



Department of
Agriculture and Food



Report card on sustainable natural resource use in the rangelands

Status and trend in the pastoral rangelands
of Western Australia

Supporting your success

Appendix

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Cover: Cattle grazing on rangeland pasture in the Pilbara



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Shortened forms

Short form	Long form
ARLI	Annual Return of Livestock and Improvements
CC	carrying capacity
Commissioner	Commissioner of Soil and Land Conservation
CU	cattle unit (see Glossary)
DSE	dry sheep equivalent (see Glossary)
ha	hectare; 100ha = 1km ²
ha/CU	hectares per cattle unit
km ²	square kilometres; 1km ² = 100ha
LCD, LCDC	land conservation district, land conservation district committee (see Glossary)
MODIS	Moderate Resolution Imaging Spectroradiometer
NAFI	North Australian Fire Information (firenorth.org.au)
Potential CC	Potential Carrying Capacity (see Glossary)
Present CC	Present Carrying Capacity (see Glossary)
RVCI	Rangeland Vegetation Condition Index
t/ha/y	tonnes per hectare per year
UCL	unallocated Crown land
WARMS	Western Australian Rangeland Monitoring System (see Glossary)

Appendix

Appendix A

Calculating seasonal quality

Assessment method

To calculate seasonal quality, DAFWA uses a scoring system based on long-term rainfall and its seasonal distribution (summer and winter) to indicate site seasonal quality. Seasonal quality provides an indication of the relative value of rainfall over a defined period for vegetation growth as a basic resource for livestock and fauna (forage and shelter) and for soil protection (Bastin & ACRIS 2008). The seasonal quality categories are based on terciles — a division of the rainfall data into three equal groups — derived from interpolated rainfall data for WARMS sites (see ‘Assessing change’ in Section 1.3 and Section 3.2), using the ranked amount of rainfall in the growing season(s) before the monitoring period, compared to the long-term rainfall record.

A single, seasonal quality category to summarise rainfall amounts and season (summer or winter) over the appropriate period is assigned to each monitoring site. Winter is defined as April to September and summer is October to March. Rainfall data are obtained from the gridded rainfall surfaces (bom.gov.au/jsp/awap/rain/archive.jsp) and are defined for a given year or assessment period relative to the long-term rainfall record (1900–2015). To define the terciles, the set of rainfall data for the period under consideration is arranged from lowest to highest and then partitioned into three groups, each containing one-third of the data. For example, if there are 30 years of record, each group would contain 10 years. The lowest third of the data values are defined as the lowest tercile (tercile 3), the middle third are the middle tercile (tercile 2) and the upper third are the upper tercile (tercile 1).

For WARMS grassland sites, summer rainfall is considered more important than winter rainfall for determining site dynamics; for shrubland sites, winter rainfall is considered more important. Individual tercile categories for summer and winter rainfall are used to derive a

combined score for each year. The combined scores for each year over the interval are aggregated to produce a single score for each site. Tercile categories are derived from this aggregate score to provide seasonal quality categories of above average (tercile 1), average (tercile 2) or below average (tercile 3). For grassland sites, the combined score ranges from 1, the worst scenario — a winter tercile 3 (below average) followed by a summer tercile 3 (below average) — to 9, the best scenario — a winter tercile 1 (above average) followed by a summer tercile 1 (above average) (Table A1). The higher the combined score, the more favourable the seasonal quality.

Table A1 Matrix for deriving a combined score for seasonal quality for each year for grassland sites, based on the sequence of winter and summer rainfall

	Winter tercile 1 (Above average)	Winter tercile 2 (Average)	Winter tercile 3 (Below average)
Summer tercile 1 (Above average)	9	8	6
Summer tercile 2 (Average)	7	5	4
Summer tercile 3 (Below average)	3	2	1

For shrubland sites, the combined score ranges from 1, the worst scenario — a summer tercile 3 followed by a winter tercile 3 — to 9, the best scenario — a summer tercile 1 followed by a winter tercile 1 (Table A2). In the transitional zone from summer to winter rainfall dominance, the LCDs of Gascoyne – Ashburton Headwaters, Upper Gascoyne and Wiluna use a slightly different matrix to account for summer rainfall (Table A3). In either situation, the higher the combined score, the more favourable the seasonal quality.

Table A2 Matrix for deriving a combined score for seasonal quality for each year for shrubland sites, based on the sequence of summer and winter rainfall

	Winter tercile 1 (Above average)	Winter tercile 2 (Average)	Winter tercile 3 (Below average)
Summer tercile 1 (Above average)	9	7	3
Summer tercile 2 (Average)	8	5	2
Summer tercile 3 (Below average)	6	4	1

Table A3 Matrix for deriving a combined score for seasonal quality for each year for shrubland sites in the transitional zone, based on the sequence of summer and winter rainfall

	Winter tercile 1 (Above average)	Winter tercile 2 (Average)	Winter tercile 3 (Below average)
Summer tercile 1 (Above average)	9	8	4
Summer tercile 2 (Average)	7	5	2
Summer tercile 3 (Below average)	6	3	1

Seasonal quality can be assessed for individual years, using the 12-month rainfall data for a particular year to indicate the between-year variation. Additionally, a single seasonal quality category can be assessed for a site for a multiyear period, such as the interval between monitoring assessments (see Section 3.2). For multiyear periods, a seasonal quality rating is calculated for each year and these ratings are aggregated to produce a single category for the entire interval between assessments. This category summarises rainfall amounts and timing (winter or summer) over the period between one WARMS site assessment and the next, and assists in interpreting any changes.

For this report, seasonal quality is assessed on a 12-month basis and for one or more monitoring assessment periods.