The Rangelands region of Western Australia covers around 226.7 million hectares, of which 40% is under agricultural production. Grazing cattle make up around 80% of the region's agricultural output, with some broadacre cropping, horticulture and wool production. The region contributed around $564 million to the Australian economy in 2017–18. This guide covers the southern Rangelands.

In the last 30 years in the southern Rangelands

- Annual rainfall has increased by 19%
- There has been a change in rainfall distribution, with winter rainfall decreasing and summer rainfall increasing
- Dry years have occurred five times and wet years 15 times
- Rainfall has been unreliable throughout the year
- Changes in evaporation rates have not been consistent across the region
- There have been more hot days, with more consecutive days above 40 °C
- Extreme heat stress days for livestock are increasing

The Rangelands at a glance

The Rangelands region of Western Australia covers around 226.7 million hectares, of which 40% is under agricultural production. Grazing cattle make up around 80% of the region’s agricultural output, with some broadacre cropping, horticulture and wool production. The region contributed around $564 million to the Australian economy in 2017–18. This guide covers the southern Rangelands.

A guide to weather and climate in the Rangelands

Primary producers make decisions using their knowledge and expectations of regional weather patterns. The purpose of this guide is to provide an insight into the region’s climate and an understanding of changes that have occurred through recent periods. This information can potentially assist primary producers and rural communities make better informed decisions for their business and livelihoods. This guide is part of a series of guides produced for every Natural Resource Management area around Australia.
Annual Rainfall

Annual rainfall in the southern Rangelands has increased by around 40 mm (19%) from about 230 mm to about 270 mm over the past 30 years (1989–2018) when compared to the previous 30 years (1959–1988). The charts show annual rainfall (blue bars), with a 10-year running average (solid blue line) for Kalgoorlie and Wiluna.

In the past 30 years (1989–2018), dry years (lowest 30%) have occurred five times and wet years (highest 30%) have occurred 15 times, while the remaining years were in the average range. During the previous 30-year period (1959–1988), dry years occurred 11 times and wet years occurred nine times.

Rainfall reliability maps for the past 30 years (1989–2018) show that rainfall is unreliable (beige and red areas) across all seasons of the year for the majority of the southern Rangelands. The only exception is winter rainfall along the southern coastal region which has been moderately reliable (blue areas).

For more information on future projections, visit the Climate Change in Australia website > [www.climatechangeinaustralia.gov.au](http://www.climatechangeinaustralia.gov.au)


Rangelands rainfall has been unreliable throughout the year

Rainfall reliability maps for the past 30 years (1989–2018) show that rainfall is unreliable (beige and red areas) across all seasons of the year for the majority of the southern Rangelands. The only exception is winter rainfall along the southern coastal region which has been moderately reliable (blue areas).
Rainfall in the summer months increased at Kalgoorlie between 1989–2018 (orange bars) compared with 1959–1988 (blue bars). Over the past 30 years, summer rainfall (October to March inclusive) for Kalgoorlie was 165 mm, 38 mm higher than the 127 mm average for the previous 30-year period (1959–1988). Monthly rainfall averages at Meekatharra and Wiluna (not shown) reveal a similar pattern of summer rainfall over the past 30 years.

Over the same 30-year periods, winter rainfall from April to September was 121 mm at Kalgoorlie, 26 mm lower than the 147 mm average for 1959–1988. Meekatharra and Wiluna (not shown) also experienced decreases in winter rainfall, although the change at Wiluna was not as large. The change in rainfall distribution at Kalgoorlie shows that it has been a more summer dominant rainfall area in the past 30 years.

In Carnarvon, monthly rainfall averages have mostly decreased, but the pattern of distribution has remained fairly consistent between the two 30-year periods. Carnarvon has received more December rain in the past 30 years but this has been offset by a decrease in January and February totals. Overall, summer rainfall totals have remained stable, from 67 mm in 1959–1988 to 65 mm in 1989–2018. Winter season rainfall at Carnarvon decreased slightly over the same period, falling 12 mm from 161 mm to 149 mm.

### Evaporation

Changes in evaporation rates are not consistent across the region

The graphs show the mean monthly evaporation and water balance (rainfall minus evaporation) for Wiluna and Kalgoorlie between 1989-2018 (orange bars) compared with 1959-1988 (blue bars). The southern Rangelands covers a very large, diverse region and average evaporation rates, and changes in evaporation rates, are not consistent across the region. In the past 30 years (1989-2018) at Wiluna, evaporation rates increased across all months of the year. A similar pattern was also observed at Carnarvon. Over the same period, evaporation rates at Kalgoorlie decreased across all months of the year, a pattern that was also observed at Meekatharra.
The Rangelands has experienced more hot days in the past 30 years

The chart shows the annual number of days above 42 °C (red bars), with a 10-year running average (solid red line) for Meekatharra. Meekatharra experienced an average of 11 days per year above 42 °C between 1989–2018, compared to an average of six days per year above 42 °C between 1959–1988. Since 1989, temperatures of 46 °C have been recorded for Meekatharra four times, twice in 2013, and once each in 2015 and 2018. A temperature of 46 °C had not been recorded at Meekatharra prior to 2013. Instances of consecutive days above 40 °C have also been more frequent in the past 30 years. In 2007, 2008 and 2015, Meekatharra experienced three periods of 16 or more days in a row above 40 °C. The longest run was in 2008 and lasted 24 days. A run of 16 or more days above 42 °C is unusual at Meekatharra and had not been recorded before.

Severe to extreme heat stress days for livestock are increasing

THI (temperature humidity index) is a measure of heat stress for animals and humans. The THI charts show the annual number of days with a THI of 80 and above (Moderate-Severe), and 90 or above (Severe), for Wiluna. Wiluna experienced an average of 107 days per year with a THI of 80 or over between 1989–2018, compared to an average of 88 days per year between 1959–1988. Between 1989–2018, Wiluna experienced an average of eight days per year with a THI of 90 or above, compared to an average of less than one day per year between 1959–1988.

Regional Weather and Climate Guides are produced as a partnership between Bureau of Meteorology, CSIRO and FarmLink

© 2019 Bureau of Meteorology and the CSIRO. The information contained in this publication cannot be reproduced without the written permission of Bureau of Meteorology and the CSIRO. Requests and enquiries concerning reproduction and rights should be addressed to the Bureau of Meteorology. DISCLAIMER: The information contained in this publication is offered by the Bureau of Meteorology and CSIRO solely to provide general information. While all due care has been taken in compiling the information, the Bureau of Meteorology and CSIRO and its employees, accept no liability resulting from the interpretation or use of the information. Information contained in this document is subject to change without notice.