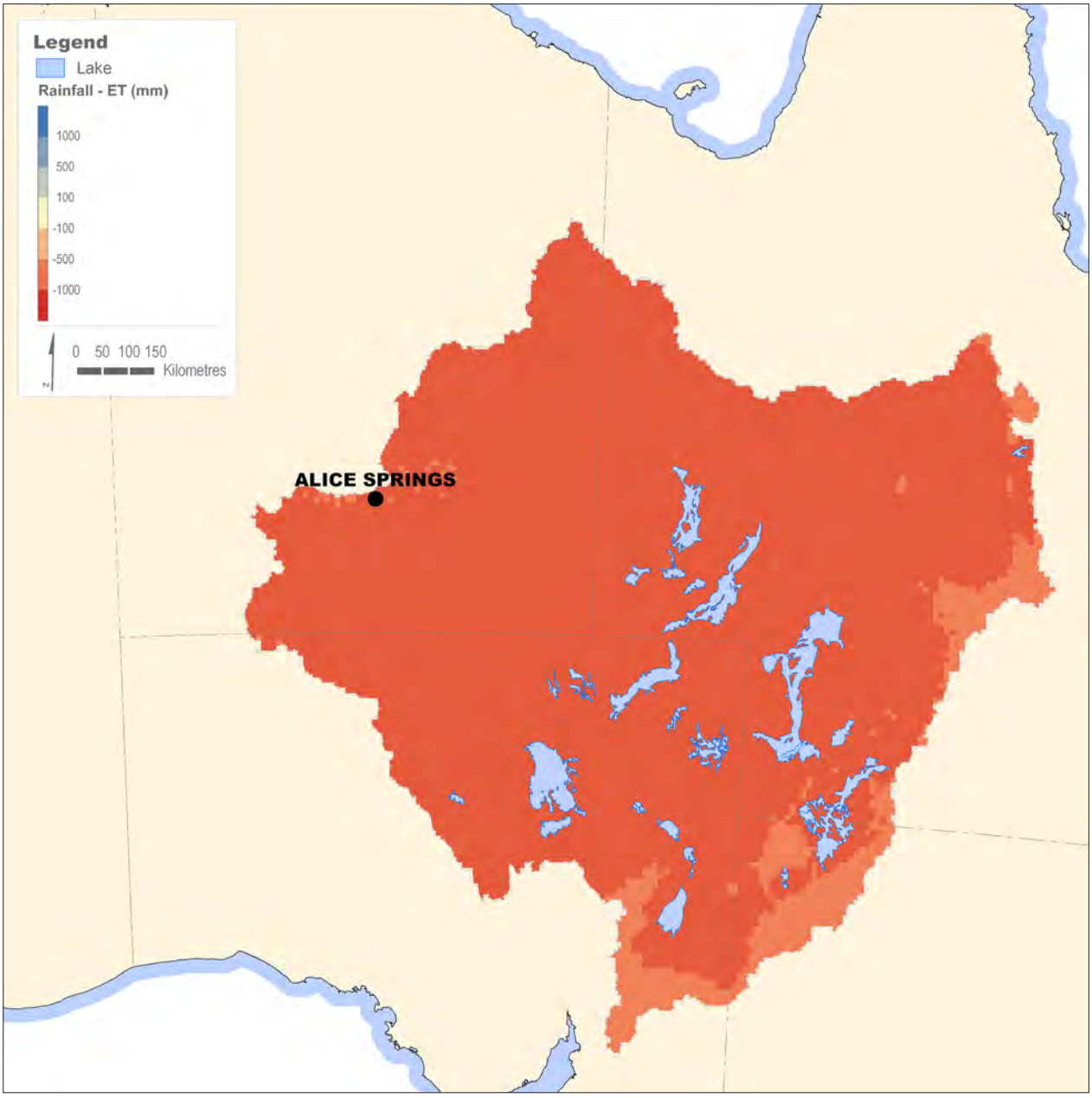


Figure 14.11 Rainfall deficit distribution in the Lake Eyre Basin region

14.4 Landscape water flows

This section presents analyses of the spatial and temporal variation of landscape water flows (rainfall, evapotranspiration and landscape water yield) across the Lake Eyre Basin region in 2011–12. National rainfall grids were generated using data from a network of persistent, high-quality rainfall stations managed by the Bureau. Evapotranspiration and landscape water yields were derived using the landscape water balance component of the Australian Water Resources Assessment System (Van Dijk 2010). These methods and associated output uncertainties are discussed in the Introduction and addressed in more detail in the Technical Supplement.

Figure 14.12 shows that the Lake Eyre Basin region has a seasonal rainfall pattern with a wetter spring to early autumn and a largely dry winter period. Evapotranspiration in the dry winter period generally exceeds rainfall. After the wet period the soils normally contain plenty of moisture that is available for evapotranspiration. The monthly landscape water yield history for the region shows a stable pattern of very low yield throughout the year, although it marginally increases between January and March.

The 2011–12 year was a relatively wet year, with the months of November and March receiving very much above average rainfall. An active monsoon in the north of the region and La Niña and wetter Indian Ocean influences contributed to high rainfall totals, particularly for the month of March.

Evapotranspiration was particularly high in November, December and March. In March, evapotranspiration was the second highest on record for the 1911–2012 time-series.

The landscape water yield for 2011–12 was fifth highest on record in November and third highest on record in March.

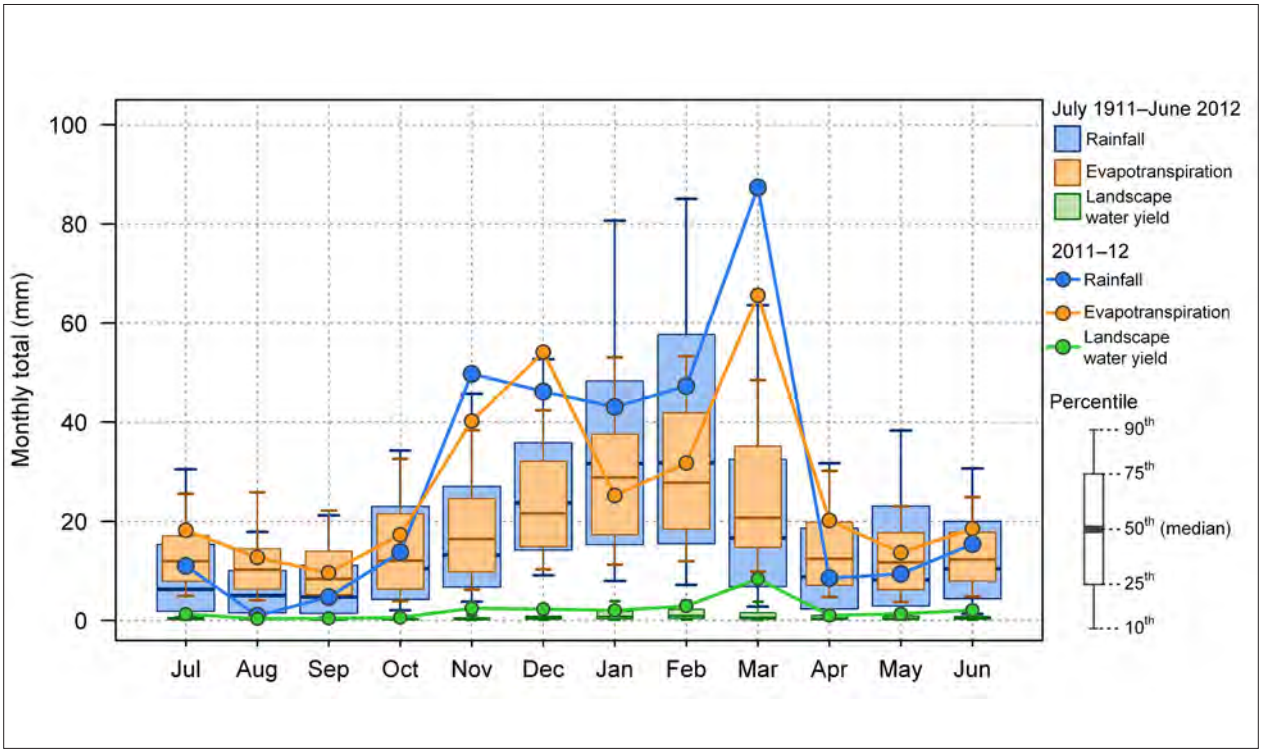


Figure 14.12 Landscape water flows in 2011–12 compared with the long-term record (July 1911–June 2012) for the Lake Eyre Basin region

14.4.1 Rainfall

Rainfall for the Lake Eyre Basin region for 2011–12 is estimated to be 337 mm. This is 42% above the region's long-term average (July 1911–June 2012) of 237 mm. Figure 14.13a shows that the highest rainfall occurred in the northeast with annual totals exceeding 600 mm in 2011–12. Rainfall in the centre of the region did not exceed 200 mm over large areas.

Rainfall deciles for 2011–12 indicate average to above average rainfall for the entire region over the course of the year (Figure 14.13b). The southeast of the region received very much above average rainfall. The Diamantina–Georgina river basins in the northwest of the region received predominantly average rainfall only.

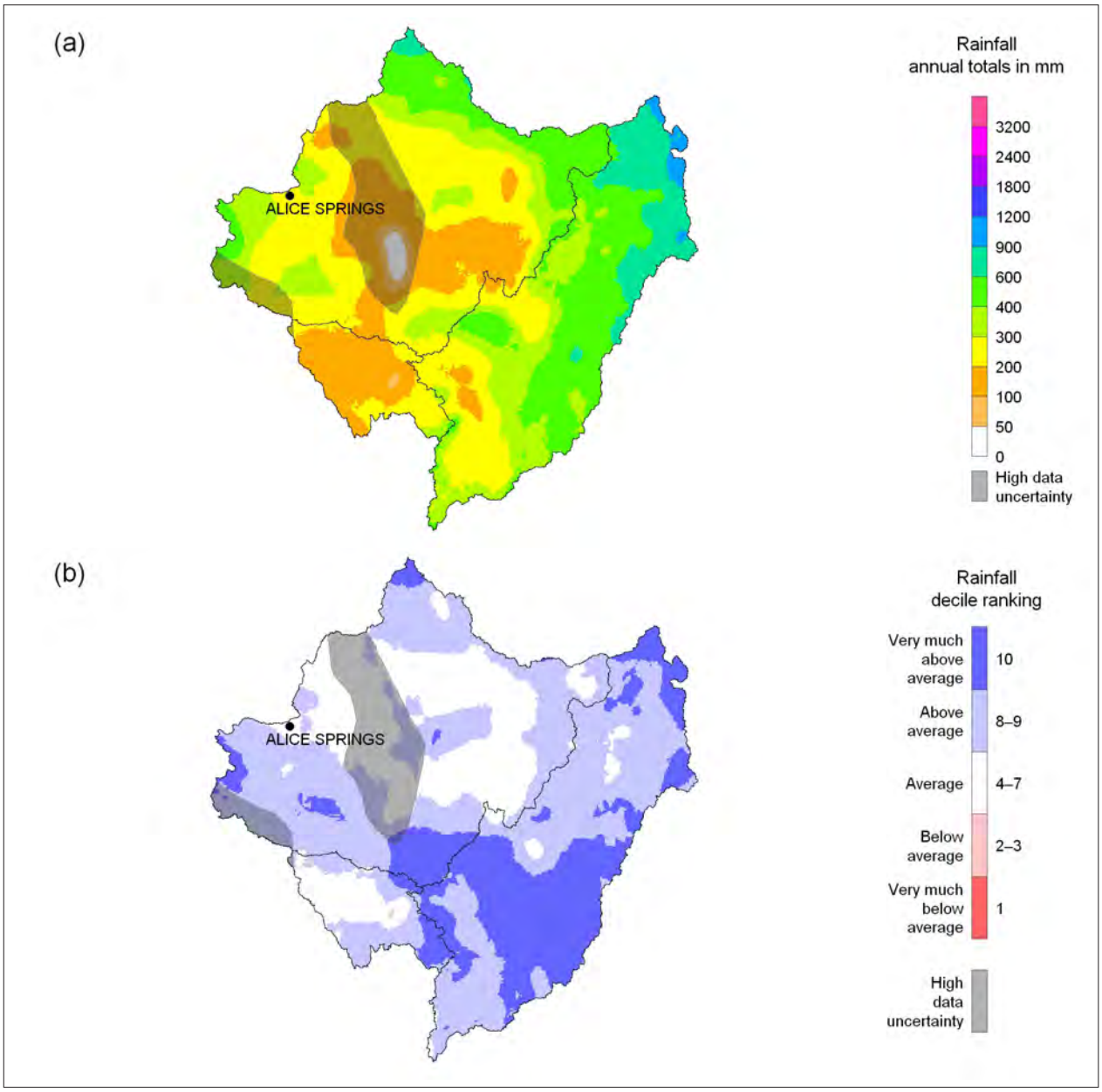


Figure 14.13 Spatial distribution of (a) annual rainfall in 2011–12, and (b) their decile rankings over the 1911–2012 period for the Lake Eyre Basin region

Rainfall variability in the recent past

Figure 14.14a shows annual rainfall for the region from July 1980 onwards. Over this 32-year period the annual average was 264 mm, varying from 156 mm (2007–08) to 616 mm (2010–11). Temporal variability and seasonal patterns since 1980 are presented in Figure 14.14b.

The graphs indicate the presence of cyclical patterns typical in the region's annual rainfall, which are particularly noticeable in the summer period. This pattern is closely linked to the Southern Oscillation Index and the occurrence of El Niño and La Niña periods (see the National Overview chapter). A strong La Niña period typically delivers above average rainfall, particularly to the northeast of the region, clearly seen in the recent very strong 2010–11 La Niña event.

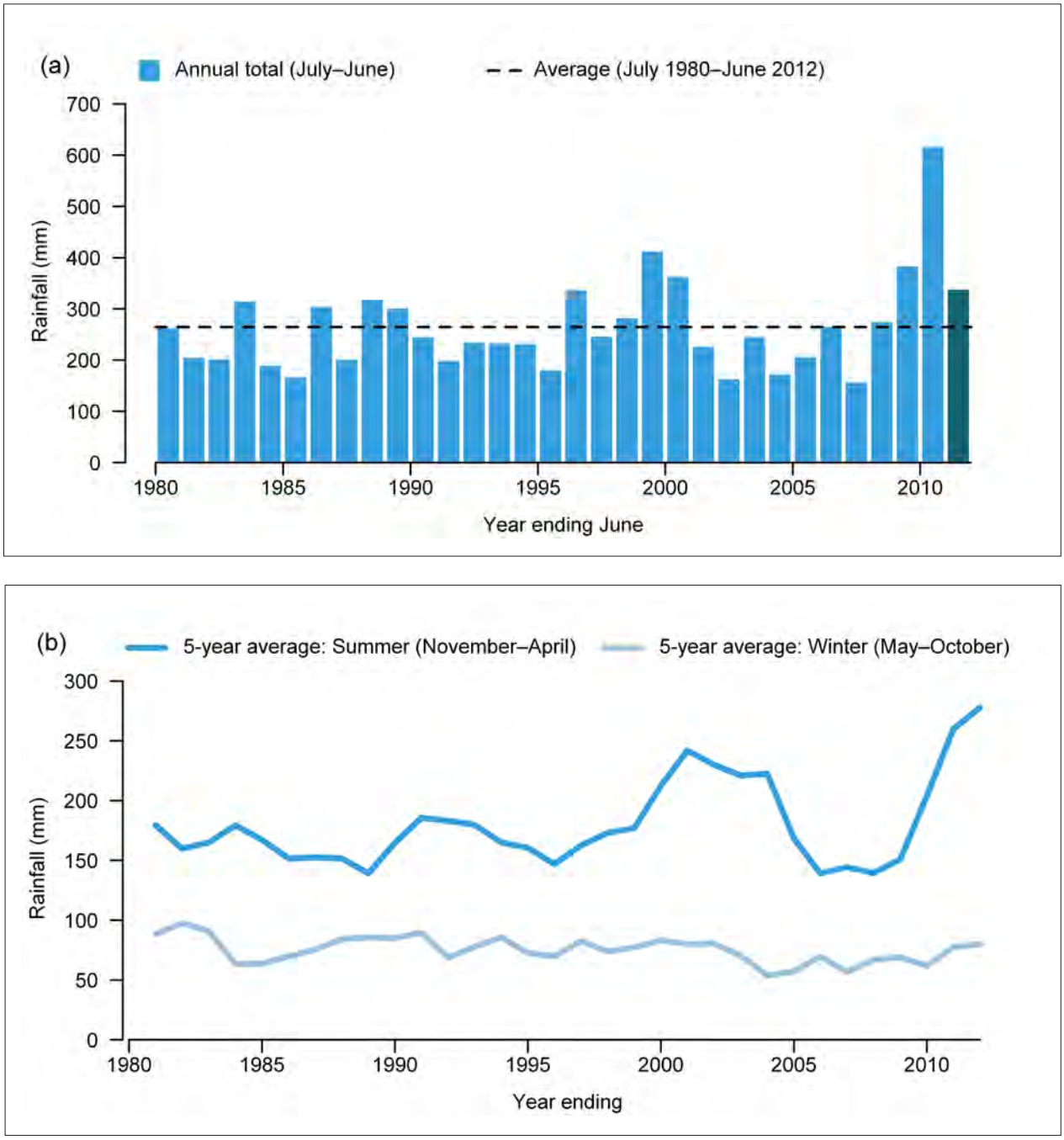


Figure 14.14 Time-series of (a) annual rainfall, and (b) five-year retrospective moving averages for the summer (November–April) and winter (May–October) periods for the Lake Eyre Basin region

Recent trends in rainfall

Figure 14.15a presents the spatial distribution of the trends in annual rainfall for July 1980–June 2012. These are derived from linear regression analyses on the time-series of each model grid cell. The statistical significance of the trends is provided in Figure 14.15b.

Figure 14.15b shows that since 1980 an increase in rainfall has occurred in large parts of the region, particularly towards the north; however, the trends are only strongly statistically significant in 6% of the region. The trends are largely a result of the multi-annual cyclic rainfall pattern shown in Figure 14.14 and the particularly high rainfall of 2011–12.

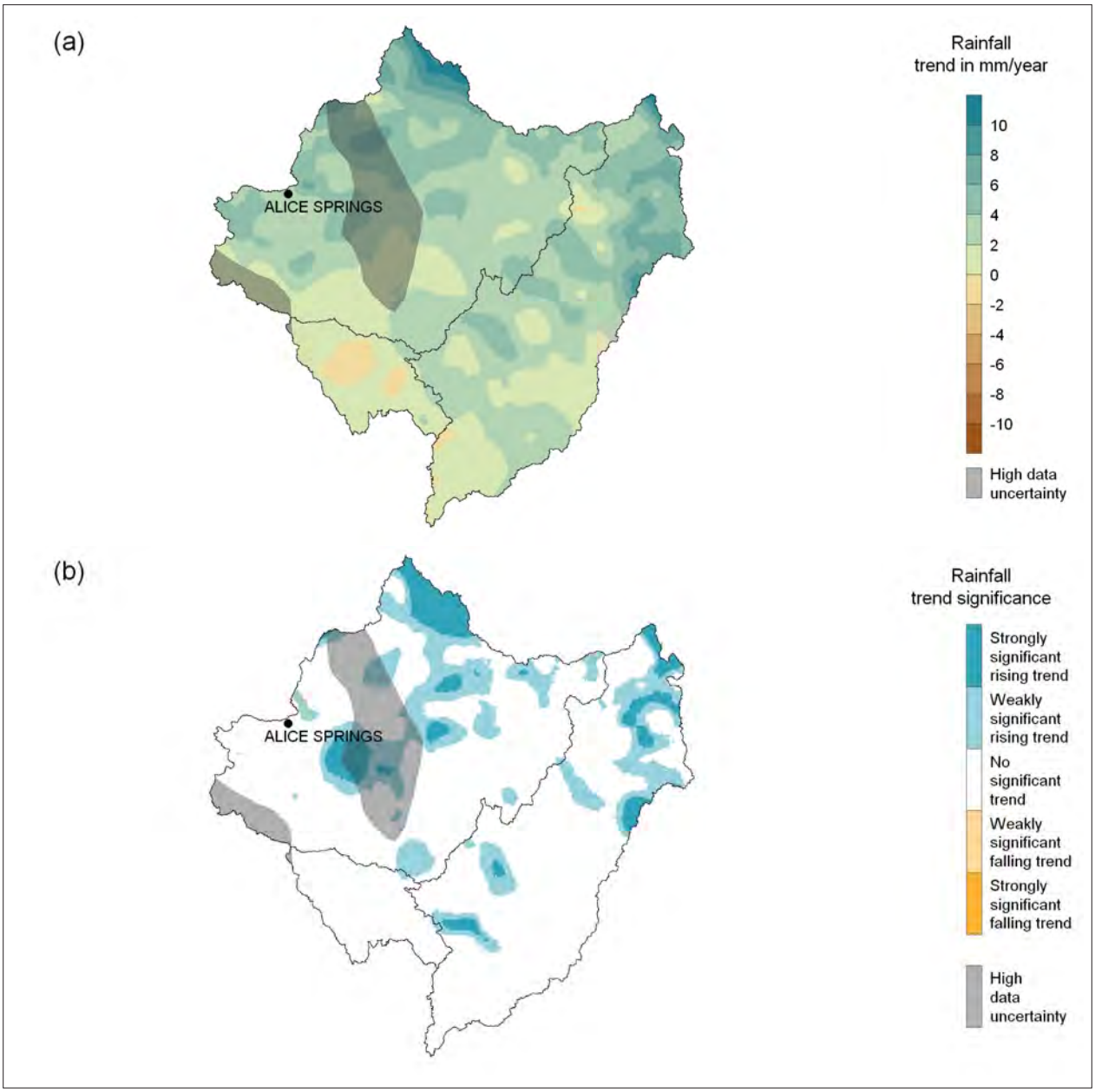


Figure 14.15 Spatial distribution of (a) trends in annual rainfall from 1980–2012, and (b) their statistical significance at 90% (weak) and 95% (strong) confidence levels for the Lake Eyre Basin region

14.4.2 Evapotranspiration

Modelled annual evapotranspiration for the Lake Eyre Basin region for 2011–12 is estimated to be 327 mm. This is 45% above the region's long-term (July 1911–June 2012) average of 226 mm. The spatial distribution of annual evapotranspiration in 2011–12 (Figure 14.16a) is similar to that of rainfall (Figure 14.13a).

Evapotranspiration deciles for 2011–12 indicate above average totals across most of the region (Figure 14.16b). Around 23% of the region even recorded very much above average evapotranspiration, scattered throughout. The Lake Eyre district in the southwest is the exception, where generally average evapotranspiration is estimated.

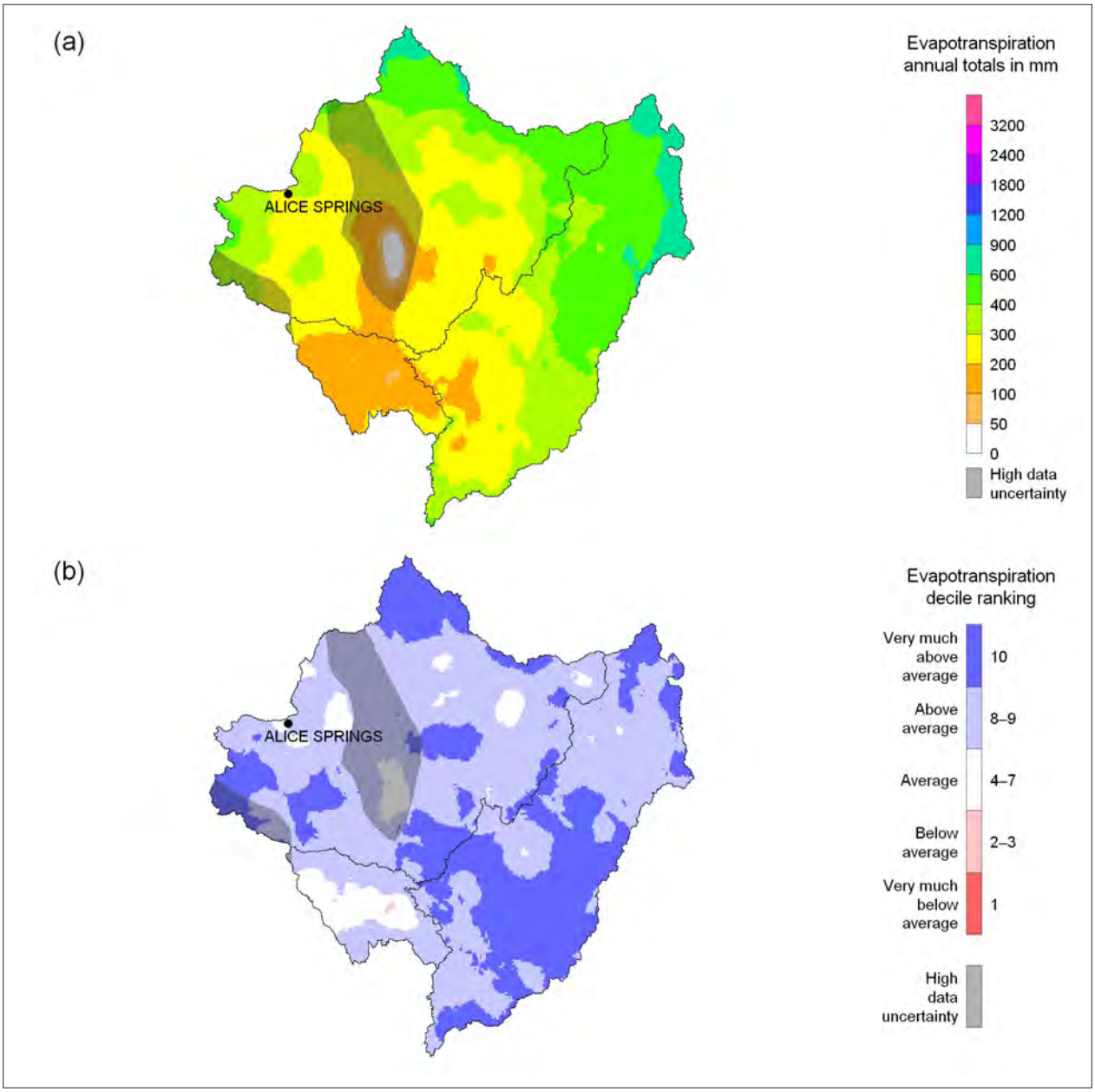


Figure 14.16 Spatial distribution of (a) modelled annual evapotranspiration in 2011–12, and (b) their decile rankings over the 1911–2012 period for the Lake Eyre Basin region

Evapotranspiration variability in the recent past

Figure 14.17a shows annual evapotranspiration for the region from July 1980 onwards. Over this 32-year period the annual evapotranspiration average was 250 mm, varying from 153 mm (2004–05) to 543 mm (2010–11). Temporal variability and seasonal patterns since 1980 are presented in Figure 14.17b.

Summer periods showed consistently higher evapotranspiration than the winter period due to the higher temperatures and the higher rainfall in the north of the area. Also the annual variability is mainly caused during the summer period, which again follows the pattern of rainfall (Figure 14.14b).

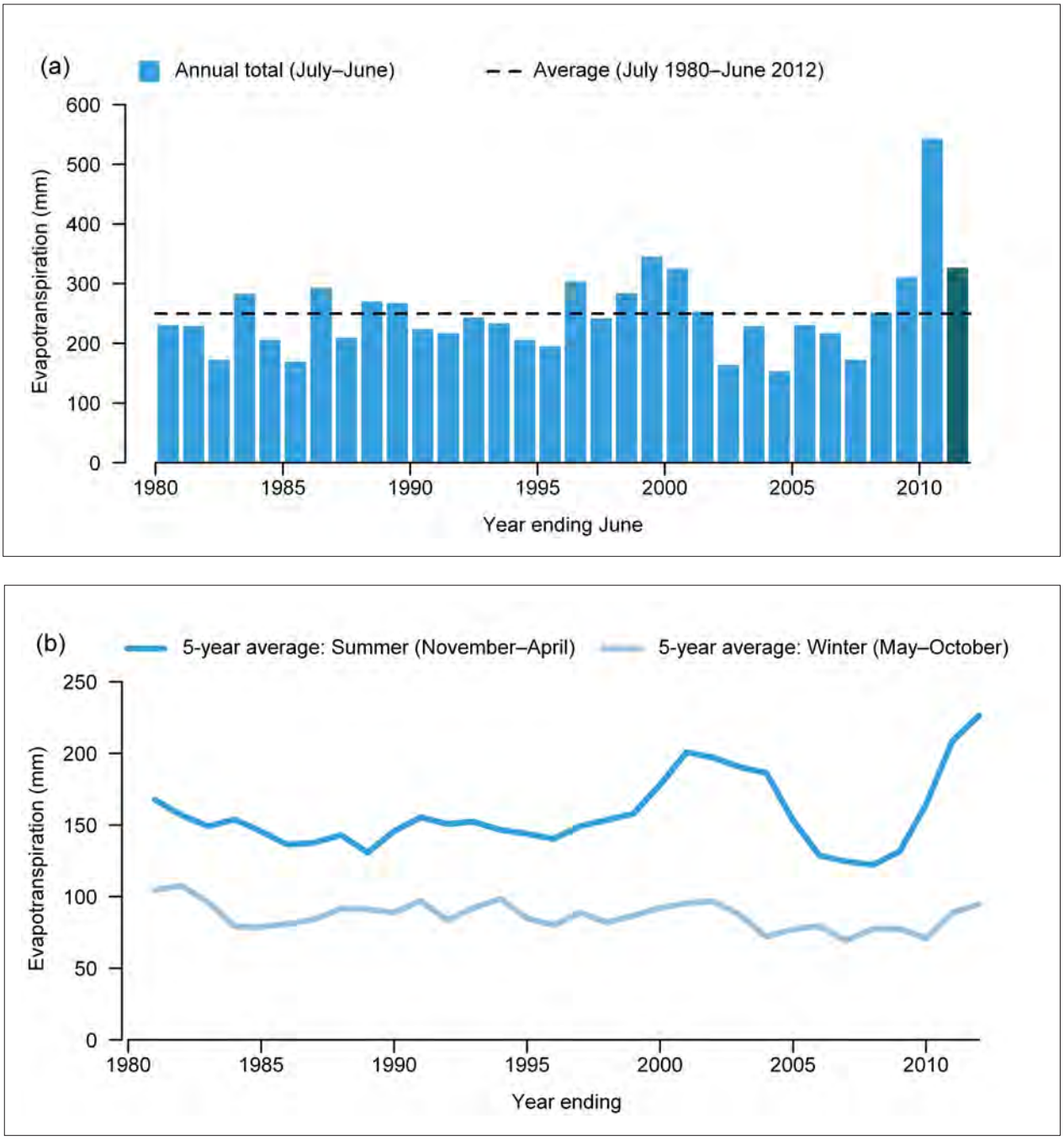


Figure 14.17 Time-series of (a) annual evapotranspiration, and (b) five-year retrospective moving averages for the summer (November–April) and winter (May–October) periods for the Lake Eyre Basin region

Recent trends in evapotranspiration

Figure 14.18a presents the spatial distribution of the trends in modelled annual evapotranspiration for 1980– 2012. These are derived from linear regression analyses on the time-series of each model grid cell. The statistical significance of the trends is provided in Figure 14.18b.

Figure 14.18a shows that since 1980 trends are mostly rising with a stronger signal in the north of the region. Figure 14.18b confirms that these stronger northern trends are statistically more significant.

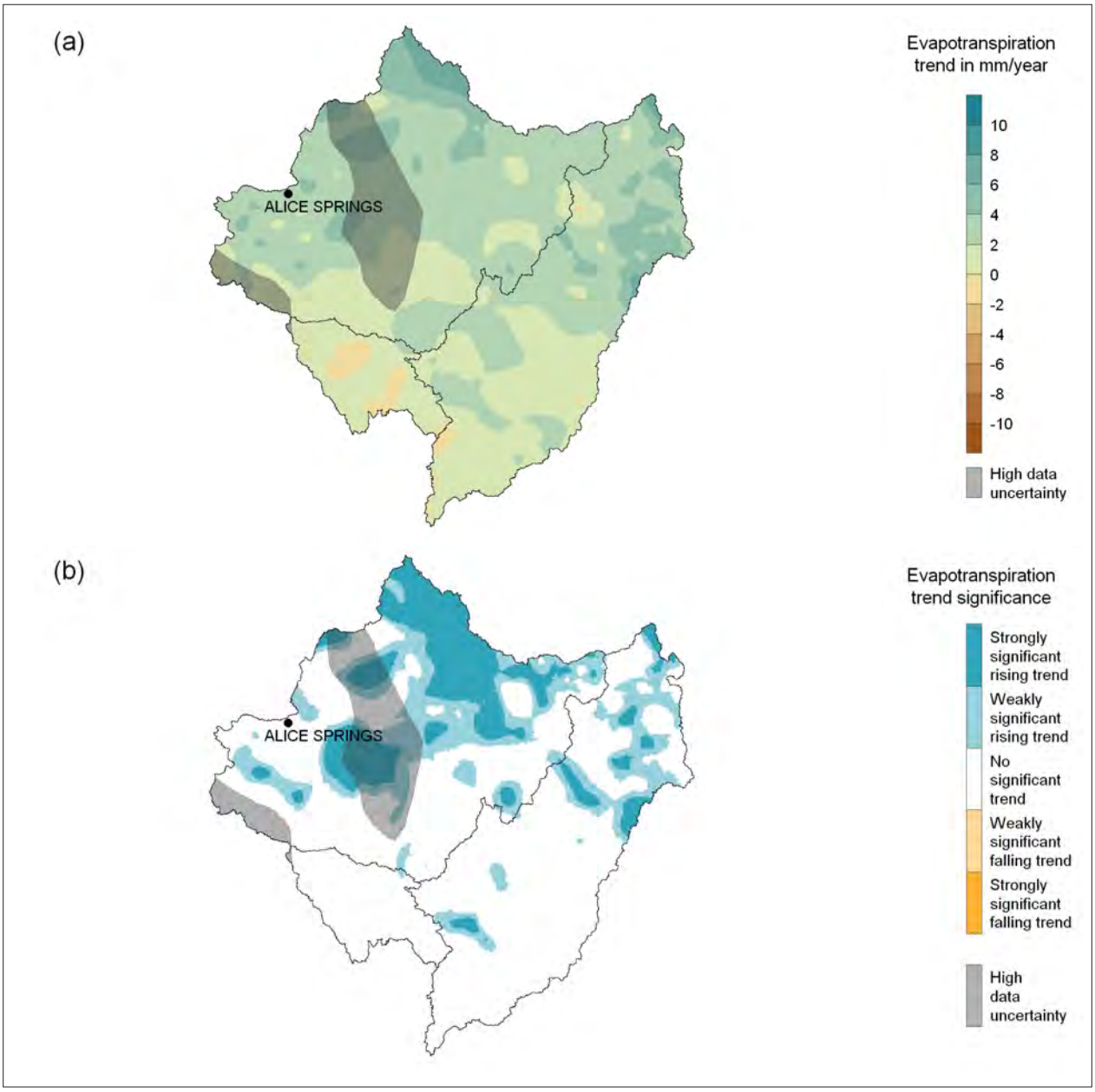


Figure 14.18 Spatial distribution of (a) trends in annual evapotranspiration from 1980–2012, and (b) their statistical significance at 90% (weak) and 95% (strong) confidence levels for the Lake Eyre Basin region

14.4.3 Landscape water yield

Modelled landscape water yield for the Lake Eyre Basin region for 2011–12 is estimated to be 25 mm. This is 150% above the region's long-term (July 1911–June 2012) average of 10 mm. Figure 14.19a shows the spatial distribution of landscape water yield for 2011–12, which is similar to the annual rainfall distribution (Figure 14.13a, note the difference in the scales between the two figures).

The decile-ranking map for 2011–12 (Figure 14.19b) shows above average to very much above average landscape water yields. The decile rankings of landscape water yield are substantially higher than those of rainfall due to the higher initial soil moisture levels, caused by the strong wet season in 2010–11.

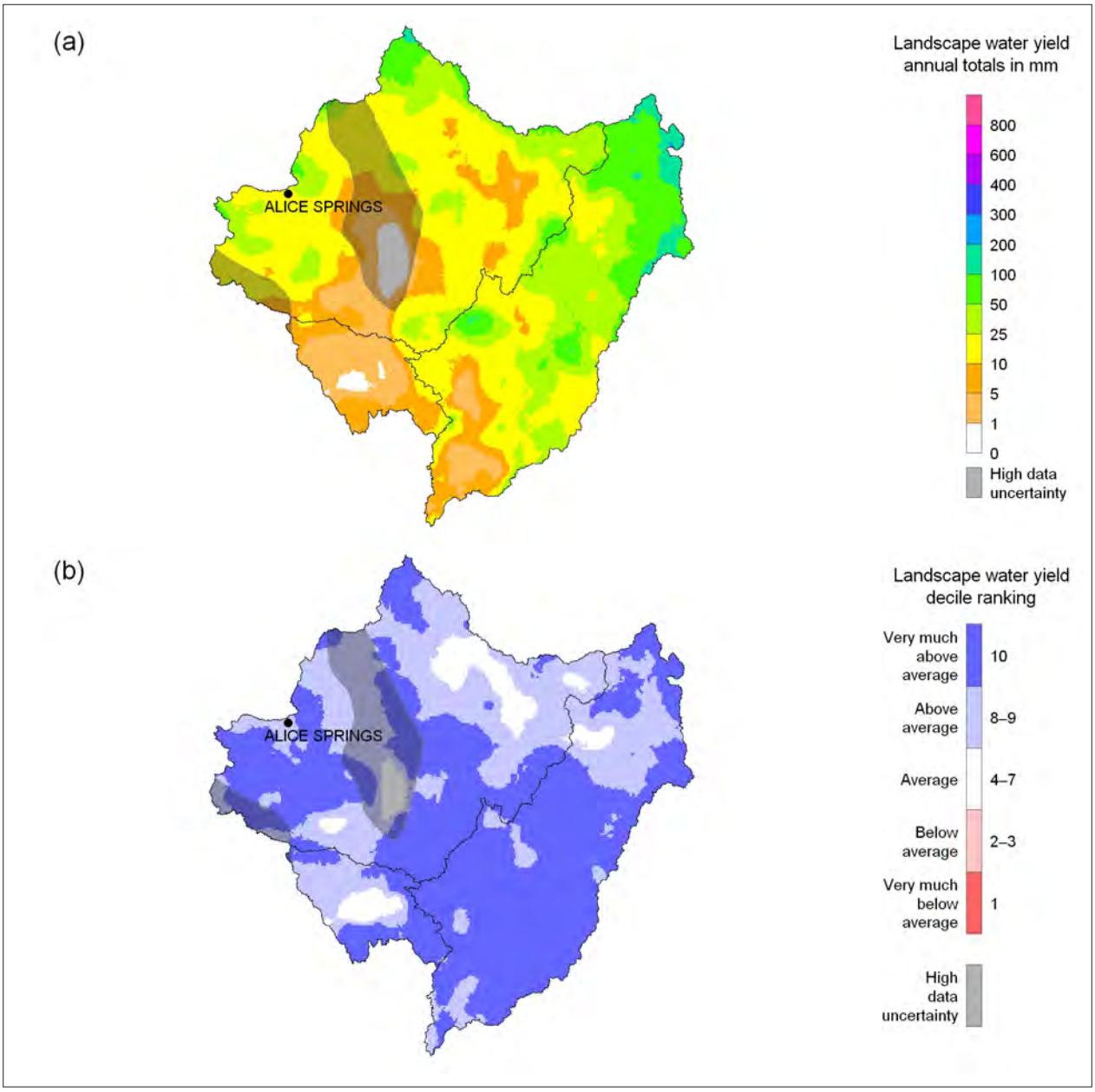


Figure 14.19 Spatial distribution of (a) modelled annual landscape water yield in 2011–12, and (b) their decile rankings over the 1911–2012 period for the Lake Eyre Basin region

Landscape water yield variability in the recent past

Figure 14.20a shows annual landscape water yield for the Lake Eyre Basin region from July 1980 onwards. Over this 32-year period, annual landscape water yield was 13 mm, varying from 4 mm (1985–86) to 51 mm (2010–11). Temporal variability and seasonal patterns since 1980 are presented in Figure 14.20b.

Landscape water yield is highly variable in the Lake Eyre Basin region with the second highest coefficient of variation (standard deviation divided by mean) of all regions, behind the Pilbara–Gascoyne region. The variability in landscape water yield in the annual totals as well as the landscape water yield of the summer period is directly related to rainfall.

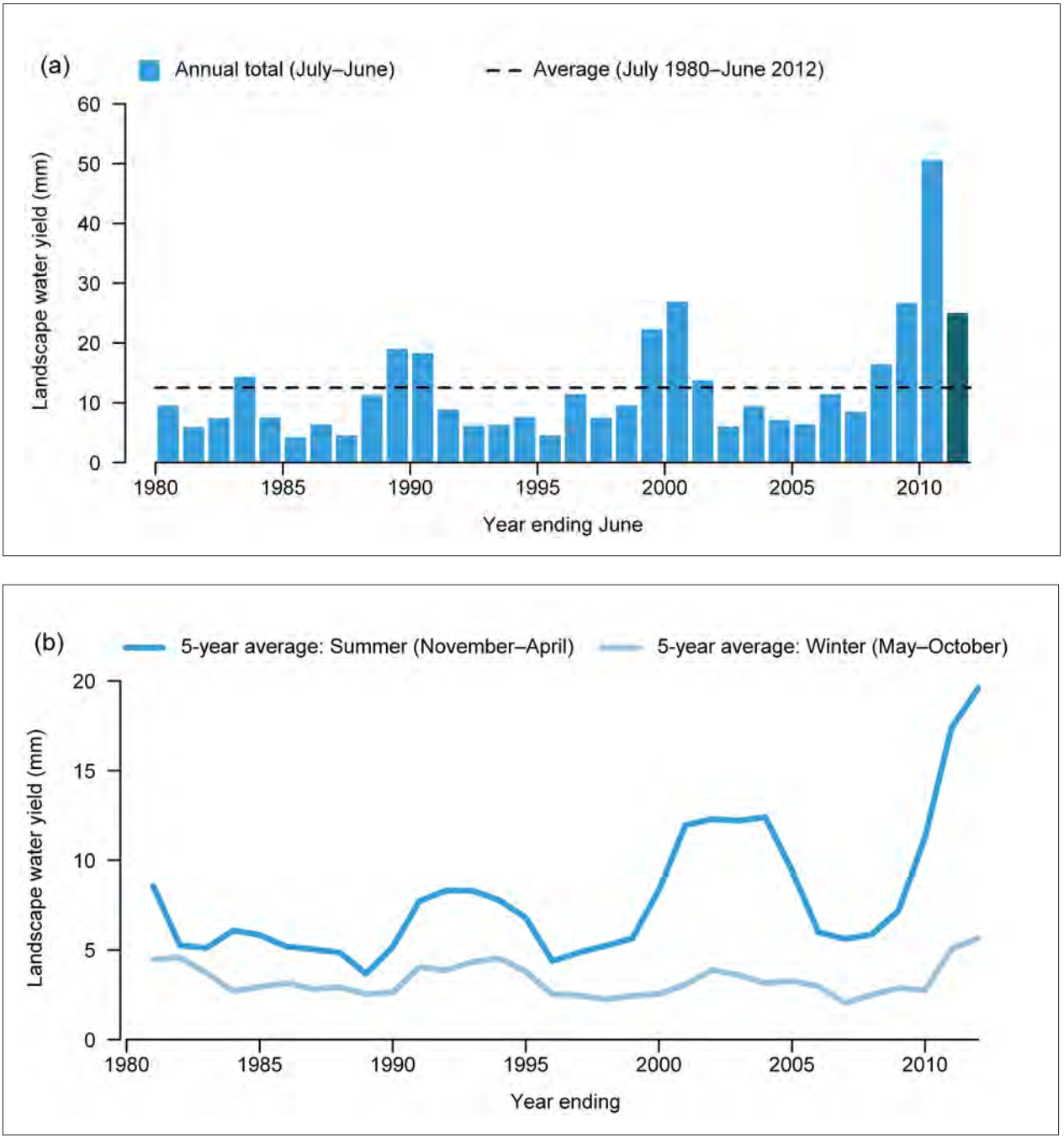


Figure 14.20 Time-series of (a) annual landscape water yield, and (b) five-year retrospective moving averages for the summer (November–April) and winter (May–October) periods for the Lake Eyre Basin region

Recent trends in landscape water yield

Figure 14.21a shows the spatial distribution of the trends in modelled annual landscape water yield for 1980–2012. These are derived from linear regression analyses on the time-series of each model grid cell. The statistical significance of the trends is provided in Figure 14.21b.

The pattern in Figure 14.20a and the particularly high peak of 2010–11 makes the landscape water yield trends stand out as rising throughout the region, with the exception of the very low landscape water yield area in the Lake Eyre district in the southwest. Figure 14.21b shows that in large parts of the region trends are statistically significant.

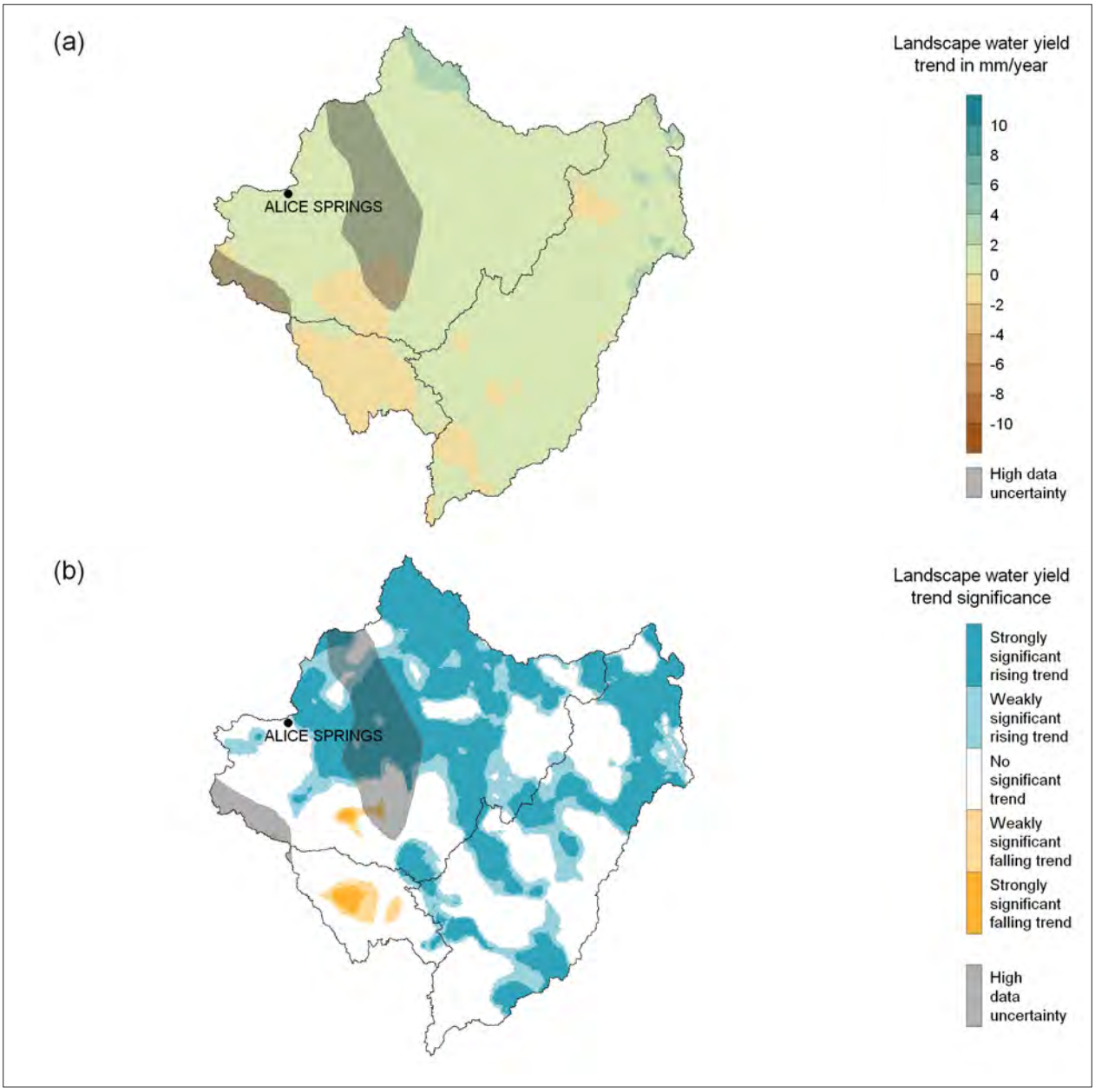


Figure 14.21 Spatial distribution of (a) trends in annual landscape water yield from 1980–2012, and (b) their statistical significance at 90% (weak) and 95% (strong) confidence levels for the Lake Eyre Basin region

14.5 Surface water and groundwater

This section examines surface water and groundwater resources in the Lake Eyre Basin region in 2011–12. Rivers, wetlands and storages are discussed to illustrate the state of the region's surface water resources. The region's watertable aquifers and salinity are described. No data was available at the Bureau in a suitable format for a detailed analysis on individual aquifers.

Data was not available for streamflow salinity in the Lake Eyre Basin.

There are no storage systems in the Lake Eyre Basin.

14.5.1 Rivers

The region is the world's largest internally draining system and Lake Eyre is the fifth largest terminal lake in the world. There are three river basins in the region, varying in size from 106,000 to 699,000 km^2 (Figure 14.22).

The major rivers in the region flow from central and western Queensland in the northeast into South Australia in the south. The southwest corner of the region (Lake Eyre) is up to 15 m below sea level and it is the final receiving area for all major watercourses in the basin if the flood extent is large enough.

The rivers and creeks are characterised by high variability and unpredictability in their flow with high transmission losses and very low gradients. All creeks and rivers of the basin are ephemeral with relatively short periods of flow following rain, and often long periods with no flow.

14.5.2 Streamflow volumes

Figure 14.23 presents an analysis of flows at five monitoring sites during 2011–12 relative to annual flows for the period from July 1980–July 2012. Monitoring sites with relatively long records across four geographically representative rivers were selected (see Technical Supplement). The annual river flows for 2011–12 are colour-coded according to the decile rank at each site over the 1980–2012 period.

The flows generally reflect the mostly average to above average modelled landscape water yield results shown in Figure 14.19b. Only the monitored flows in the Darr River present a slightly different pattern of below average flows (red dot in Figure 14.23).

Above average flows were observed at three sites in the region which were located on rivers in the east of the Lake Eyre Basin region. Average total flows were recorded at one monitoring site. This was on the Diamantina River in the centre of the region.

Flow deciles in the summer (November 2011–April 2012) were very similar to total annual flows for 2011–12 as shown in Figure 14.23. This is to be expected given the bulk of flows in the region, particularly in the northeast, occurred over the summer period. It is also the consequence of the summer-dominated rainfall in that part of the region.

Figure 14.22 Rivers and catchments in the Lake Eyre Basin region

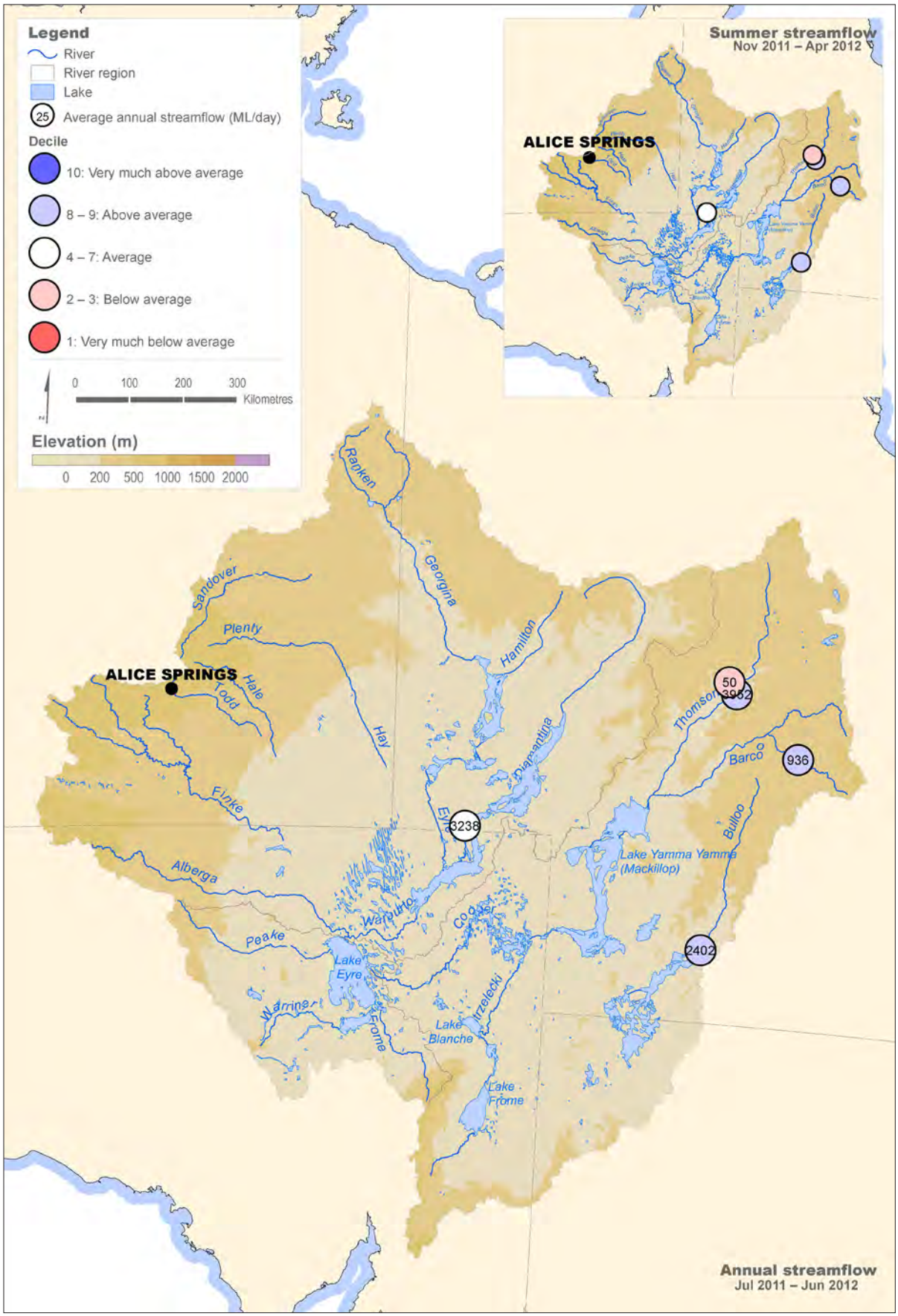


Figure 14.23 Average annual and summer period flow volumes of selected gauges for 2011–12 and their decile rankings over the 1980–2012 period in the Lake Eyre Basin region

14.5.3 Flooding

Figure 14.24 gives an overview of the locations where the Bureau is monitoring flood levels in the Lake Eyre Basin region through the Northern Territory Government. These levels are further specified in the Technical Supplement.

A sequence of wet and dry spells has been observed in the lake over years, which is very much related to the El Niño—Southern Oscillation Index. Major events of filling the Lake Eyre are associated with rare cases of annual rainfall in excess of 500 mm. Several of the tributaries to the lake were flooded during the months between January and March 2012. In early 2012, major floods occurred in the Bulloo River.

Later in February, the main tributary to Lake Eyre, the Diamantina River, was flooded; this was concurrent with major floods in several segments of the Barcoo River. Some moderate floods were also registered in the Thomson and Bulloo rivers during February.

In March 2012 and following heavy rainfalls in the catchment all tributaries of the lake were flooded, the most significant of which was the Diamantina River which had major floods. Moderate floods occurred in other tributaries of the lake. In April, the floods gradually subsided and were limited to some moderate and minor floods in the Diamantina and Thomson rivers, respectively.

14.5.4 Wetlands

There are two Ramsar-listed, internationally important wetlands in the Lake Eyre Basin region as well as a number of wetlands of national importance mentioned in the *Australian Directory of Important Wetlands* (www.environment.gov.au/water/topics/wetlands/database/diwa.html)

The wetlands mainly consist of ephemeral river floodplains and lakes (Figure 14.25). They play important roles in the survival of many rare species of plants and animals. They also attract large numbers of common water birds when the lakes and floodplains are flooded.

No detailed assessment on the inflows of selected wetlands has been performed for this region.

Coongie Lakes wetlands | Paul Wainwright

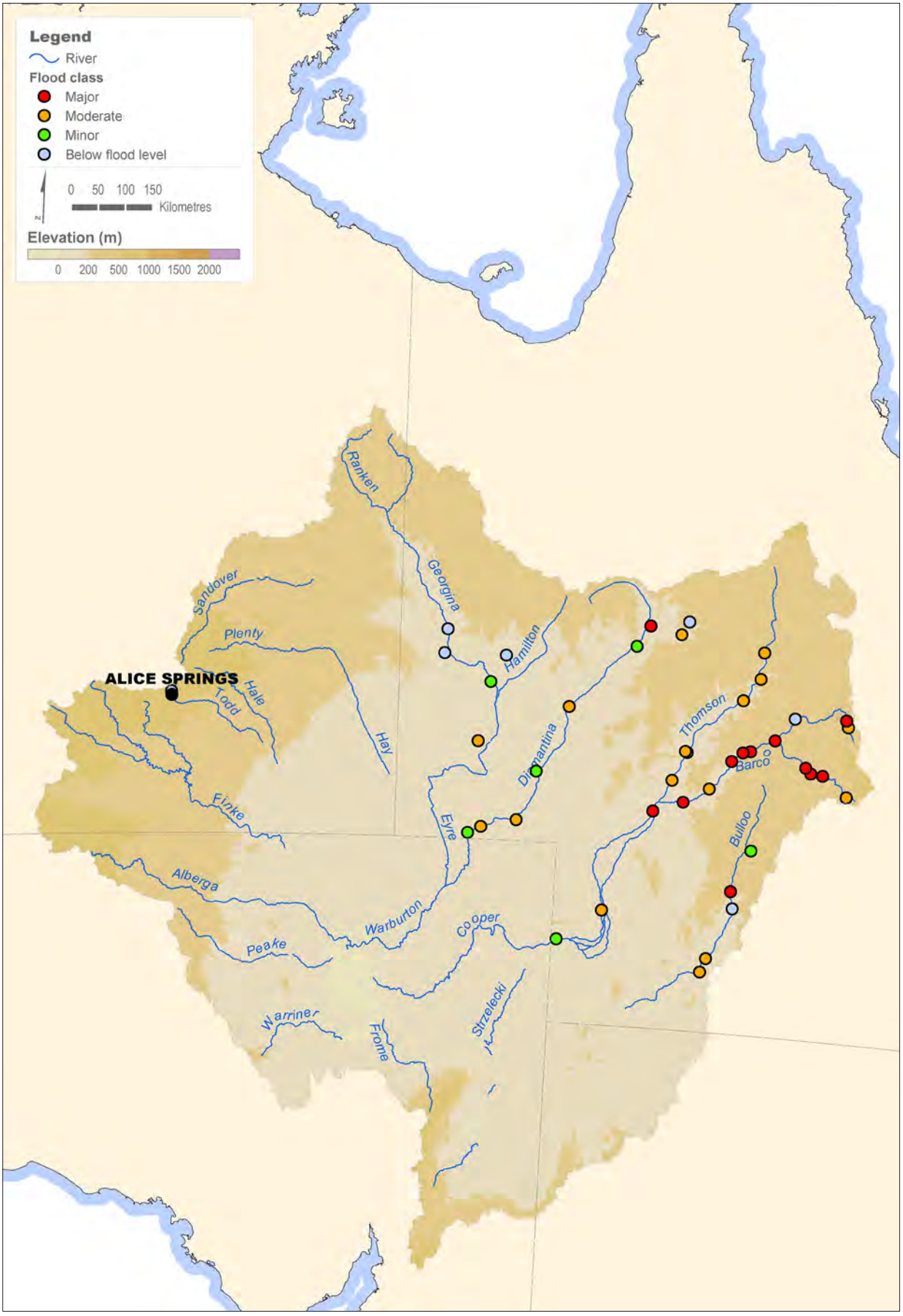


Figure 14.24 Flood occurrences in the Lake Eyre Basin region

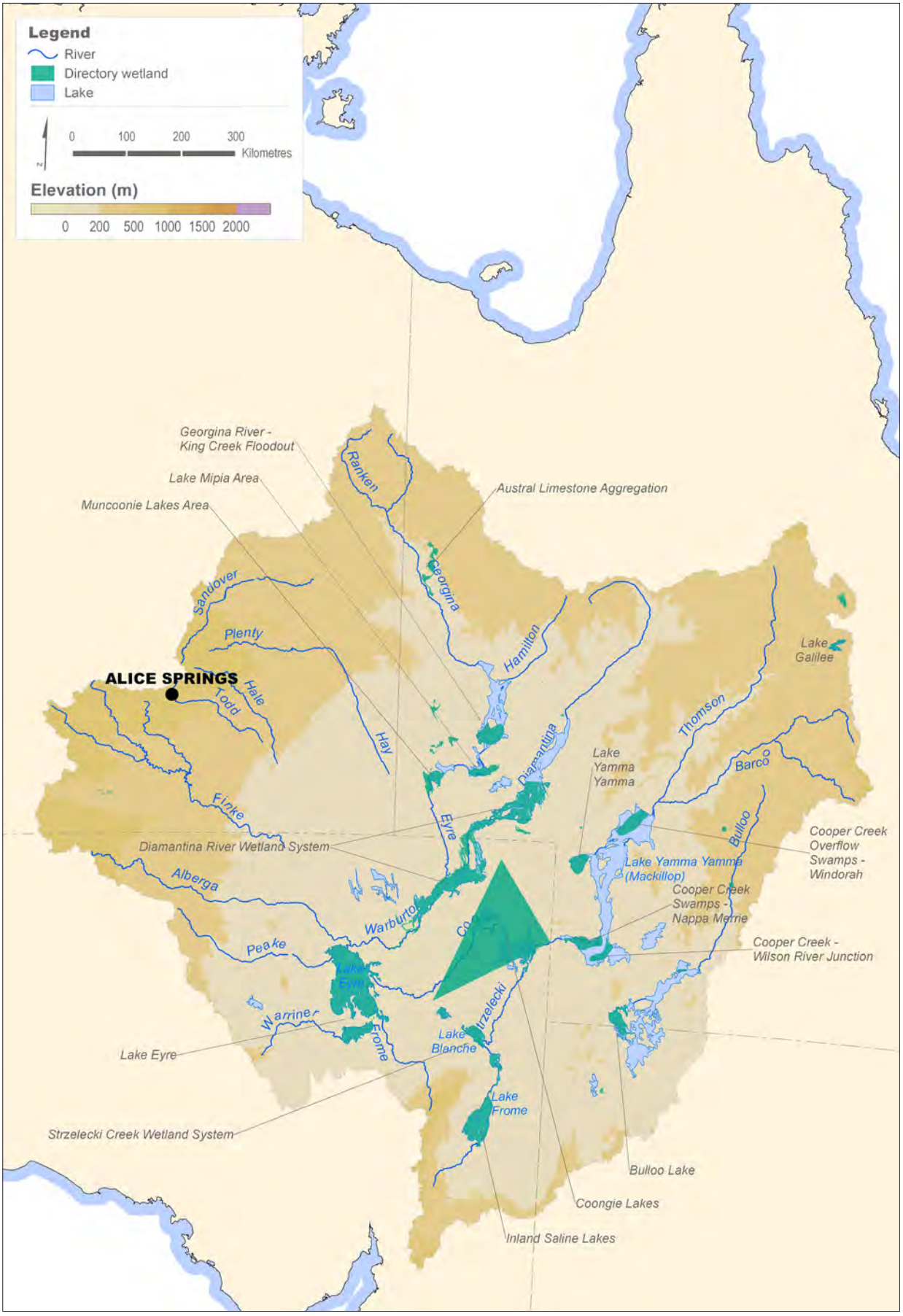


Figure 14.25 Location of important wetlands in the Lake Eyre Basin region

14.5.5 Hydrogeology

The hydrogeology of the region is dominated by the sediments of the Great Artesian Basin with porous sandstone aquifers. Figure 14.26 shows that the Great Artesian Basin underlies the region from the northeast, where the boundaries of both basins closely approximate each other, and extends through to the central and southwest margins. This basin is one of Australia's most significant groundwater basins. The areas identified as Palaeozoic fractured rock (low permeability) in the northwest of this region typically offer restricted low volume groundwater resources.

In contrast, the areas identified as fractured and karstic and Palaeozoic fractured rock (consolidated and partly porous) provide a usable groundwater resource in some parts. These units provide 95% of the town water supply for Alice Springs.

Groundwater systems that provide more potential for extraction are labelled as:

- Fractured and Karstic Rocks (regional) and (local); and
- Mesozoic GAB (porous media—consolidated).

14.5.6 Watertable salinity

Figure 14.27 below shows the classification of watertable aquifers as fresh (total dissolved solids <3,000 mg/L) or saline (TDS ≥3,000 mg/L) water according to water table salinity. There are small areas of no data represented in grey. In general, groundwater has been classified as mainly fresh along the borders of the Northern Territory and New South Wales, and mainly saline in the South Australian border area.

14.5.7 Groundwater management units

The groundwater management units within the region are key features that control the extraction of groundwater through planning mechanisms. Figure 14.28 shows the major groundwater management units that are superimposed on the Great Artesian Basin, that is, Northern Territory, Great Artesian Basin Water Control District; South Australia: Far North Prescribed Wells Area; Queensland: Great Artesian Basin; New South Wales: Great Artesian Basin Cap Rock, and the Karstic and Fractured Rocks resources, that is, Northern Territory: Alice Springs and Queensland: Mount Isa.

Aerial view, Lake Eyre with water | Edstock (iStockphoto)

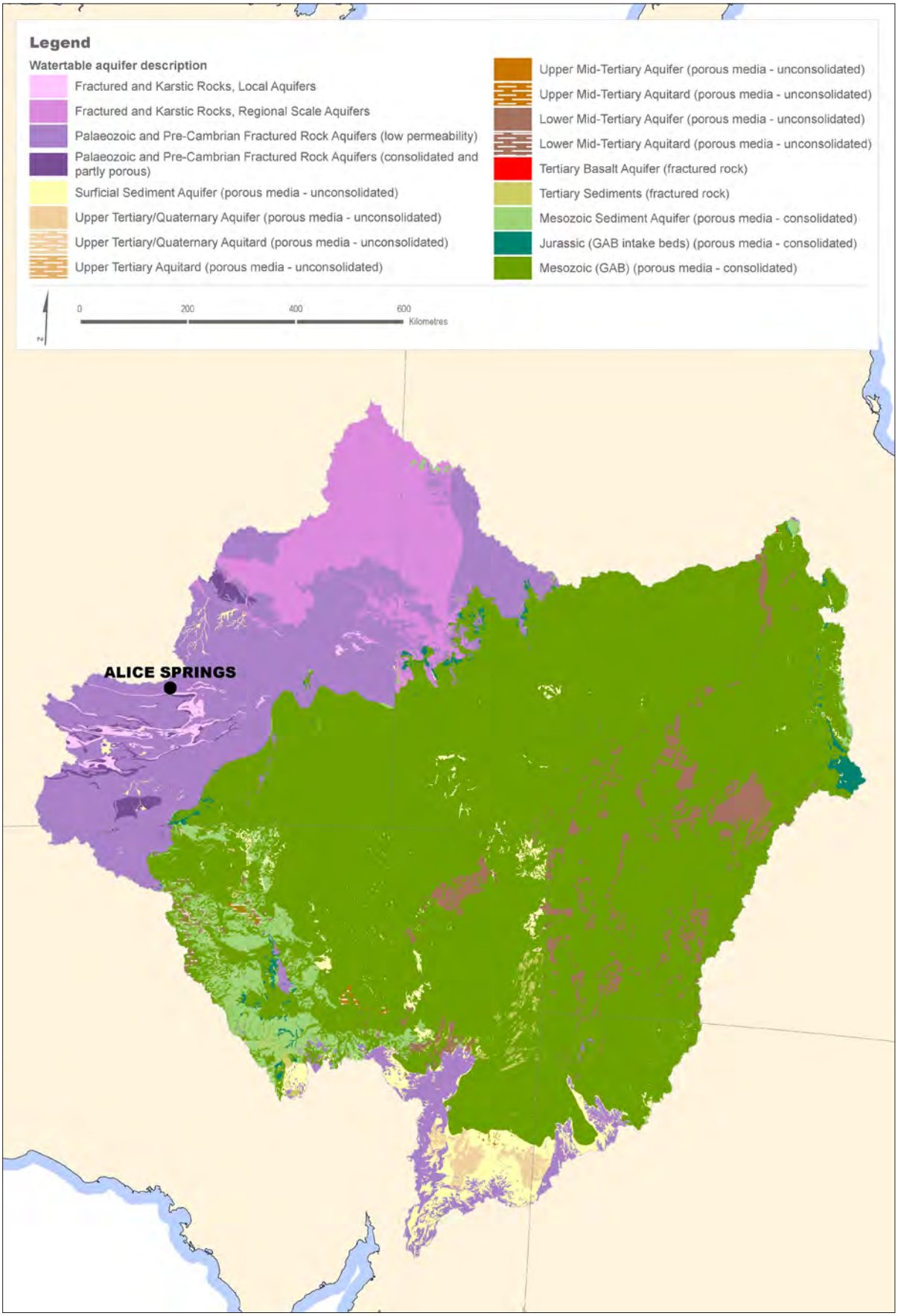


Figure 14.26 Watertable aquifers of the Lake Eyre Basin region; data extracted from the Groundwater Cartography of the Australian Hydrological Geospatial Fabric (Bureau of Meteorology 2012)

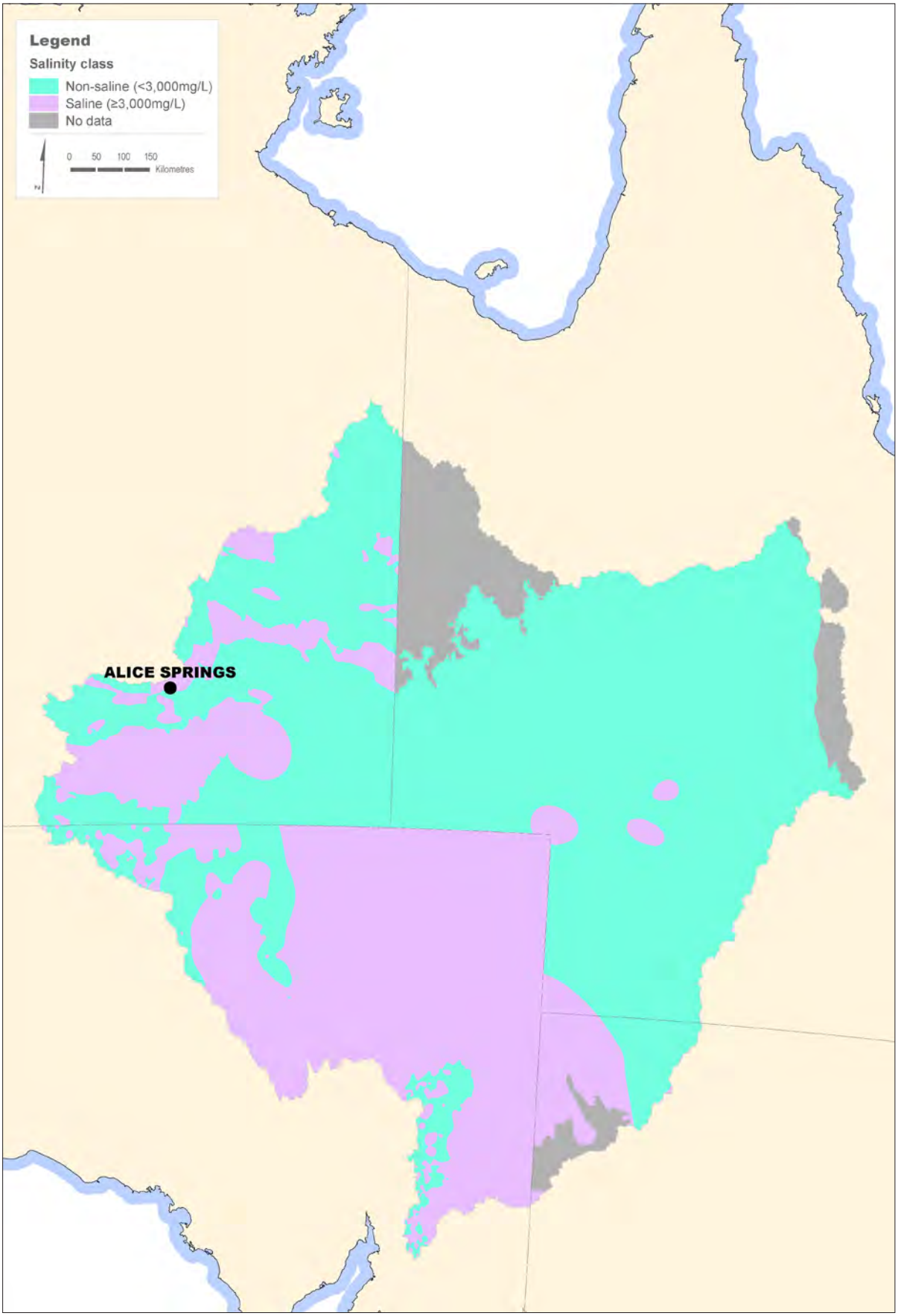


Figure 14.27 Water table salinity classes in the Lake Eyre Basin region; data extracted from the Groundwater Cartography of the Australian Hydrological Geospatial Fabric (Bureau of Meteorology 2012)

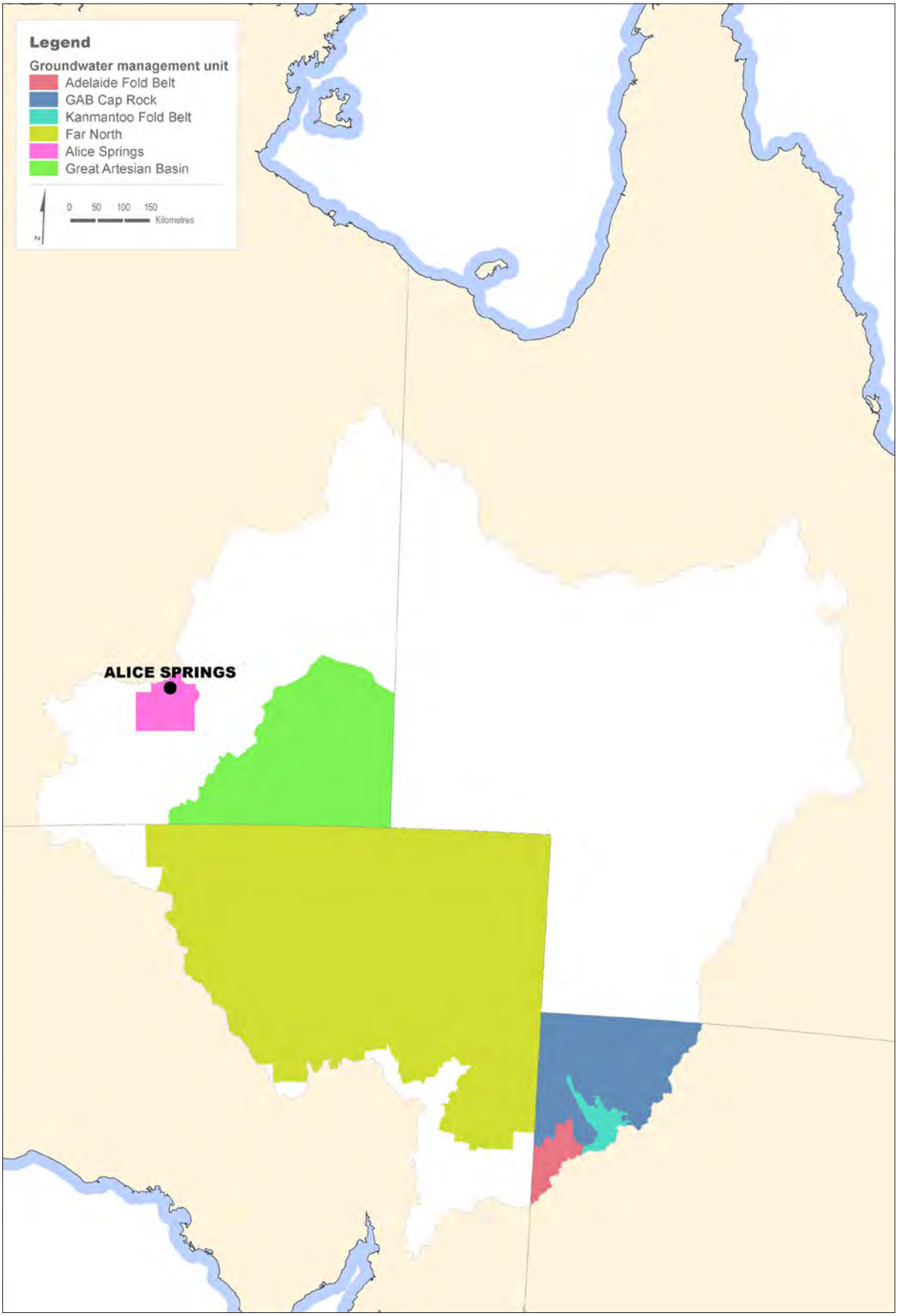


Figure 14.28 Groundwater management units in the Lake Eyre Basin region; data extracted from the National Groundwater Information System (Bureau of Meteorology 2013)