

Ground cover results



Great Barrier Reef Report Card 2016

Reef Water Quality Protection Plan



Australian Government



Queensland Government

Ground cover results

The ground cover target in the Reef Water Quality Protection Plan 2013 is:

- Minimum 70 per cent late dry season ground cover on grazing lands by 2018.

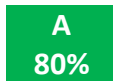
The mean late dry-season ground cover in 2015-16 for grazing lands in the Great Barrier Reef region was above the target at 80 per cent and was slightly above the 29-year mean of 79 per cent. Mean annual rainfall for 2015–16 was 780 millimetres, slightly below the 29-year mean annual rainfall of 807 millimetres.

Much of Queensland remained either wholly or partially drought-declared in the dry season of 2016, including large areas of the Burdekin and Fitzroy regions. El Niño patterns continued into 2016 but rainfall increased from 2015 levels in all regions except for the Burnett Mary. Consequently, mean ground-cover levels increased across most regions but the localised effects of drought may have been more pronounced for some areas.

Scoring system

Grade	Status	Mean ground cover (%) for late dry season 2016	Colour
E	Very poor	0–30%	Red
D	Poor	30–39%	Orange
C	Moderate	40–49%	Yellow
B	Good	50–69%	Light green
A	Very good	70–100%	Dark green

Great Barrier Reef-wide



Target: 70 per cent late-dry-season ground cover by 2018.

Very good: Late-dry-season mean ground cover across the grazing lands was 80 per cent, above the Reef Water Quality Protection Plan target of 70 per cent. The 29-year mean ground cover was 79 per cent.

Approximately 73 per cent of the total land area of the Great Barrier Reef region is reported here as grazing lands.

All reporting regions had mean ground cover levels above the target in 2016, ranging from 74 per cent (Burdekin) to 90 per cent (Mackay Whitsunday). The area below the 70 per cent target was 19 per cent in 2016, compared with 23 per cent over the 29-year period (Table 1).

Table 1: Ground cover results for the Great Barrier Reef catchment and regions

Region	29-year mean ground cover (%)	2016 mean ground cover (%)	Area with less than 70% ground cover averaged over past 29 years (%)	Area with less than 70% ground cover in 2016 (%)
Cape York	85	87	13	13
Wet Tropics	87	88	6	4
Burdekin	75	74	33	33
Mackay Whitsunday	89	90	5	3
Fitzroy	80	84	20	8
Burnett Mary	86	84	7	8
Total Great Barrier Reef	79	80	23	19

The ground cover frequency distribution for the Great Barrier Reef region provides a visual representation of the results (Figure 1). The proportion of the region with less than 70 per cent cover is shaded blue and labelled '19%'. The frequency distribution of the long-term mean ground cover levels is displayed as the dashed line, and the 2016 frequency distribution of ground cover levels as the solid line. The median of the long-term mean and 2016 cover are presented (vertical dashed and solid lines, respectively), with the actual median value in 2016 (83 per cent) shown in red at the base of the solid line.

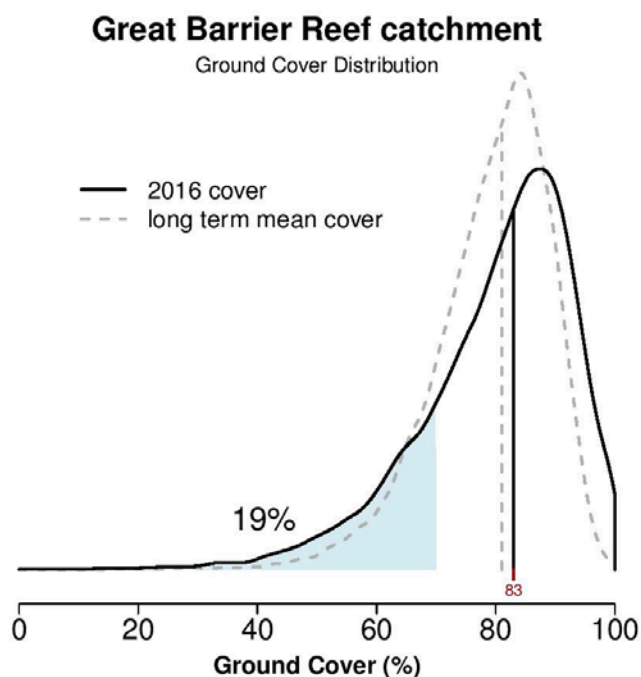


Figure 1: Great Barrier Reef catchment ground cover frequency distribution for late dry season 2016 (solid line) and the long-term mean (dashed line)

Ground cover changes over time

The mean ground cover across the Reef region had been declining between 2010 and 2015, but has increased in this reporting period from 77 per cent in 2015 to 80 per cent in 2016. The very high rainfall of 2010 and 2011 resulted in a very high proportion of the region being above 70 per cent ground cover, and the subsequent drier years had resulted in a decrease in mean ground cover. Historically, the years with the lowest ground cover were 1987–1988, 1994, 2004 and 2006. During these years, mean ground cover for the region was just over 70 per cent and the percentage of area with mean ground cover below 70 per cent was in the range of 37 to 41 per cent (Figures 2 and 3). These years had low mean annual rainfall in preceding years.

Mean annual rainfall in 2016 was slightly above the 29-year mean for the Fitzroy region, and slightly below the mean for the Burdekin, Mackay Whitsunday, Burnett Mary and Cape York regions (Table 2; Figure 4). The Wet Tropics was further below the 29-year mean than the other regions (257 millimetres below the 29-year mean); however, the region has a relatively high 29-year mean annual rainfall (1877 millimetres) (Table 2; Figure 4).

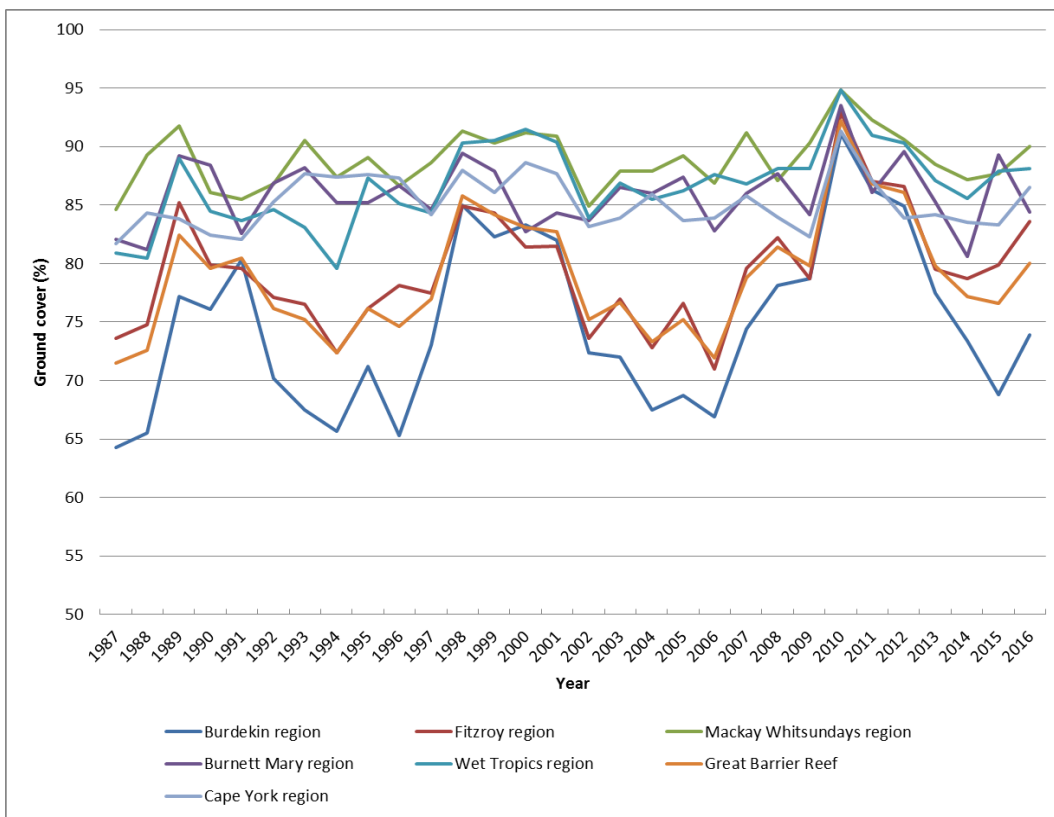


Figure 2: Great Barrier Reef regions – mean late-dry-season ground cover (1987–2016). Note the scale on the y-axis is between 50 per cent and 100 per cent ground cover

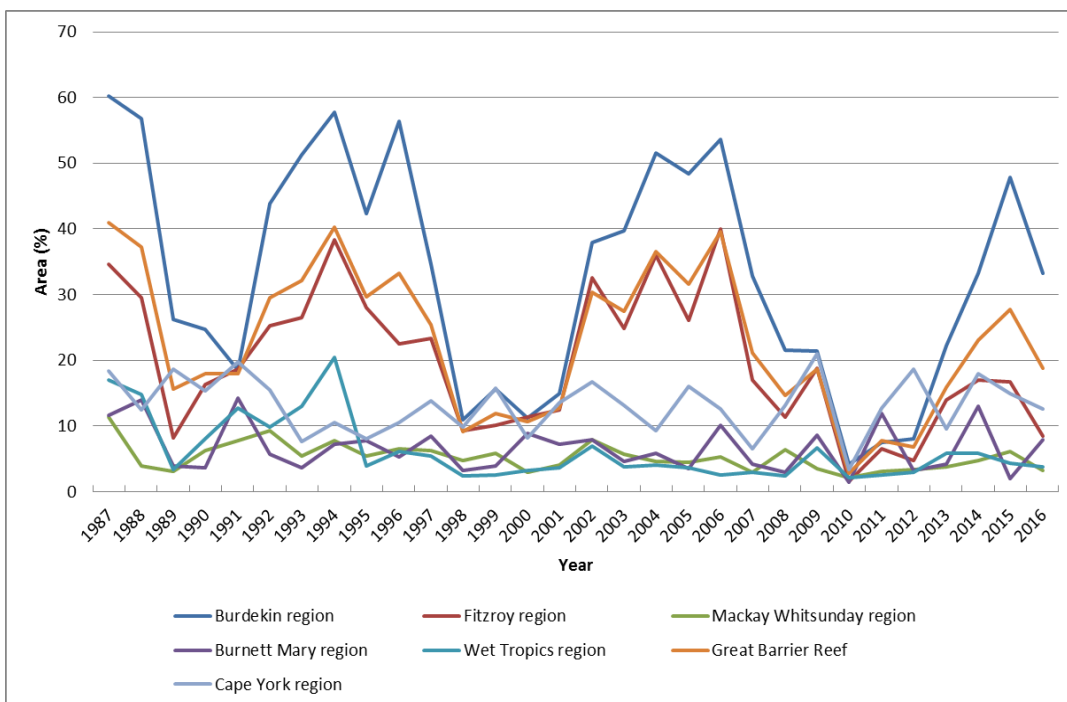


Figure 3: Great Barrier Reef regions – percentage area with ground cover below 70 per cent (1987–2016)

Regions with generally high average annual rainfall have consistently high levels of ground cover. For example, the Mackay Whitsunday, Wet Tropics, Burnett Mary and Cape York regions had mean ground cover greater than or equal to 85 per cent over the 29-year period. In addition, the area with mean ground cover below 70 per cent for these regions has been less than 21 per cent for the entire monitoring period. In comparison, regions with lower, more variable annual rainfall (e.g. Fitzroy and Burdekin) show greater fluctuations in ground cover over time. In these regions, mean ground cover declines in drier years, increasing the area which is below the 70 per cent ground cover target.

It is interesting to note that in these regions, in general, a prolonged time lag follows the end of a wet period before larger areas of lower ground cover appear, because reserves of ground cover diminish and are not replaced by new growth due to the lack of rainfall. However, the ground cover returns to higher levels comparatively quickly following significant rainfall after a dry period. These lags and the response time after rainfall can be influenced by a range of factors including stocking rates during wet and dry periods, localised climate effects, soil type, land condition and pasture composition.

Although ground cover is above the target in all regions, sediment loads can still be affected by localised sources of sediment such as over-grazed patches, and erosion features such as gullies, scalds and unstable streambanks, particularly during localised heavy rainfall.

Table 2: Rainfall data for the Great Barrier Reef catchment and regions

Region	29-year mean rainfall (mm)	2016 mean annual rainfall (mm)	2016 difference from 29-year mean annual rainfall (mm)
Cape York	1266	1176	-90
Wet Tropics	1877	1620	-257
Burdekin	637	588	-49
Mackay Whitsunday	1517	1493	-24
Fitzroy	658	702	44
Burnett Mary	797	759	-38
Total Great Barrier Reef	807	780	-27

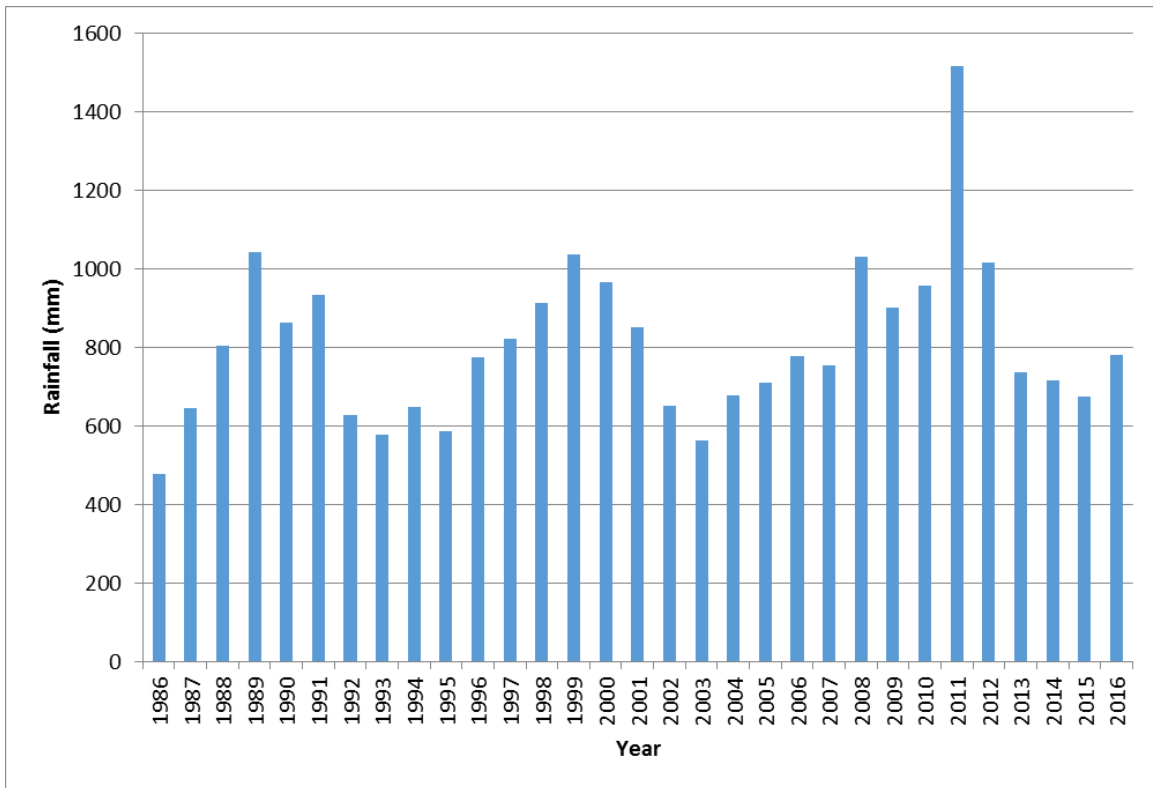


Figure 4: Mean annual rainfall (mm) for the Great Barrier Reef catchment (1986–2016). Note that a year is from October to September to align with late-dry-season reporting.

Ground cover in the regions

The percentage of ground cover for each of the regions in 2016 is shown in Figure 5. Most of the Burdekin region remained drought-declared in the spring of 2016 and this is reflected in the fact that about one-third of the region fell below the target. It highlights the importance of drought management strategies in grazing systems to maintain cover in drier periods, preventing degradation and erosion when heavy rainfall occurs at the break-of-season and/or the end of the drought conditions.

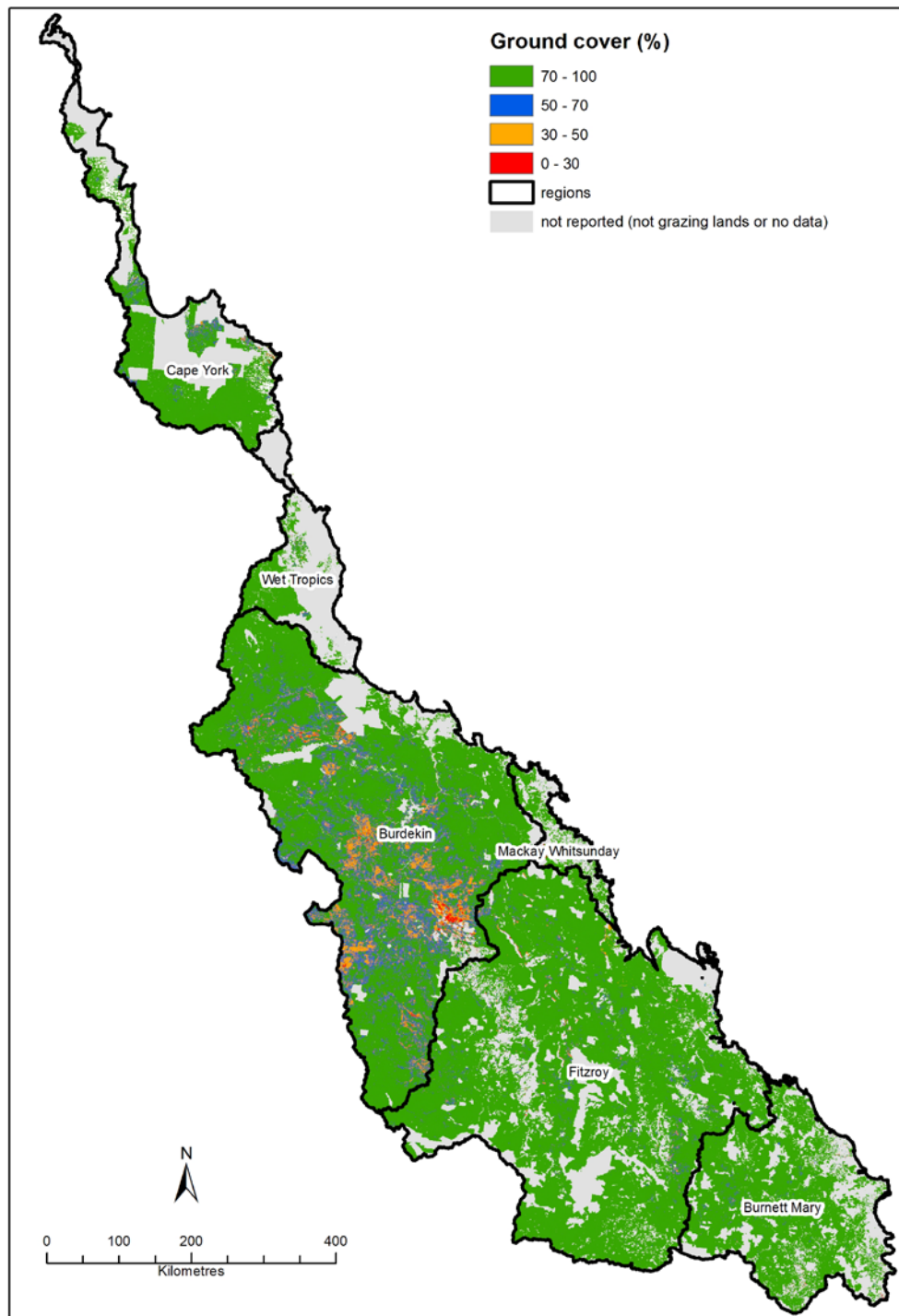


Figure 5: Late-dry-season ground cover levels in 2016 for Reef grazing lands

The map of ground cover deciles (Figure 6) shows the spring 2016 ground cover in comparison to the long-term (1988–2012 baseline) spring ground cover. Red indicates where ground cover is in the lowest deciles (i.e. the lowest level of ground cover experienced in that location relative to the baseline) while blue shows locations where ground cover is at the highest levels (or deciles) it has been relative to the baseline period. This map can be used as a guide to indicate areas of concern or improvement, or conversely, those areas that had good ground cover levels in 2016.

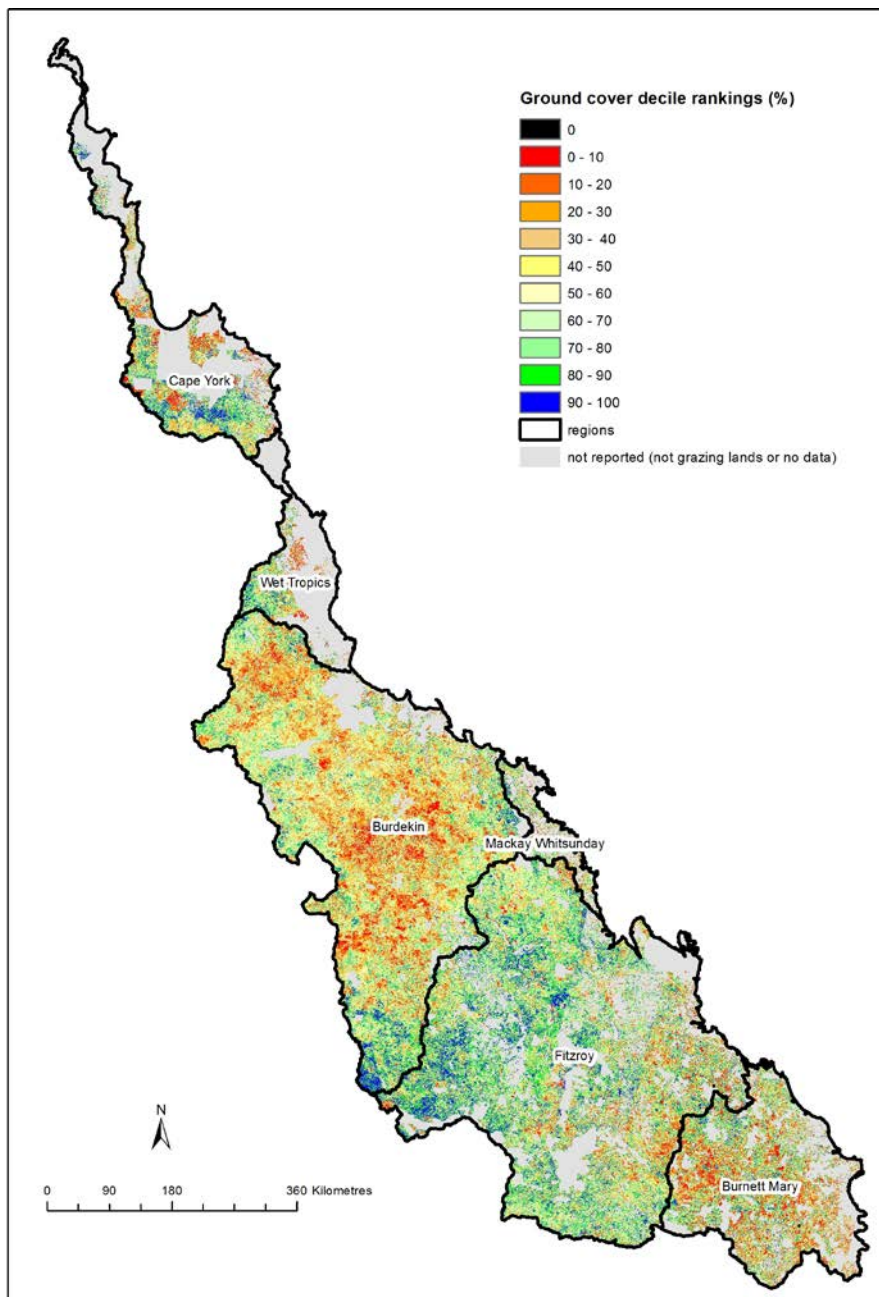


Figure 6: Ground cover decile rankings for Great Barrier Reef catchments. This map shows spring 2016 ground cover in comparison to the long-term (1988–2012 baseline) spring cover. The lowest decile (red) indicates where ground cover was at the lowest level relative to the baseline period, and the highest decile (blue) indicates where ground cover was at the highest level relative to the baseline period.

Figure 6 shows that large parts of the Burdekin region, parts of the Fitzroy and Burnett Mary, and patches of the Wet Tropics, Mackay Whitsunday and Cape York regions had very low cover compared to long-term levels in those areas. Ground cover levels in 2016 were very high (compared to the long-term levels) in the western parts of the Fitzroy, far southern Burdekin, southern Cape York and patches of the Wet Tropics and Mackay Whitsunday regions.

An overview of each of the regions is provided below.

Cape York

A
87%

Target: 70 per cent late dry season ground cover by 2018.

Very good: Late-dry-season mean ground cover across grazing lands was 87 per cent.

Table 3: Ground cover results for the Cape York region and catchments

Region	29-year mean ground cover (%)	2016 mean ground cover (%)	Area with less than 70% ground cover averaged over past 29 years (%)	Area with less than 70% ground cover in 2016 (%)
Olive–Pascoe	85	90	16	8
Lockhart	84	84	17	16
Normanby	86	88	12	9
Jeannie	81	75	23	39
Endeavour	86	89	12	9
Stewart	85	79	17	32
Cape York region (excluding Jacky Jacky catchment)	85	87	13	13

The ground cover frequency distribution for Cape York (Figure 7) provides a visual representation of the results. The proportion of the region with less than 70 per cent cover is shaded blue and labelled '13%'. The median value in 2016 (91 per cent) is shown in red at the base of the solid line. Figure 7 shows that the general frequency distribution of ground cover across the Cape York region was higher than the long-term mean frequency distribution; this is also reflected in the mean ground cover level for 2016, being 2 per cent above the 29-year mean.

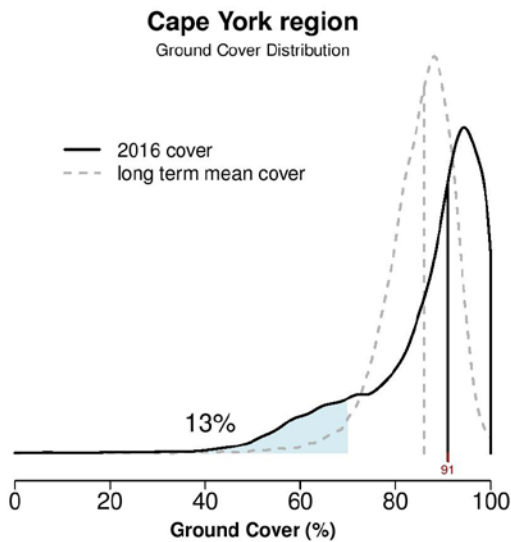


Figure 7: Cape York ground cover frequency distribution for late dry season 2016 (solid line) and the long-term mean (dashed line)

The percentage of ground cover for the Cape York region and catchments is shown in Figure 8.

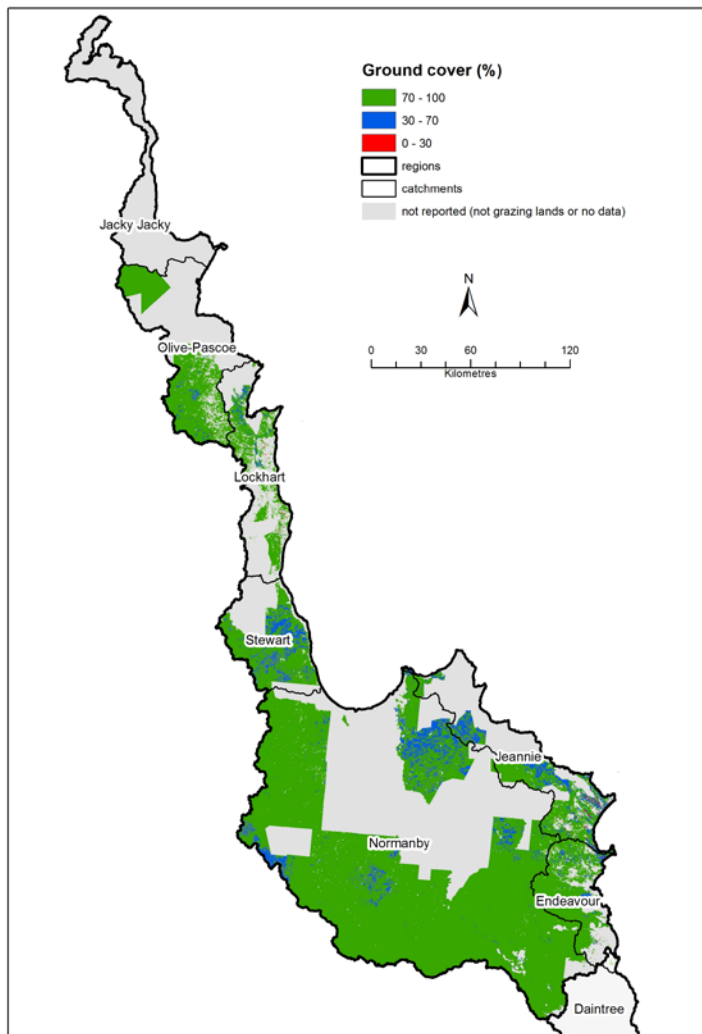


Figure 8: Late-dry-season ground cover levels in 2016 for the Cape York region grazing lands

The Cape York region had mean ground cover of 87 per cent in 2016 and consistently high mean ground cover from 1987 to 2016 with a 29-year mean ground cover level of 85 per cent. The proportion of grazing lands falling below the target of 70 per cent ground cover was 13 per cent in 2016, and 13 per cent for the 29-year period (Table 3 and Figure 7).

However, this proportion has fluctuated quite considerably over time, particularly for individual catchments. For example, the area below the 70 per cent target in the Jeannie catchment was 14 per cent in 1990, and 44 per cent in 1991. In this instance, a large fire was found to have occurred during 1991, causing significant loss of ground cover at the time of monitoring. In the Endeavour catchment, the decline in mean ground cover and increase in area under 70 per cent for 2014 was also due to fire. Fire scars were also evident at the time of reporting in 2016 in some areas of lower ground cover across Cape York. In general, the ground cover responds quickly after fire in this region, although repeated burning of some locations can expose the soil to rainfall and also lead to a shift in ground cover and woody vegetation dynamics and species composition, which can affect erosion rates and productivity. Appropriate fire management regimes can help to address these potential issues.

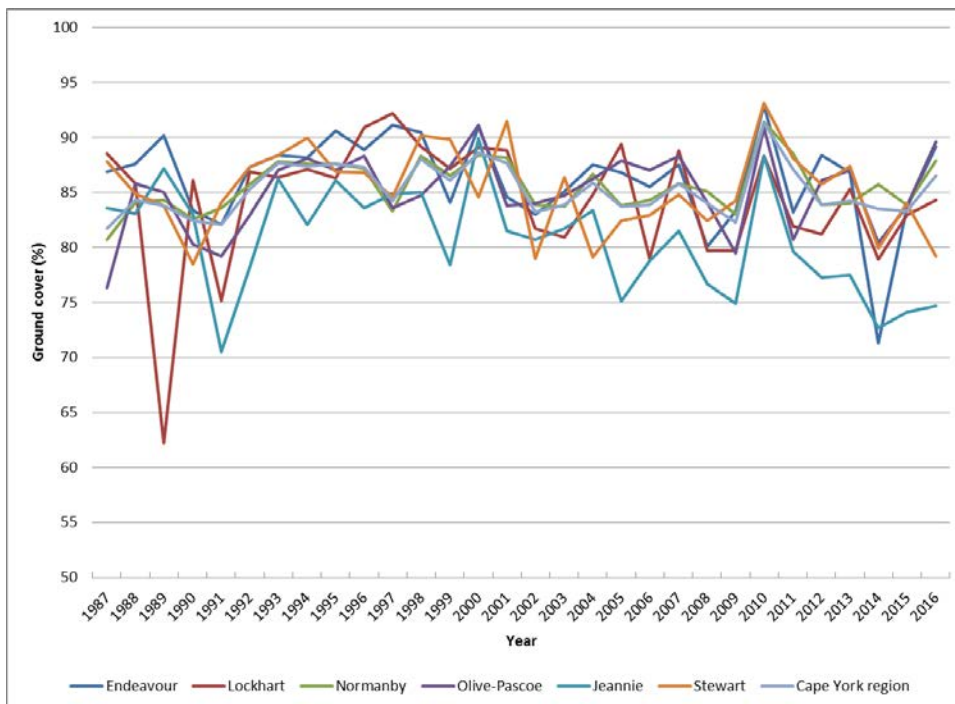


Figure 9: Cape York region and catchments - mean late-dry-season ground cover. Note the scale on the y-axis is between 50 per cent and 100 per cent ground cover.

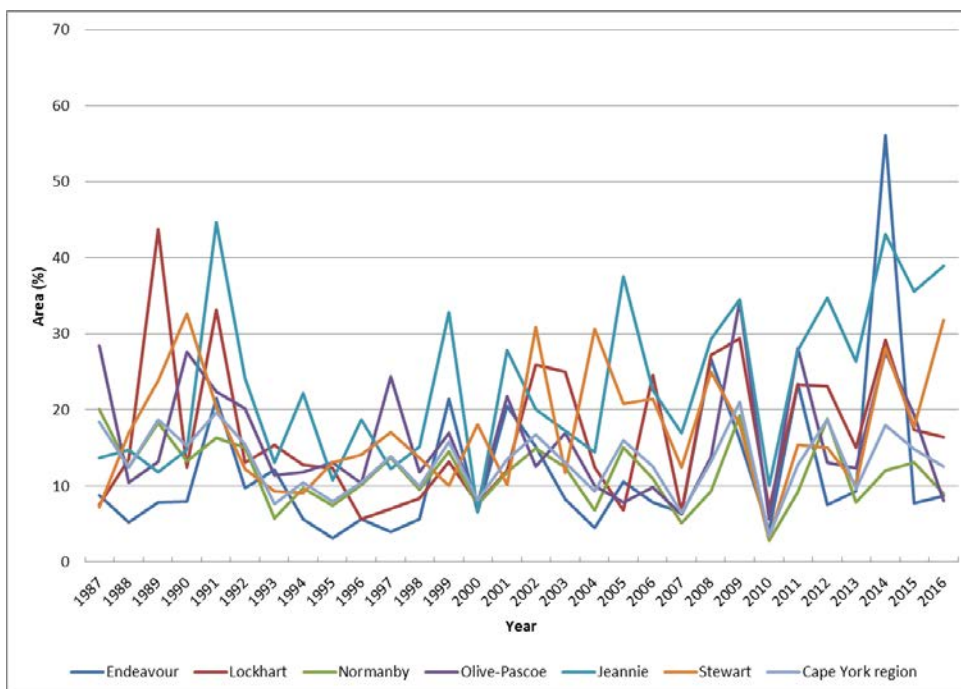


Figure 10: Cape York region and catchments - percentage area with ground cover below 70 per cent (1987–2016)

The map of ground cover deciles for the Cape York region (Figure 11) shows the spring 2016 ground cover in comparison to the long-term spring ground cover (1988–2012 baseline). Some of the large areas of red in the Normanby, Stewart, Jeannie and Endeavour catchments are the result of fires that occurred in 2014, 2015 and 2016.

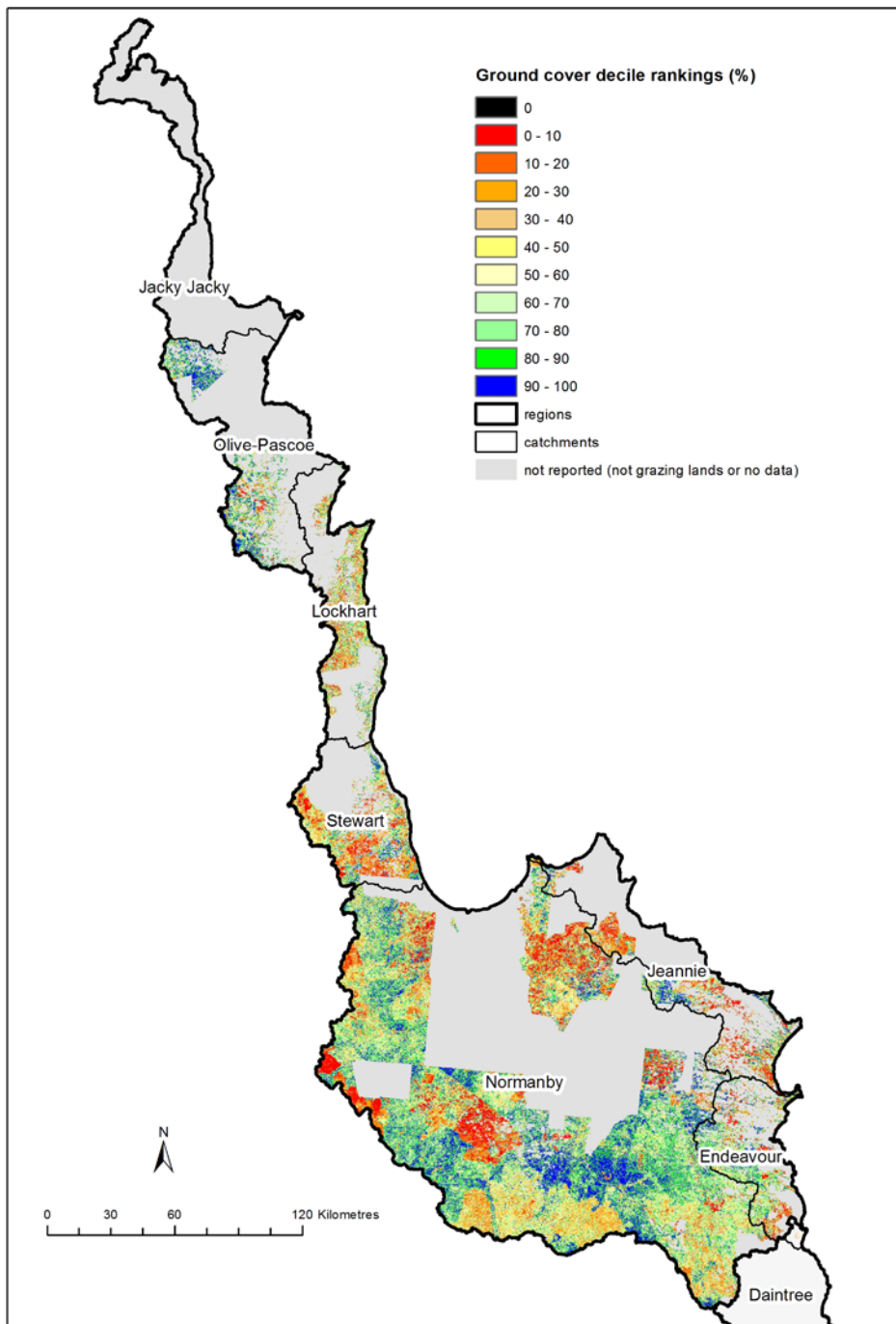


Figure 11: Cape York region ground cover decile rankings. This map shows spring 2016 ground cover in comparison to the long-term spring cover (1988–2012 baseline). The lowest decile (red) indicates where ground cover was at the lowest level relative to the baseline period, and the highest decile (blue) indicates where ground cover was at the highest level relative to the baseline period.

The Cape York region is the third wettest of the areas reported (1266 millimetres mean annual rainfall). Rainfall in 2015 was below the mean at 1023 millimetres, and again in 2016 (1176 millimetres) (Figure 12).

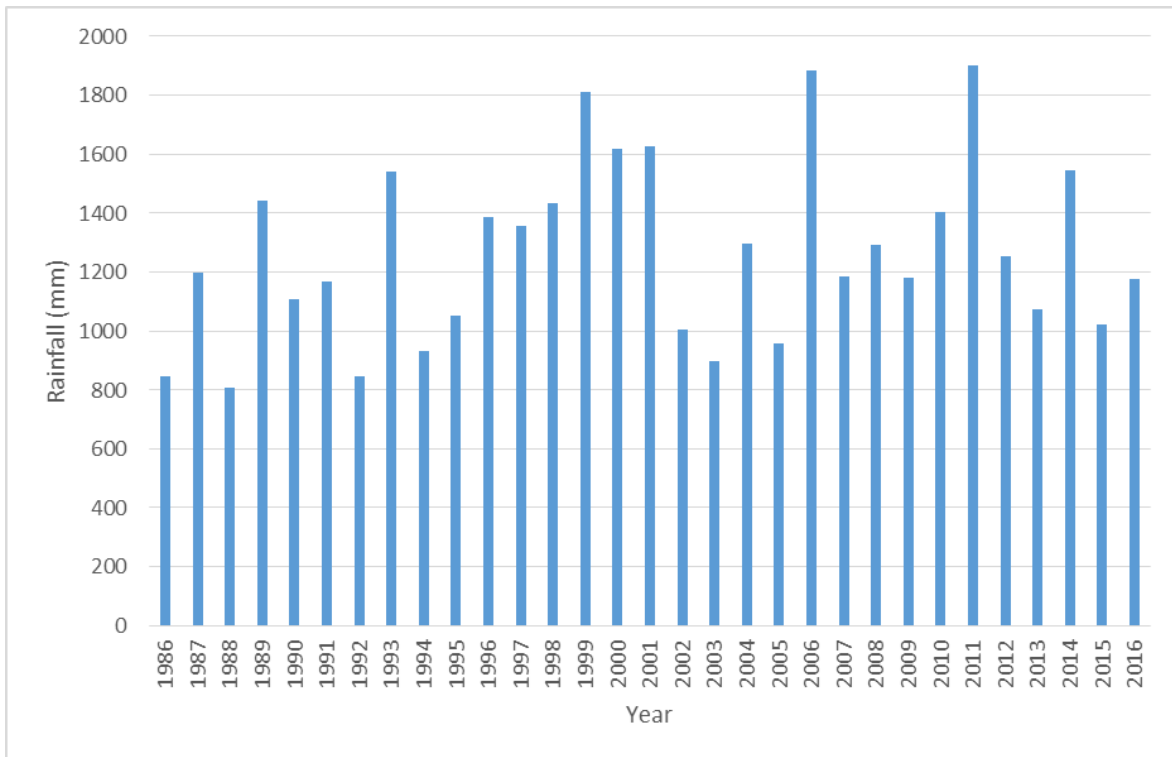


Figure 12: Mean annual rainfall for Cape York region (1986–2016). Note that a year is from October to September to align with late-dry-season reporting.

Wet Tropics

A
88%

Target: 70 per cent late dry season ground cover by 2018.

Very good: Late-dry-season mean ground cover across grazing lands was 88 per cent.

Table 4: Ground cover results for the Wet Tropics region and catchments

Region	29-year mean ground cover (%)	2016 mean ground cover (%)	Area with less than 70% ground cover averaged over past 29 years (%)	Area with less than 70% ground cover in 2016 (%)
Herbert	87	89	6	3
Johnstone	78	76	20	21
Barron	86	84	9	10
Wet Tropics region (Herbert, Johnstone and Barron only)	87	88	6	4

The ground cover frequency distribution for the Wet Tropics (Figure 13) provides a visual representation of the results. The proportion of the region with less than 70 per cent cover is shaded blue and labelled '4%'. The median value in 2016 (90 per cent) is shown in red at the base of the solid line. The frequency distribution of ground cover in 2016 was higher than the long-term frequency distribution, indicating slightly higher ground cover levels across the region in 2016.

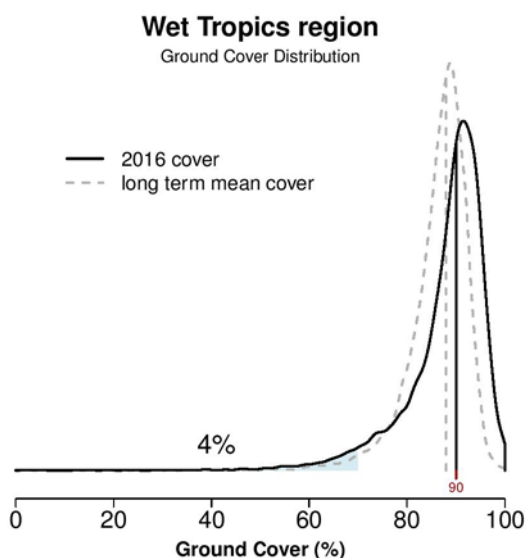


Figure 13: Wet Tropics ground cover distribution for late dry season 2016 (solid line) and the long-term mean (dashed line)

The percentage of ground cover for the Wet Tropics region and catchments is shown in Figure 14.

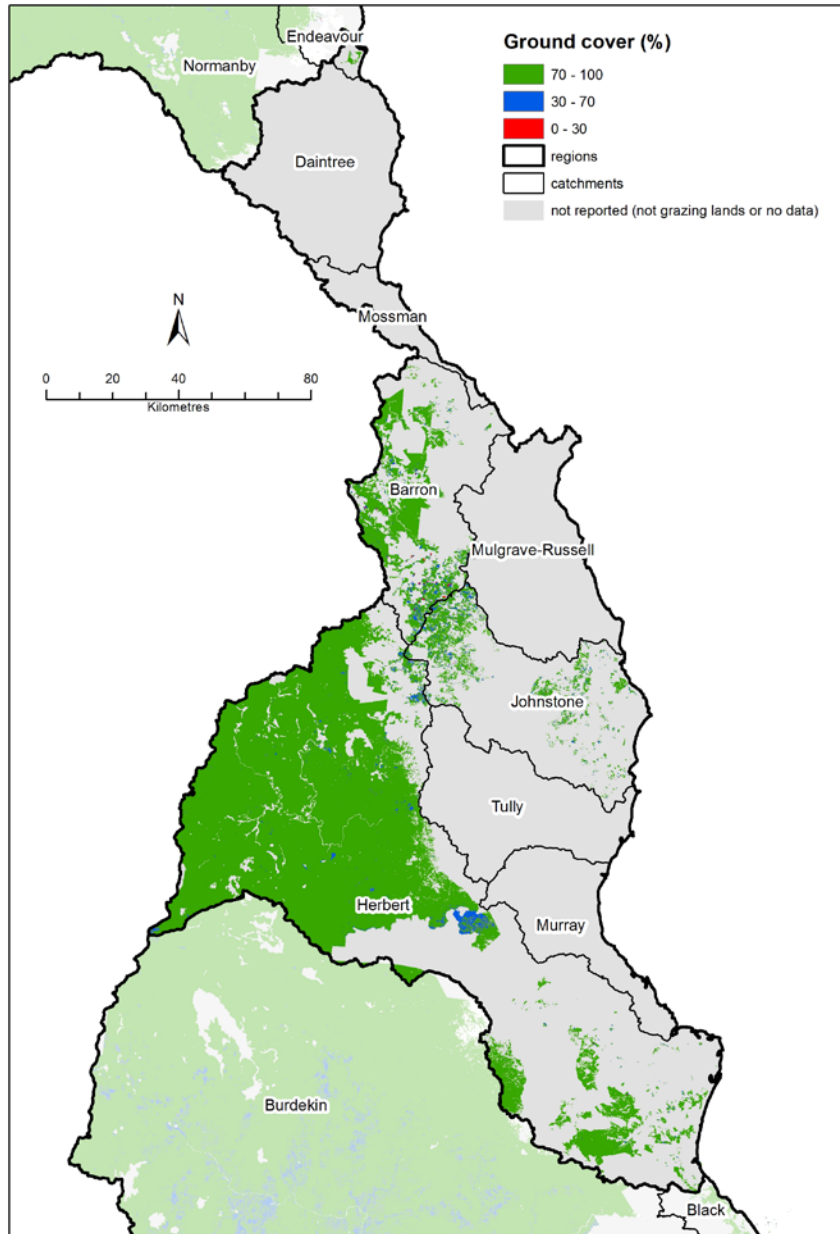


Figure 14: Late-dry-season ground cover levels in 2016 for the Wet Tropics region grazing lands

The Wet Tropics region had mean ground cover of 88 per cent in 2016 and consistently high mean ground cover (87 per cent) from 1987 to 2016. The minimum mean ground cover during this period was 80 per cent in 1994. The proportion of grazing lands falling below the target of 70 per cent was also consistently low with a mean of 4 per cent for 2016 and 6 per cent over the 29-year period (Table 4 and Figure 13). Only the grazing lands of the Herbert, Barron and Johnstone catchments were reported on in this region as the other catchments in the Wet Tropics had less than 10 per cent grazing lands.

Within the region, the Herbert and Barron catchments are well above the target for both the 29-year mean and 2016 results. The Johnstone catchment tends to fluctuate more, with the lowest mean ground cover recorded in 2014 at 65 per cent and the highest recorded in 2001 at 85 per cent. Mean ground cover for the Johnstone catchment was 76 per cent in 2016.

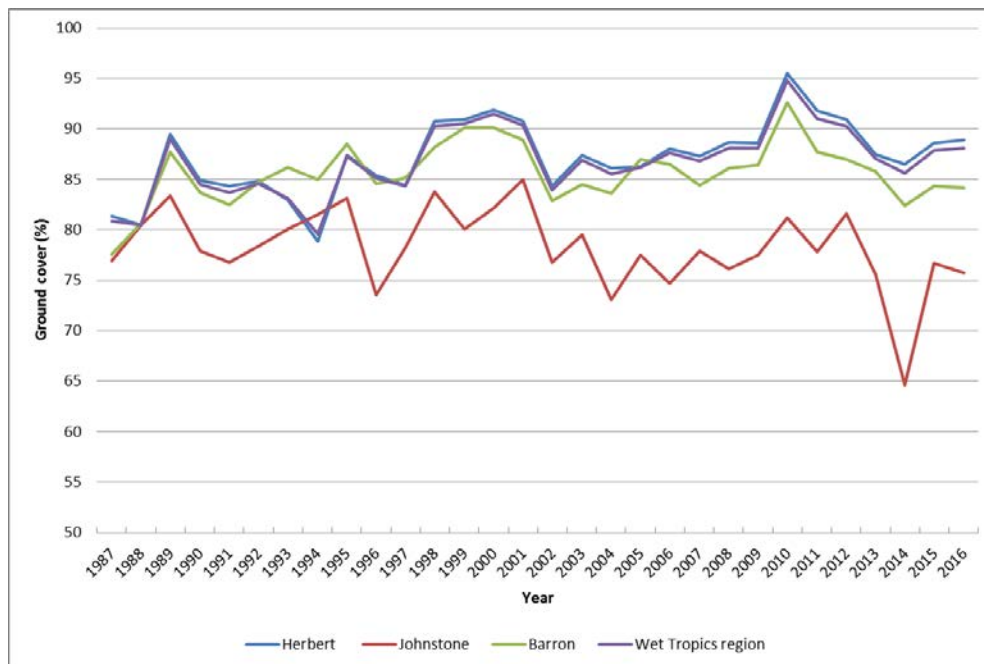


Figure 15: Wet Tropics region and catchments - mean late-dry-season ground cover. Note the scale on the y-axis is between 50 per cent and 100 per cent ground cover.

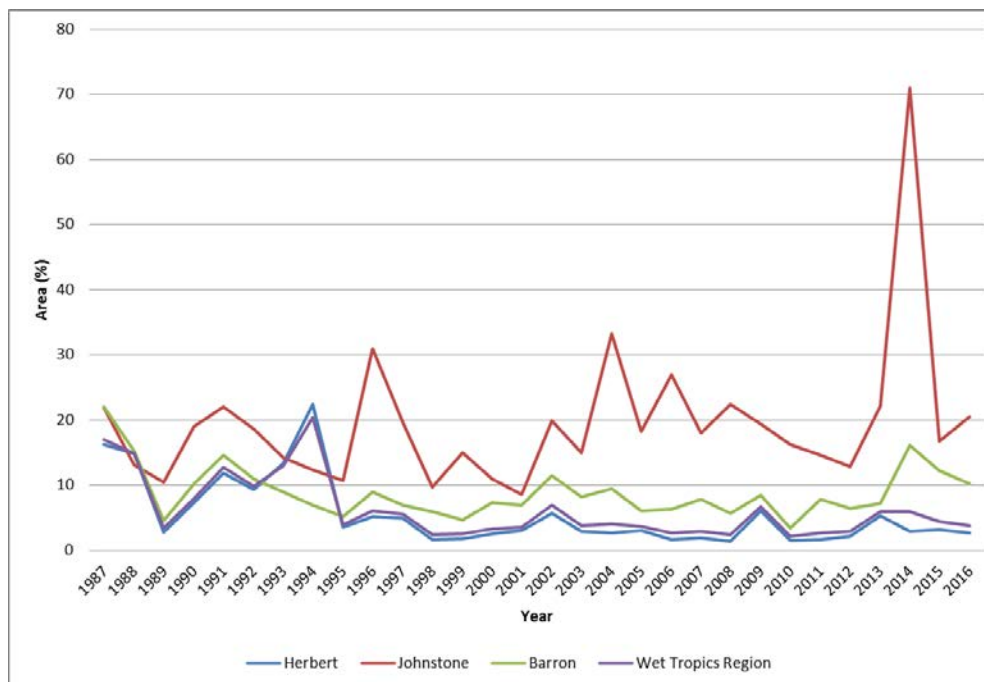


Figure 16: Wet Tropics region and catchments - percentage area with ground cover below 70 per cent (1987–2016)

The map of ground cover deciles (Figure 17) shows the spring 2016 ground cover in comparison to the long-term spring ground cover (1988–2012 baseline). Only the Herbert, Barron and Johnstone catchments were reported on as the other catchments in the Wet Tropics had less than 10 per cent grazing land. This map shows that, while the Johnstone exceeded the target for 2016, much of the grazing lands in the upper catchment were at some of the lowest levels of ground cover relative to the long-term baseline.

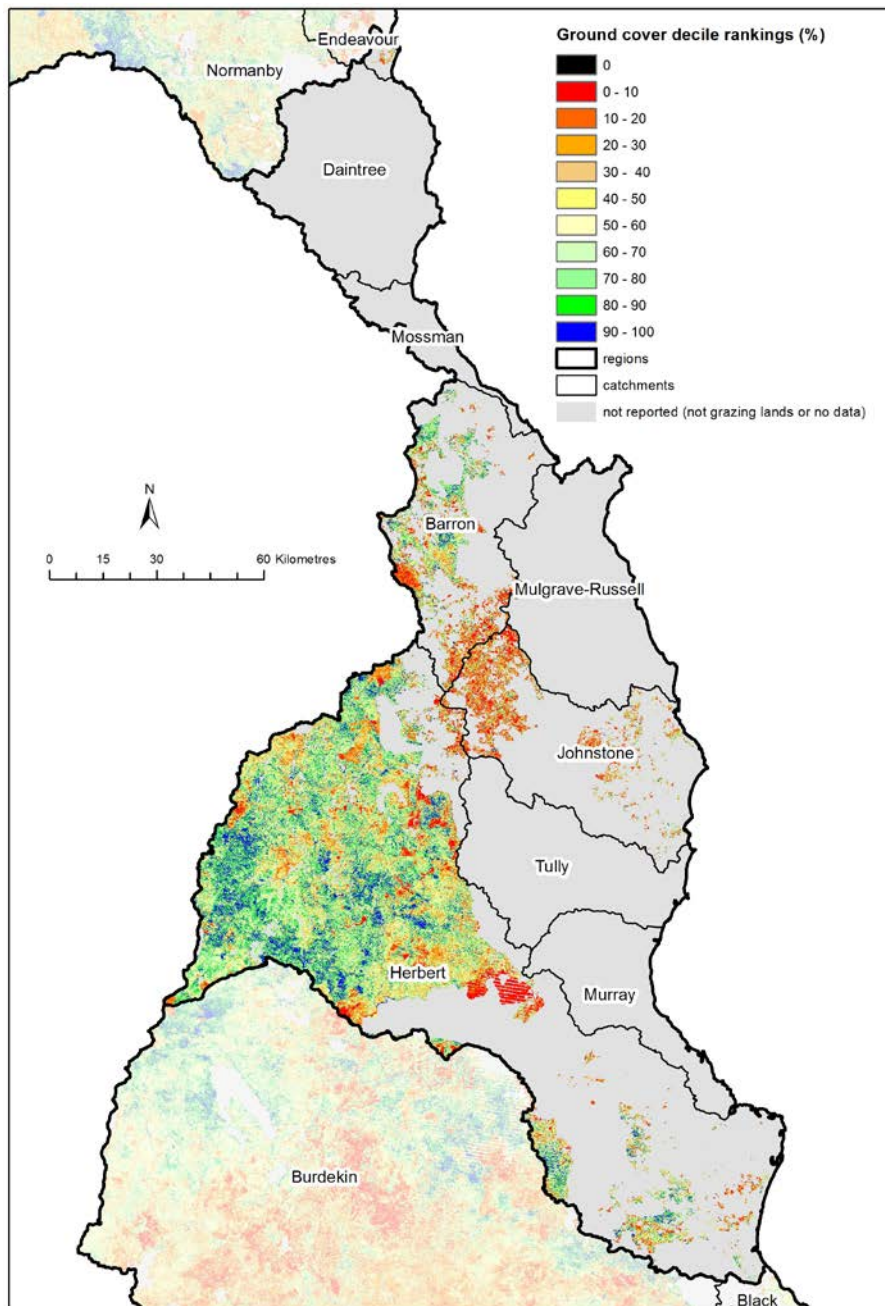


Figure 17: Wet Tropics region ground cover decile rankings. This map shows spring 2016 ground cover in comparison to the long-term spring cover (1988–2012 baseline). The lowest decile (red) indicates where ground cover was at the lowest level relative to the baseline period, and the highest decile (blue) indicates where ground cover was at the highest level relative to the baseline period.

The Wet Tropics is the wettest of all the regions (1877 millimetres mean annual rainfall). Rainfall in 2015 was below the mean at 1255 millimetres, and again in 2016 (1620 millimetres) (Figure 18).

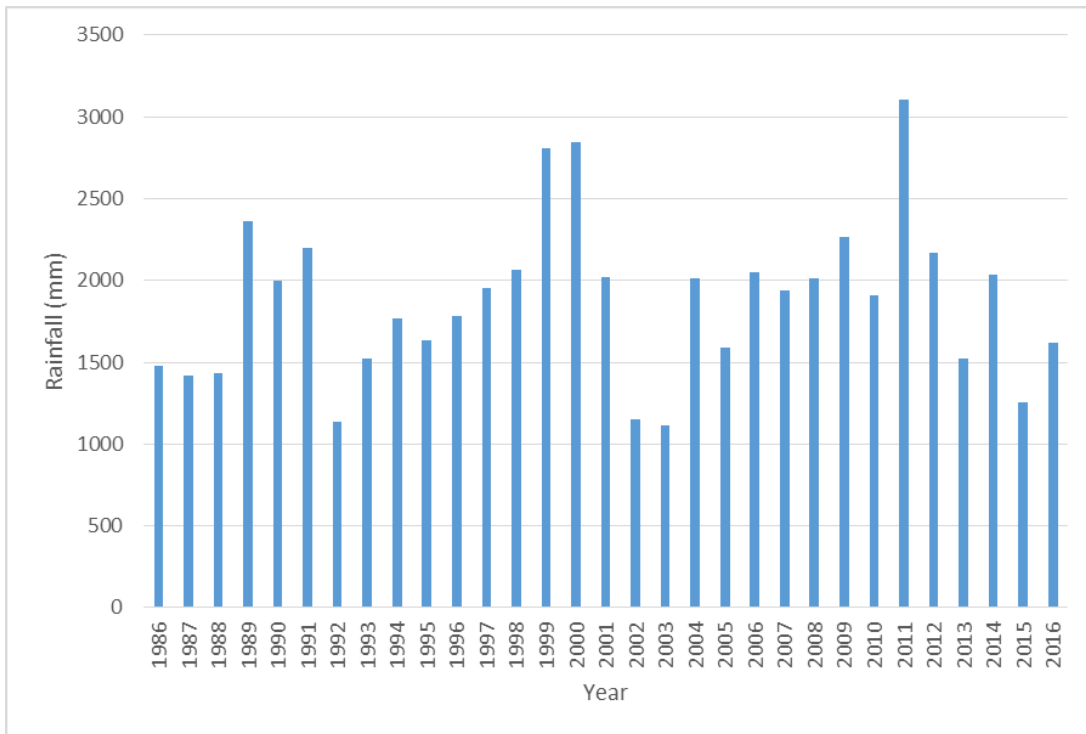


Figure 18: Mean annual rainfall for the Wet Tropics region (1986–2016). Note that a year is from October to September to align with late-dry-season reporting.

Burdekin

A
74%

Target: 70 per cent late dry season ground cover by 2018.

Good: Late-dry-season mean ground cover across grazing lands was 74 per cent.

Table 5: Ground cover results for the Burdekin region and catchments

Region	29-year mean ground cover (%)	2016 mean ground cover (%)	Area with less than 70% ground cover averaged over past 29 years (%)	Area with less than 70% ground cover in 2016 (%)
Black	87	89	10	4
Burdekin	74	73	34	35
Don	84	85	11	6
Haughton	82	81	17	14
Ross	83	86	15	7
Burdekin region	75	74	33	33

The ground cover frequency distribution for the Burdekin (Figure 19) provides a visual representation of the results. The proportion of the region with less than 70 per cent cover is shaded blue and labelled '33%'. The median value in 2016 (76 per cent) is shown in red at the base of the solid line. The frequency distribution of ground cover in 2016 was similar to the frequency distribution of the long-term mean. This is also reflected by the similarity between in the 2016 mean ground cover (75 per cent) and the 29 year mean ground cover (74 per cent) (Table 5). Further, the area of the region with ground cover below the target was the same for 2016 as the 29 year mean. These results suggest that for the Burdekin region, 2016 was an average year of ground cover levels when compared with the past 29 years.

The percentage of ground cover for the Burdekin region and catchments is shown in Figure 20.

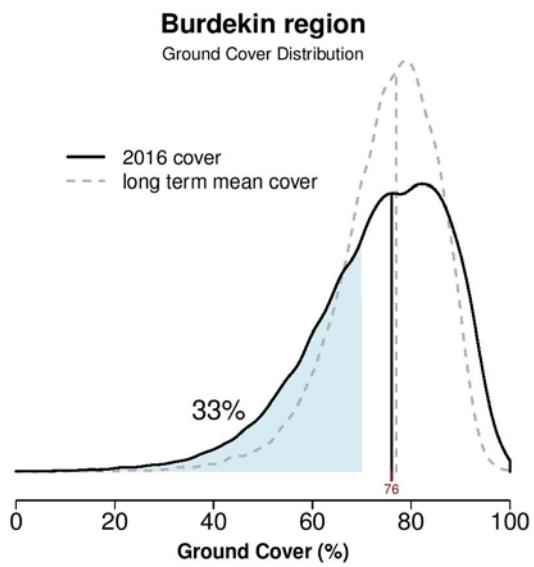


Figure 19: Burdekin ground cover frequency distribution for late dry season 2016 (solid line) and the long-term mean (dashed line)

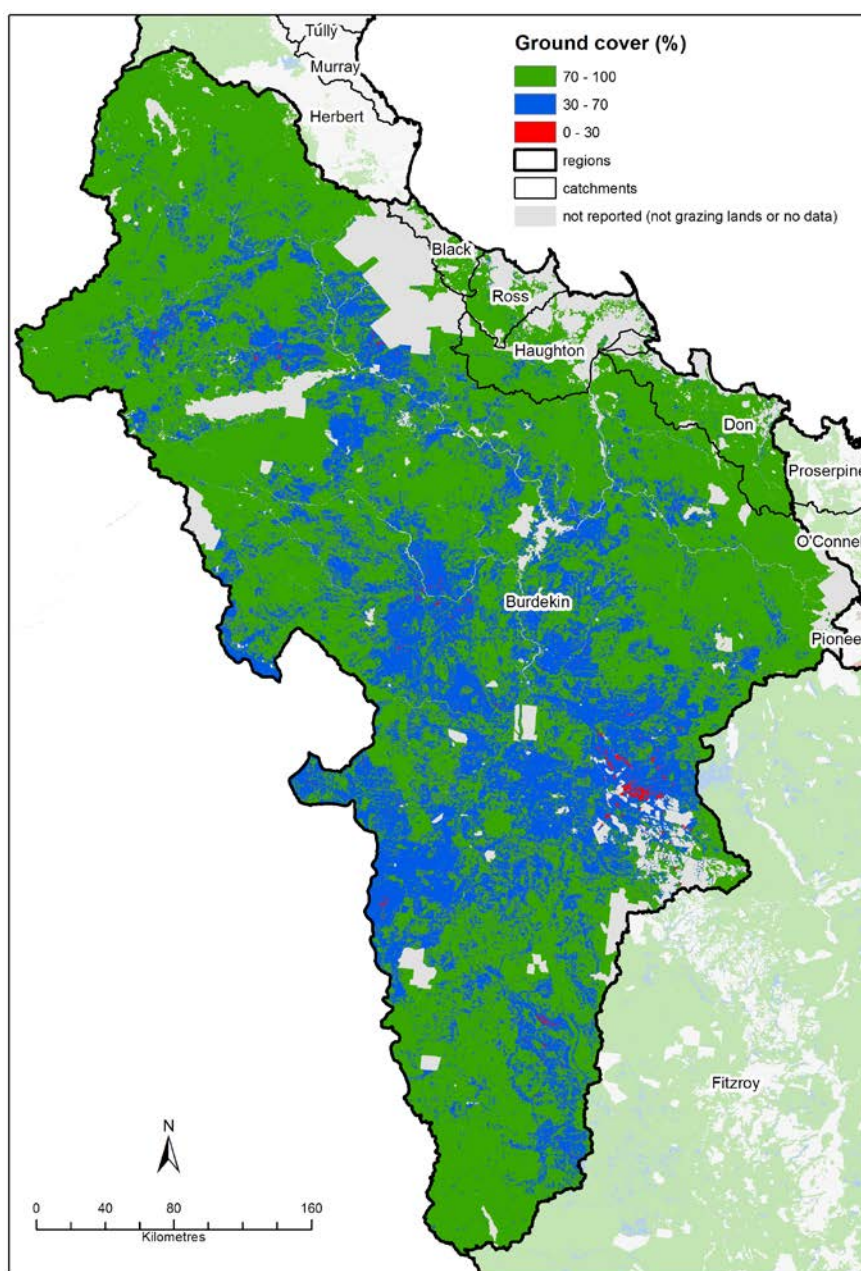


Figure 20: Late-dry-season ground cover levels in 2016 for the Burdekin region grazing lands

At 74 per cent, the mean ground cover for the Burdekin region in 2016 was above target. Comparatively, the 29-year mean ground cover is 75 per cent. Ground cover levels in the Burdekin region fluctuate significantly over time; for example, in 1988 the mean late-dry-season ground cover was 66 per cent, while the following year it was 77 per cent. The proportion of grazing lands falling below the target of 70 per cent was 33 per cent in 2016, and 33 per cent for the 29-year period (Table 5 and Figure 19). Increases in the area with less than 70 per cent ground cover correspond to low mean late-dry-season ground cover coinciding with below-average annual rainfall.

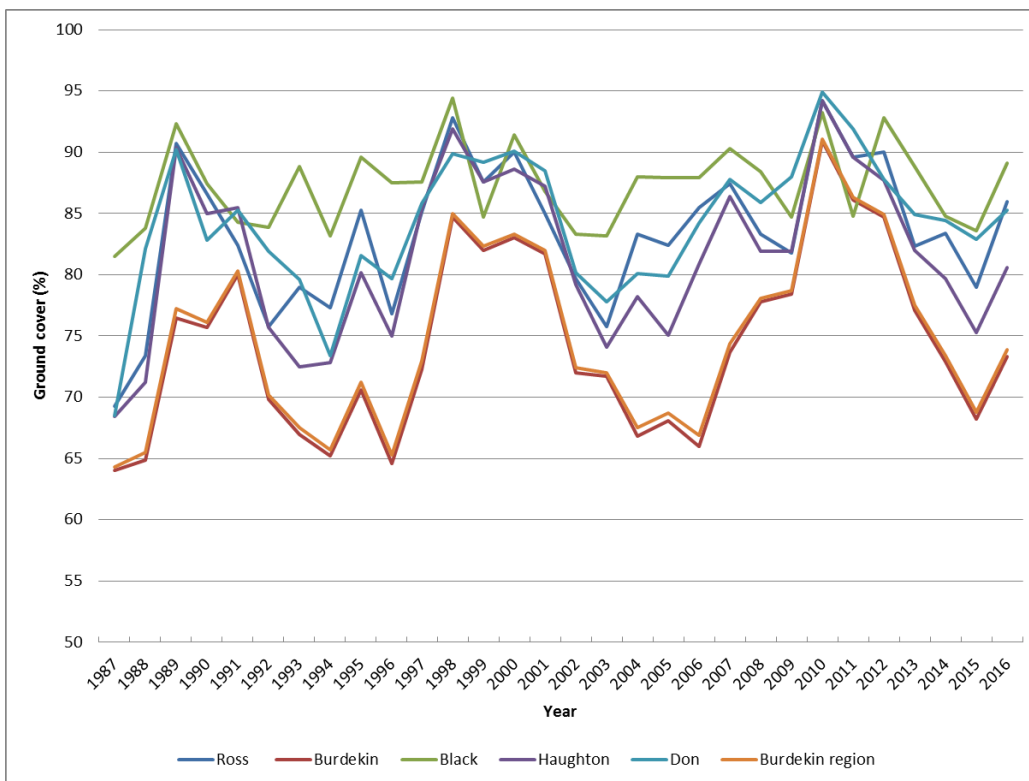


Figure 21: Burdekin region and catchments - mean late-dry-season ground cover. Note the scale on the y-axis is between 50 per cent and 100 per cent ground cover.

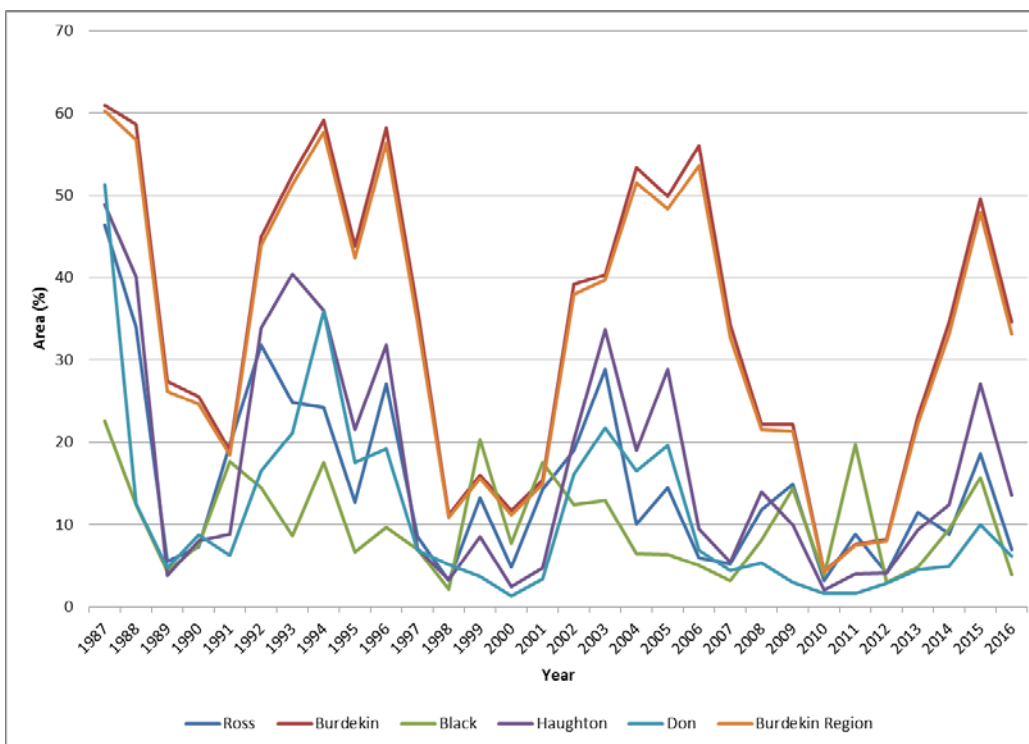


Figure 22: Burdekin region and catchments - percentage area with ground cover below 70 per cent (1987–2016)

The map of ground cover deciles (Figure 23) shows the spring 2016 ground cover in comparison to the long-term (1988–2012) spring baseline. Many areas of the Burdekin region remained low in ground cover compared to the baseline period. Much of this could be attributed to the continuation of drought conditions in the region in spring 2016; however, there are likely to be localised impacts on ground cover due to stocking rates inappropriate for the drought conditions. It is important, however, to interpret the deciles relative to the actual level of ground cover at any given time—even with a low decile ranking, ground cover can still be above target levels, as the deciles are a relative measure against a long-term baseline.

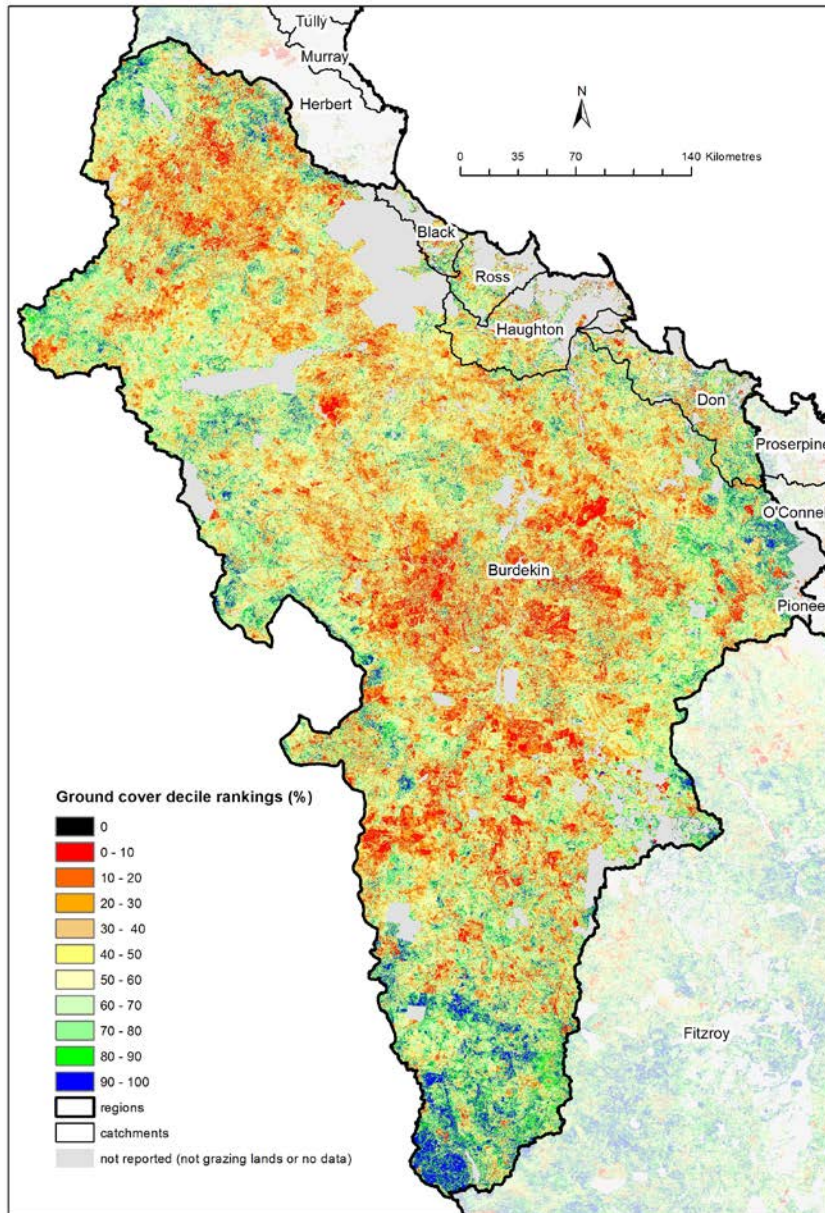


Figure 23: Burdekin region ground cover decile rankings. This map shows spring 2016 ground cover in comparison to the long-term spring cover (1988–2012 baseline). The lowest decile (red) indicates where ground cover was at the lowest level relative to the baseline period, and the highest decile (blue) indicates where ground cover was at the highest level relative to the baseline period.

The Burdekin region is the driest of the regions reported (637 millimetres mean annual rainfall). Rainfall in 2015 was well below the mean at 392 millimetres and again in 2016 at 588 millimetres (Figure 24).

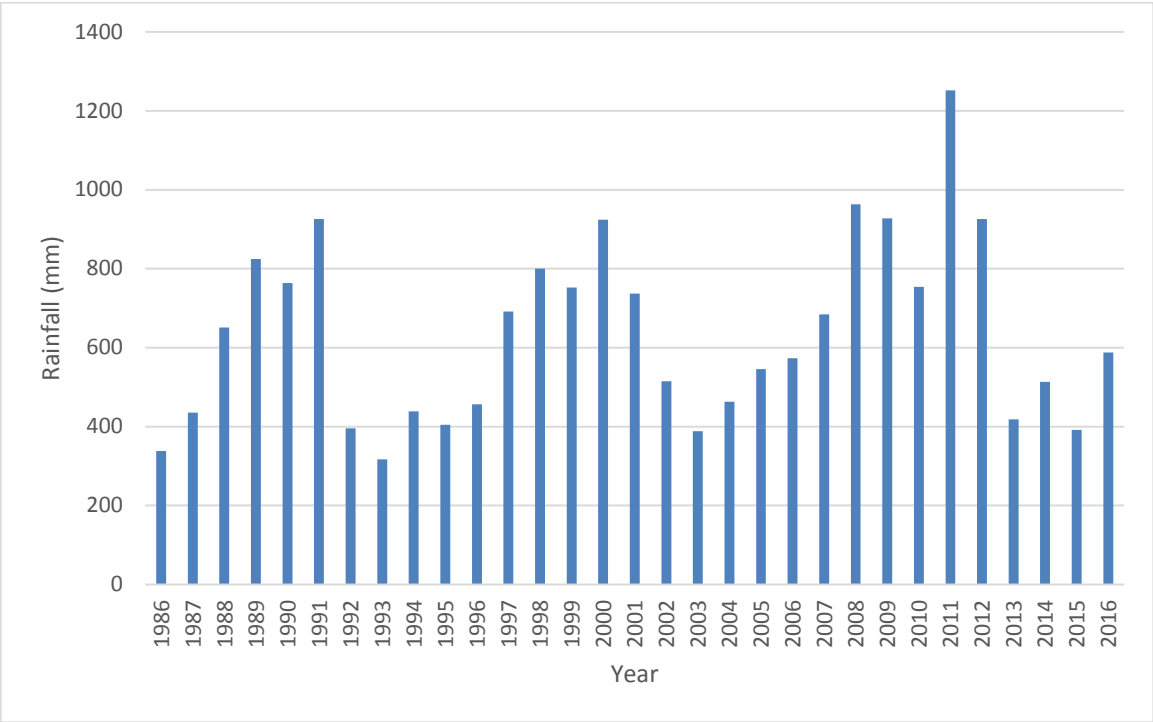


Figure 24: Mean annual rainfall for the Burdekin region (1986–2016). Note that a year is from October to September to align with late-dry-season reporting.

Mackay Whitsunday

A
90%

Target: 70 per cent late dry season ground cover by 2018.

Very good: Late-dry-season mean ground cover across grazing lands was 90 per cent.

Table 6: Ground cover results for the Mackay Whitsunday region and catchments

Region	29-year mean ground cover (%)	2016 mean ground cover (%)	Area with less than 70% ground cover averaged over past 29 years (%)	Area with less than 70% ground cover in 2016 (%)
O'Connell	90	92	4	2
Pioneer	91	93	3	2
Plane Creek	89	88	6	6
Proserpine	87	89	7	3
Mackay Whitsunday region	89	90	5	3

The ground cover frequency distribution map (Figure 25) for the Mackay Whitsunday region provides a visual representation of the results. The proportion of the region with less than 70 per cent cover is shaded blue and labelled '3%'. The median value in 2016 (92 per cent) is shown in red at the base of the solid line. The frequency distribution of ground cover in 2016 across the region was generally higher than the long-term mean; this is reflected in the generally higher mean ground cover levels for 2016 and the very low area of the region's catchments that were below the target.

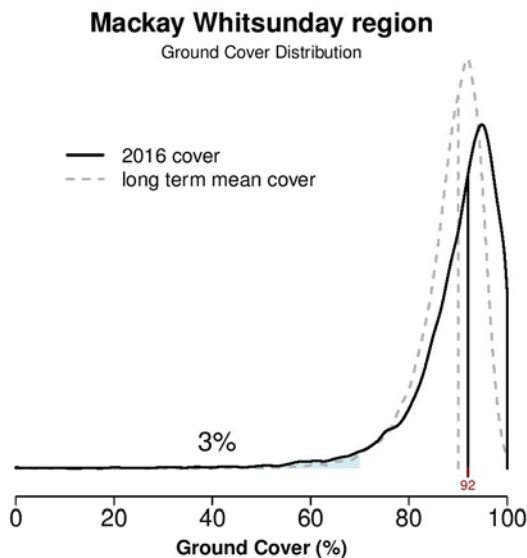


Figure 25: Mackay Whitsunday ground cover frequency distribution for late dry season 2016 (solid line) and the long-term mean (dashed line)

The percentage of ground cover for the Mackay Whitsunday region and catchments is shown in Figure 26.

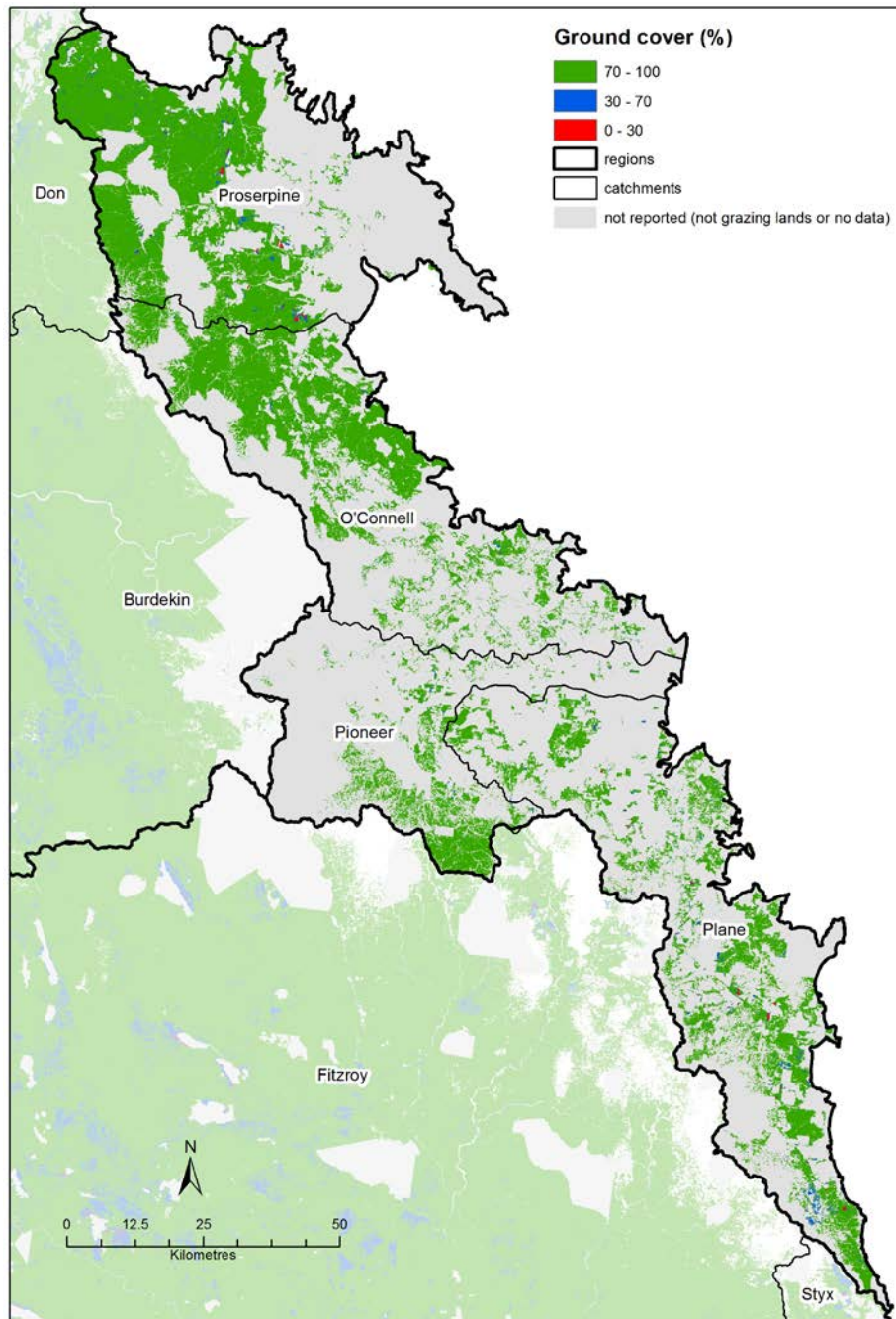


Figure 26: Late-dry-season ground cover levels in 2016 for the Mackay Whitsunday region grazing lands

The Mackay Whitsunday region had mean ground cover of 90 per cent in 2016 and consistently high mean ground cover from 1987 to 2016 (89 per cent). The area with ground cover less than 70 per cent has also been consistently low across all years, with a mean of 3 per cent for 2016 and 5 per cent for the 29-year period (Table 6 and Figure 25).

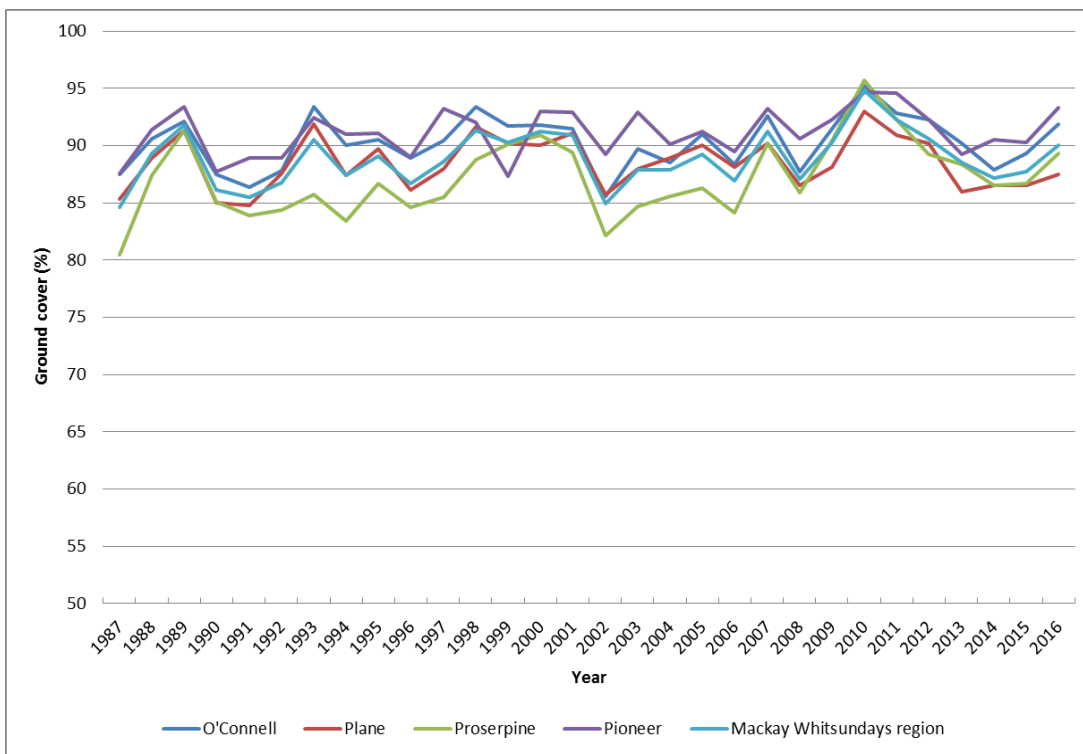


Figure 27: Mackay Whitsunday region and catchments - mean late-dry-season ground cover. Note the scale on the y-axis is between 50 per cent and 100 per cent ground cover.

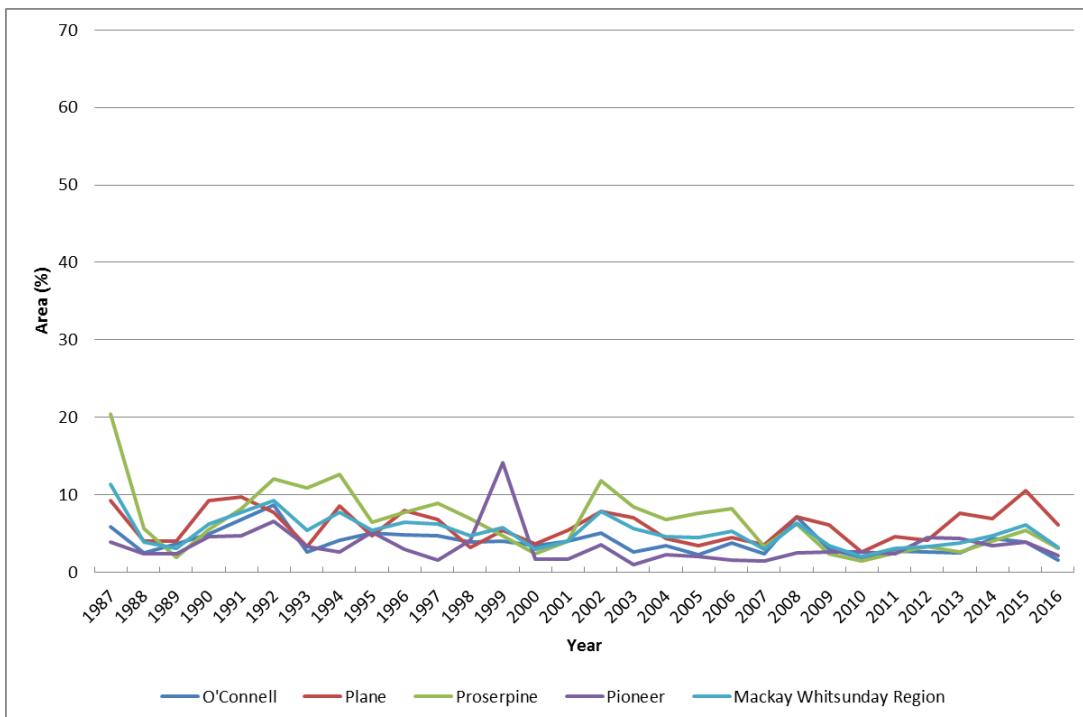


Figure 28: Mackay Whitsunday region and catchments - percentage area with ground cover below 70 per cent (1987–2016).

The map of ground cover deciles (Figure 29) shows the spring 2016 ground cover in comparison to the long-term (1988–2012) spring baseline. While some areas are relatively low in ground cover compared to the baseline period, they generally still have high-to-very-high levels of ground cover, mainly due to the consistently high rainfall in the region.

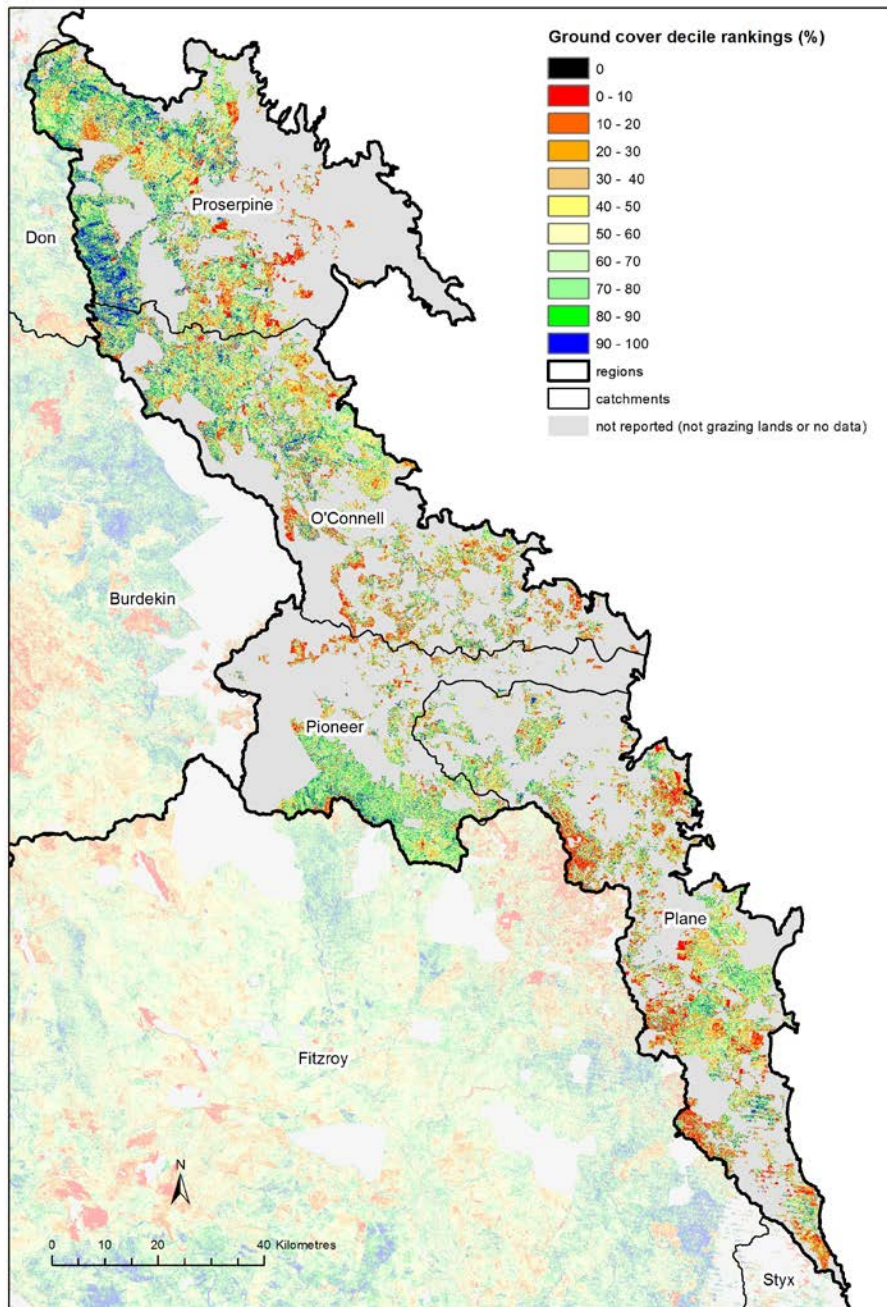


Figure 29: Mackay Whitsunday region ground cover decile rankings. This map shows spring 2016 ground cover in comparison to the long-term (1988–2012 baseline) spring cover. The lowest decile (red) indicates where ground cover was at the lowest level relative to the baseline period, and the highest decile (blue) indicates where ground cover was at the highest level relative to the baseline period.

The Mackay Whitsunday region is the second wettest of the regions reported (1517 millimetres mean annual rainfall). Rainfall in 2015 was below the mean at 887 millimetres and just below the mean in 2016 (1493 millimetres) (Figure 30).

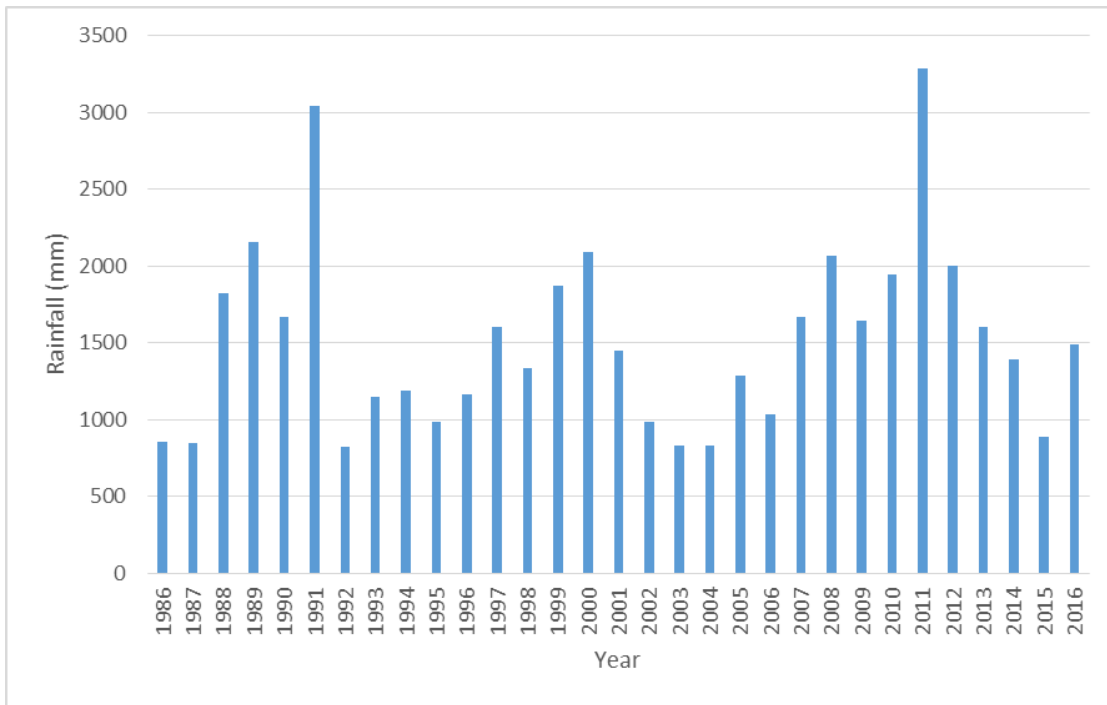


Figure 30: Mean annual rainfall for Mackay Whitsunday region (1986–2016). Note that a year is from October to September to align with late-dry-season reporting.

Fitzroy

A
84%

Target: 70 per cent late dry season ground cover by 2018.

Very good: Late-dry-season mean ground cover across grazing lands was 84 per cent.

Table 7: Ground cover results for the Fitzroy region and catchments

Region	29-year mean ground cover (%)	2016 mean ground cover (%)	Area with less than 70% ground cover averaged over past 29 years (%)	Area with less than 70% ground cover in 2016 (%)
Boyne	87	87	6	6
Calliope	87	88	6	4
Fitzroy	79	83	20	9
Shoalwater	87	90	9	3
Styx	86	91	9	3
Waterpark	87	83	8	13
Fitzroy region	79	84	20	8

The ground cover frequency distribution for the Fitzroy region (Figure 31) provides a visual representation of the results. The proportion of the region with less than 70 per cent cover is shaded blue and labelled '8%'. The median value in 2016 (85 per cent) is shown in red at the base of the solid line. The frequency distribution of ground cover across the region in 2016 was higher than the long-term mean. The area below the target (8 per cent) was much lower than the long-term mean and was more than half that of 2015, which had 17 per cent of the area below the target. This is an encouraging trend, given rainfall in 2016 was only slightly higher than the long-term mean, and was similar to 2015 rainfall. However, the Fitzroy region did receive somewhat unseasonal winter rainfall in 2016, which may have contributed to improvements in the 2016 levels.

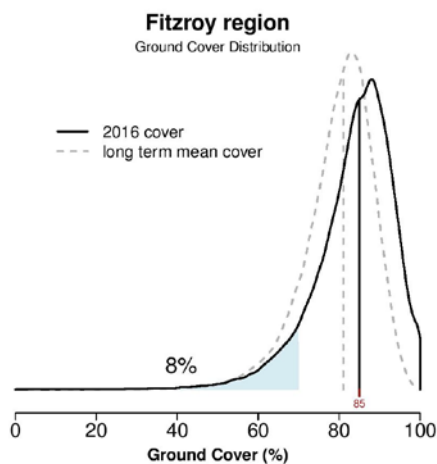


Figure 31: Fitzroy ground cover frequency distribution for late dry season 2016 (solid line) and the long-term mean (dashed line)

The percentage of ground cover for the Fitzroy region and catchments is shown in Figure 32.

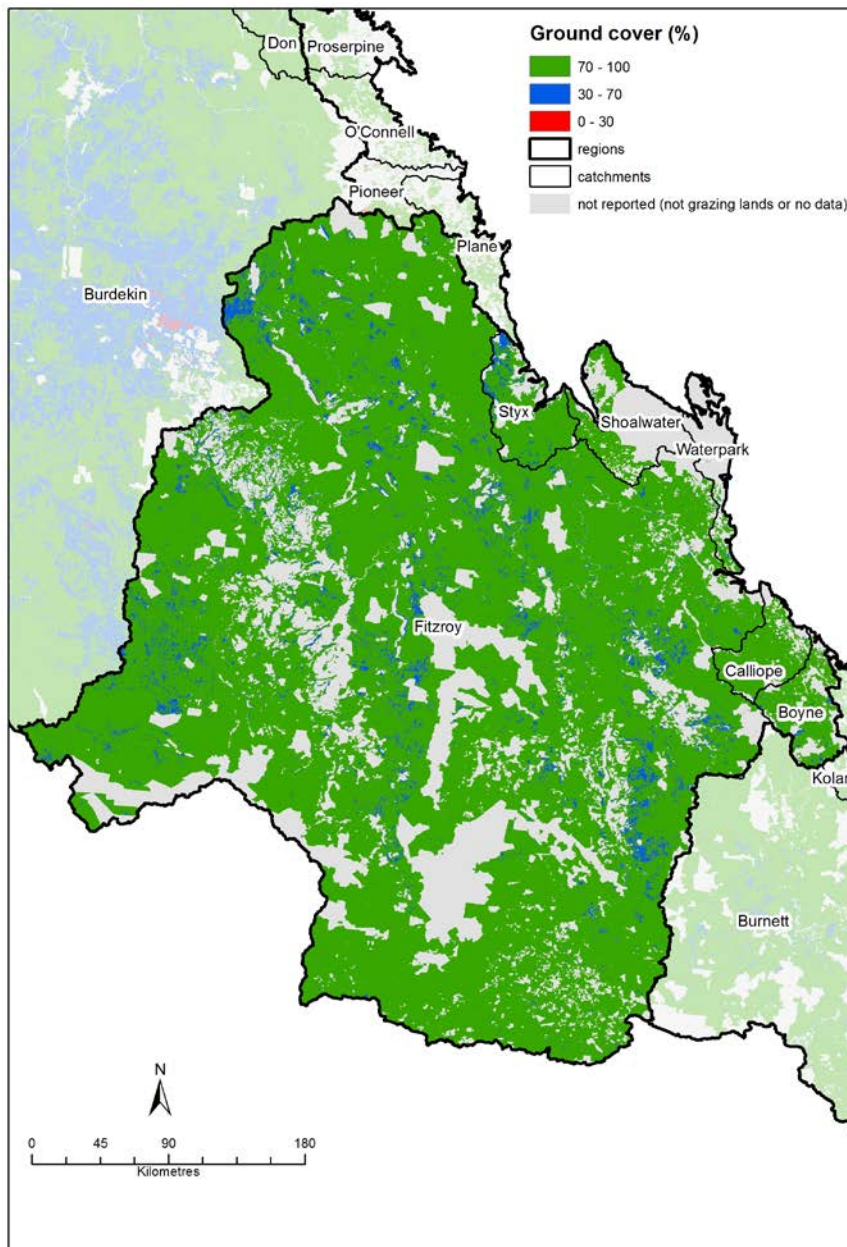


Figure 32: Late-dry-season ground cover levels in 2016 for the Fitzroy region grazing lands

The Fitzroy region had mean ground cover of 84 per cent in 2016 and 79 per cent for the 29-year period. Mean ground cover in the Fitzroy region fluctuates considerably over time. For example, in 2006 the mean ground cover was 71 per cent, in 2008 it was 82 per cent, and in 2010 it was as high as 93 per cent. The proportion of grazing lands falling below the target of 70 per cent ground cover was 8 per cent in 2016 and 20 per cent for the 29-year period (Table 7 and Figure 31). Increases in the area with less than 70 per cent ground cover correspond to low mean late-dry-season ground cover and below average annual rainfall in the current and preceding years. For example, in 1994 the mean late-dry-season ground cover was 72 per cent, the area with ground cover below 70 per cent was 38 per cent, and the mean annual rainfall had been

declining since 1989. In 1993, the annual rainfall was 396 millimetres—more than 250 millimetres lower than the region’s mean annual rainfall for 1987–2016.

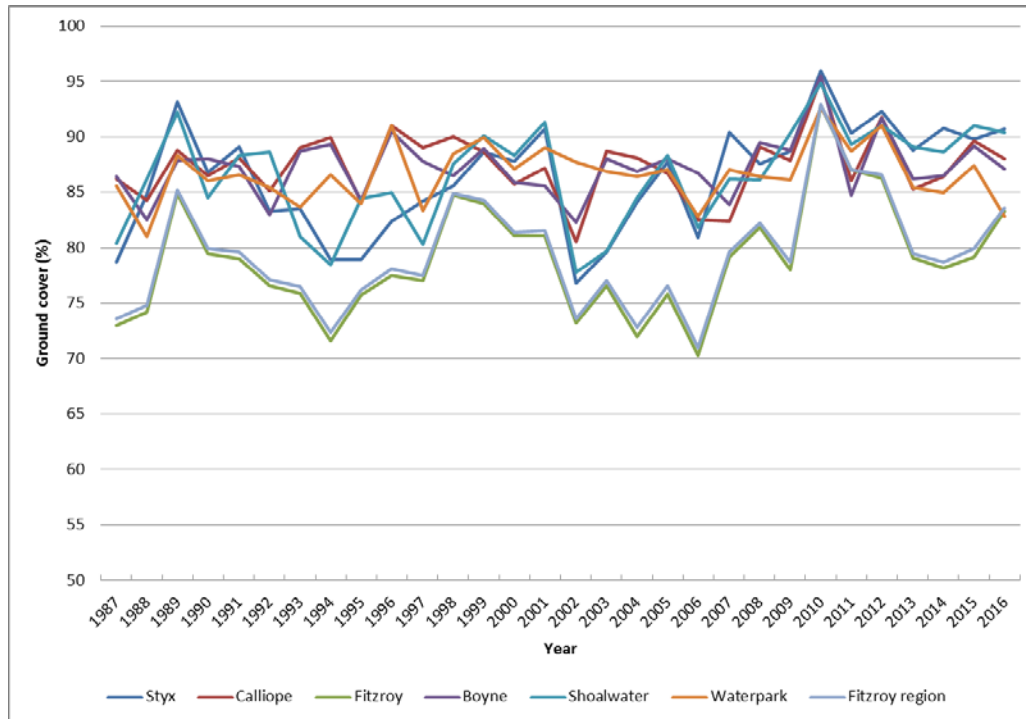


Figure 33: Fitzroy region and catchments - mean late-dry-season ground cover. Note the scale on the y-axis is between 50 per cent and 100 per cent ground cover

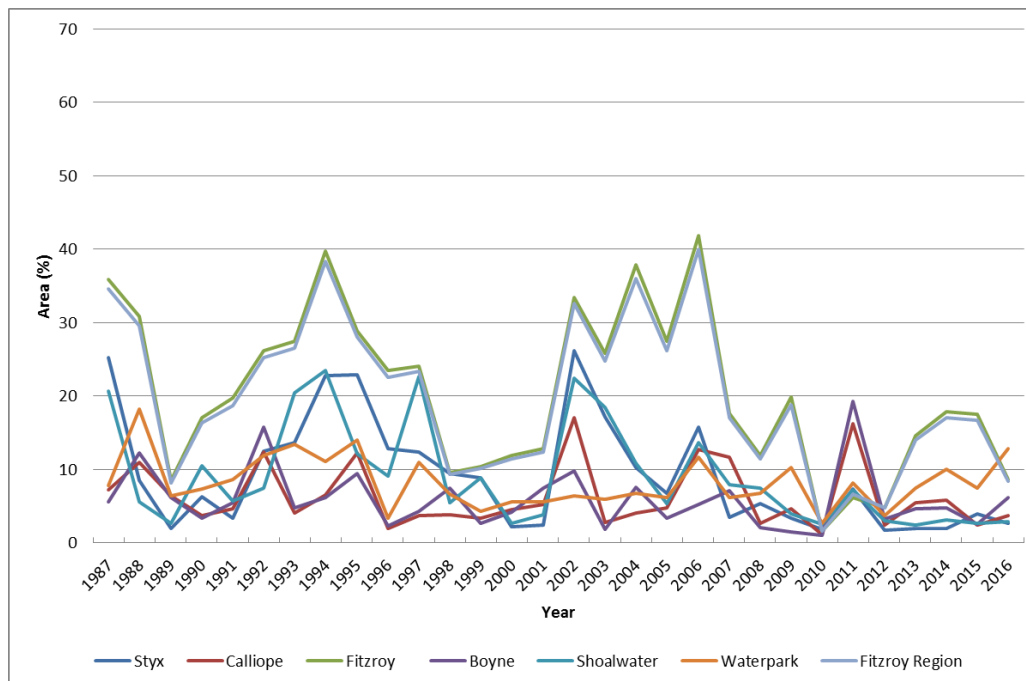


Figure 34: Fitzroy region and catchments - percentage area with ground cover below 70 per cent (1987–2016)

The map of ground cover deciles (Figure 35) shows the spring 2016 ground cover in comparison to the long-term (1988–2012 baseline) spring ground cover. The map shows that some areas in the western parts of the Fitzroy catchment had relatively higher ground cover levels in 2016 compared to the baseline period (blue areas on the map). Some localised areas in the north-west and south-east of the large Fitzroy catchment had lower relative ground cover levels (red areas). A further partition of the large Fitzroy catchment into its constituent sub-catchments is given in the ground cover technical report (DSITI, 2017 in prep.)

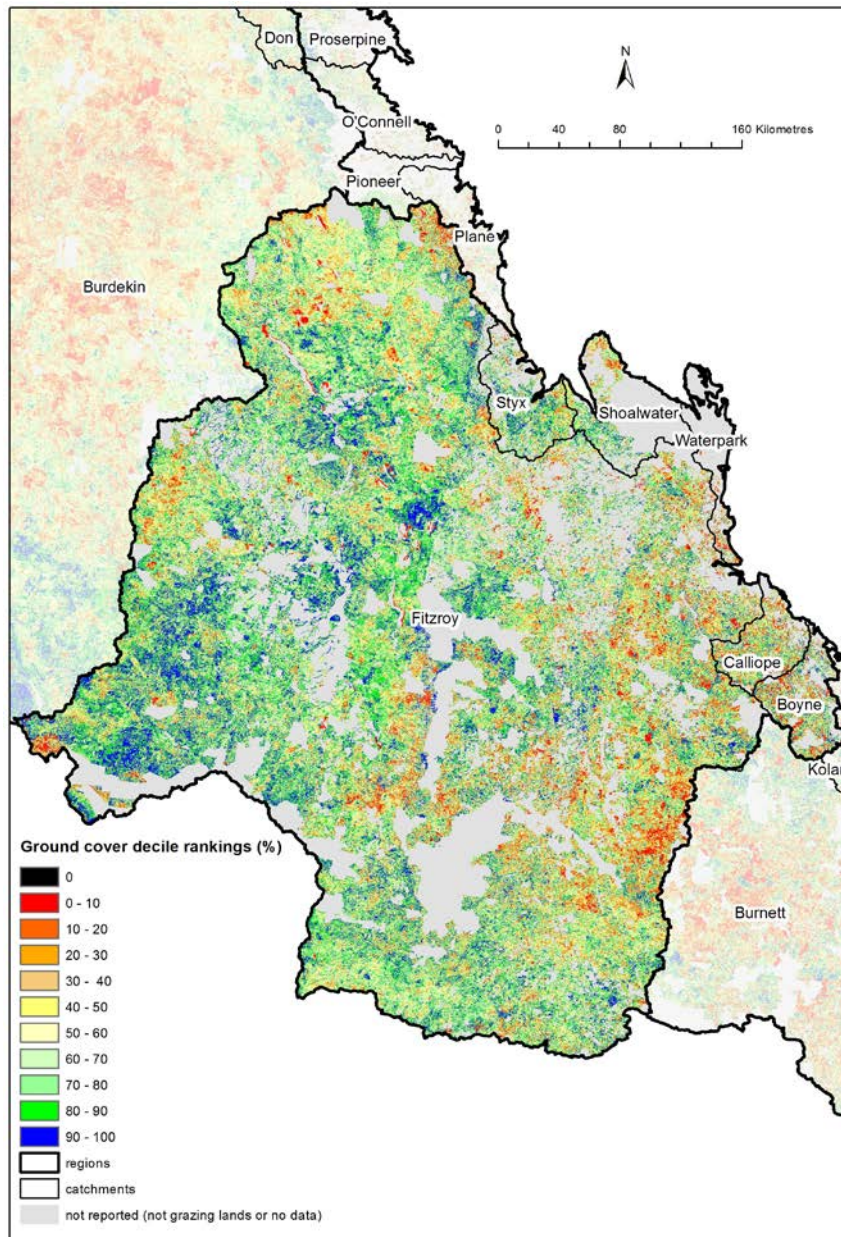


Figure 35: Fitzroy region ground cover decile rankings. This map shows spring 2016 ground cover in comparison to the long-term (1988–2012 baseline) spring cover. The lowest decile (red) indicates where ground cover was at the lowest level relative to the baseline period, and the highest decile (blue) indicates where ground cover was at the highest level relative to the baseline period.

The Fitzroy region is the second driest of the regions reported (658 millimetres mean annual rainfall). Rainfall in 2015 was above the mean at 689 millimetres, and again in 2016 (702 millimetres) (Figure 36).

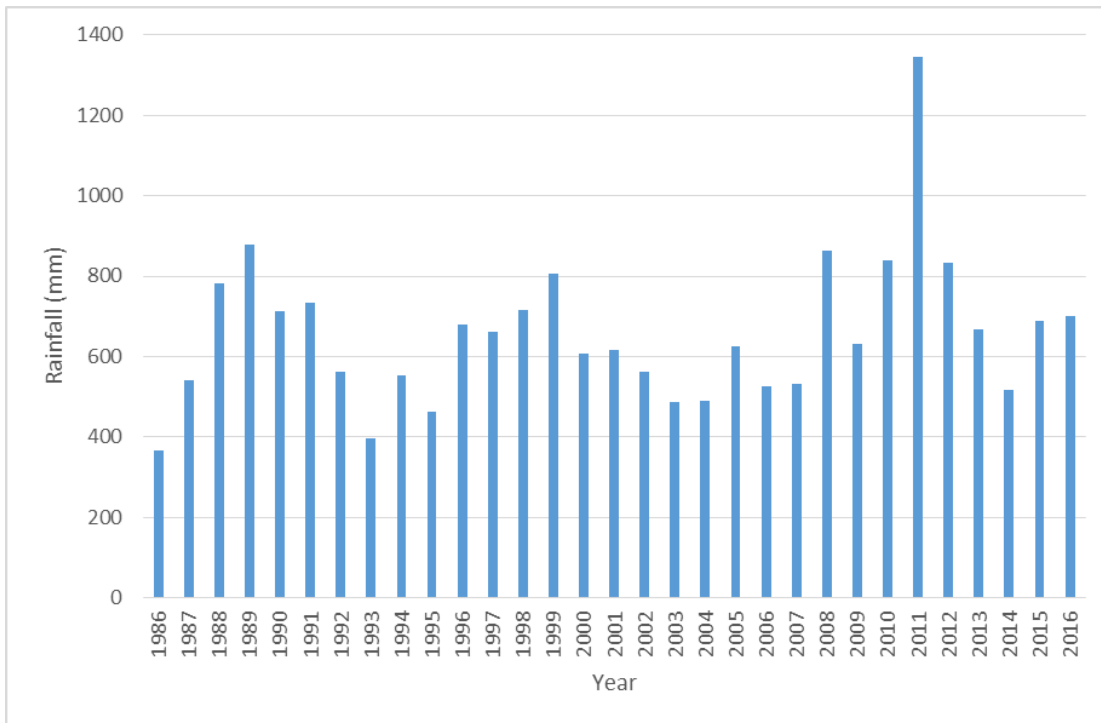


Figure 36: Mean annual rainfall for Fitzroy region (1986–2016). Note that a year is from October to September to align with late-dry-season reporting.

Burnett Mary

A
84%

Target: 70 per cent late dry season ground cover by 2018.

Very good: Late-dry-season mean ground cover across grazing lands was 84 per cent.

Table 8: Ground cover results for the Burnett Mary region and catchments

Region	29-year mean ground cover (%)	2016 mean ground cover (%)	Area with less than 70% ground cover averaged over past 29 years (%)	Area with less than 70% ground cover in 2016 (%)
Baffle	88	89	6	4
Burnett	85	84	7	9
Burrum	87	86	9	8
Kolan	88	86	4	5
Mary	88	85	5	6
Burnett Mary region	86	84	7	8

The ground cover frequency distribution (Figure 37) for the Burnett Mary region provides a visual representation of the results. The proportion of the region with less than 70 per cent cover is shaded blue and labelled '8%'. The median value in 2016 (86 per cent) is shown in red at the base of the solid line. The frequency distribution of ground cover across the Burnett Mary region was very similar to the long-term mean. This similarity is also reflected in the catchments of the region.

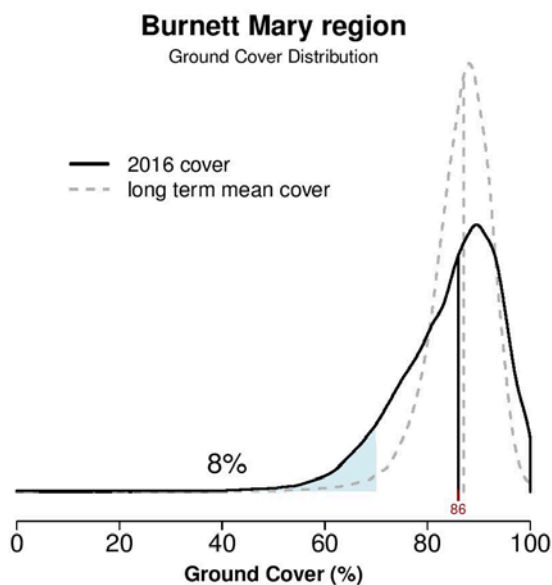


Figure 37: Burnett Mary ground cover distribution for late dry season 2016 (solid line) and the long term mean (dashed line)

The percentage of ground cover for the Burnett Mary region and catchments is shown in Figure 38.

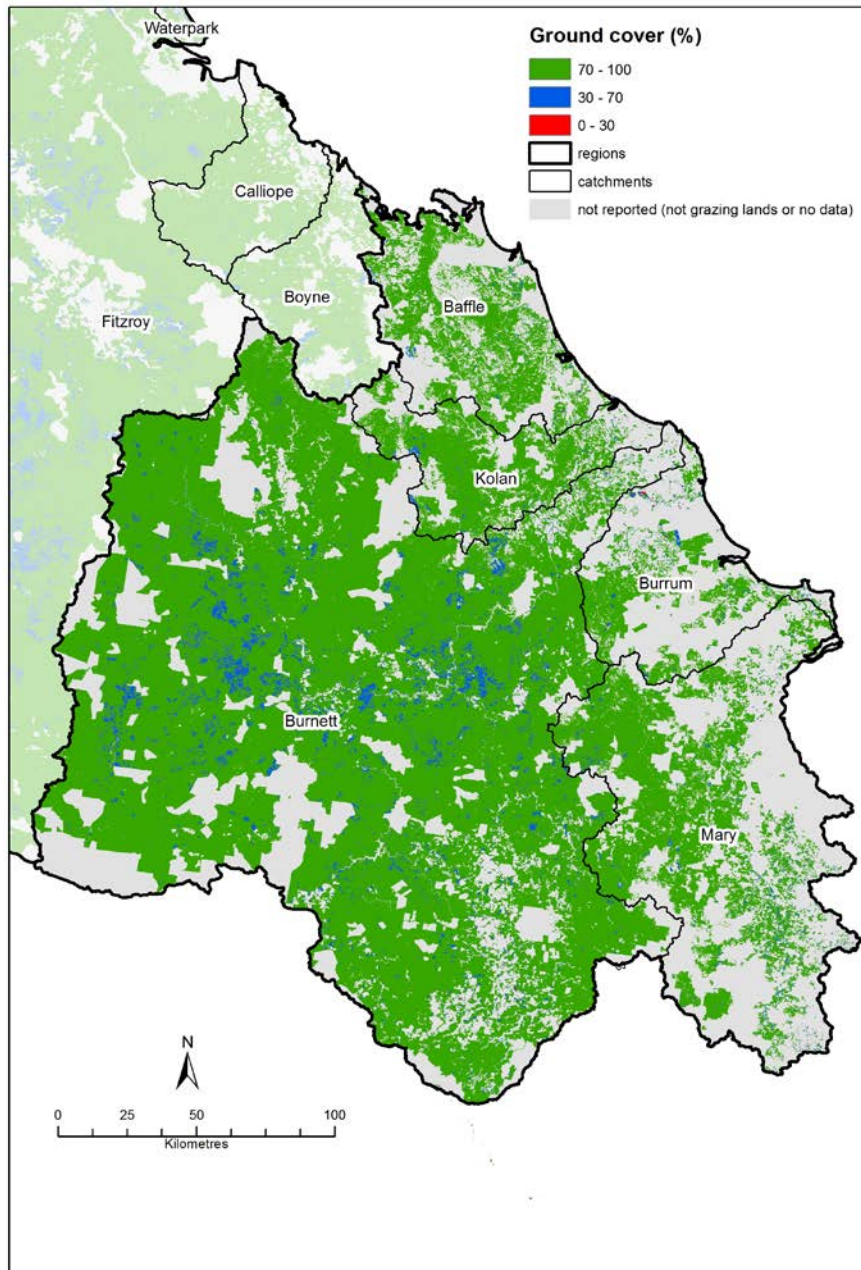


Figure 38: Late-dry-season ground cover levels in 2016 for the Burnett Mary region grazing lands

The Burnett Mary region had mean ground cover of 84 per cent in 2016 and consistently high mean ground cover from 1987 to 2016 (86 per cent). The highest level of ground cover was in 2010 (94 per cent). The lowest was 81 per cent in 1988 and 2014. The area with ground cover less than 70 per cent has been consistently low across all years, with a mean of 8 per cent for 2016 and a 29-year mean of 7 per cent (Table 8 and Figure 37). The largest area below the target was in 1991 (14 per cent). This corresponded with a low rainfall year for the area, more than 250 millimetres below the mean annual rainfall.

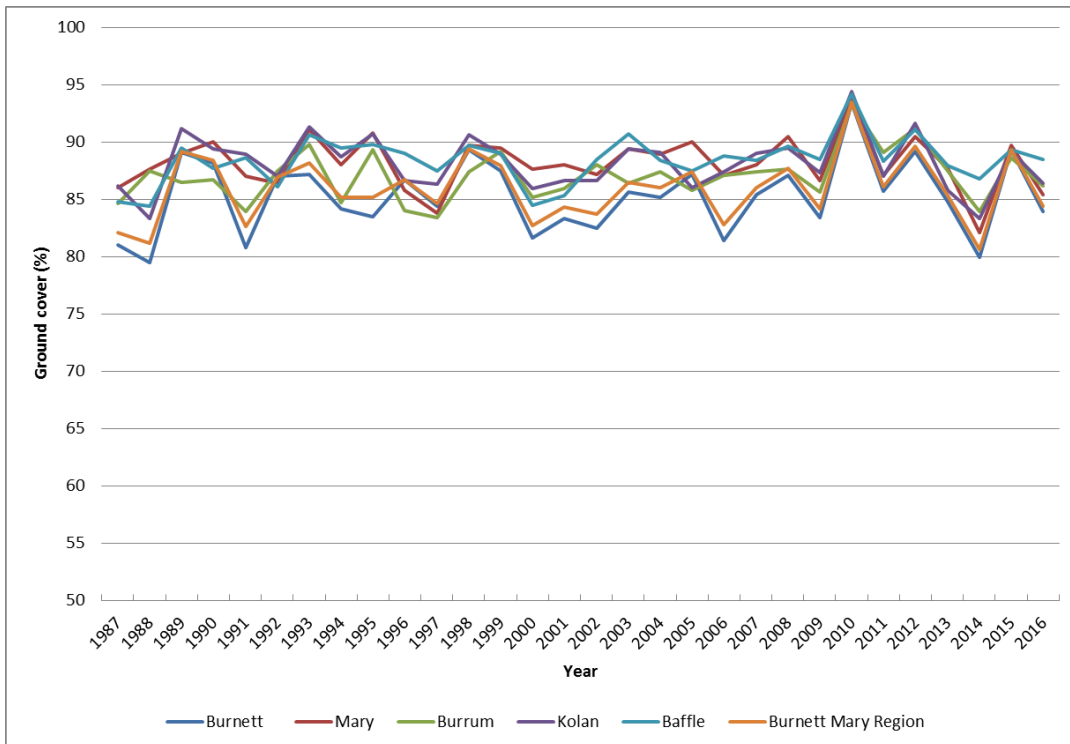


Figure 39: Burnett Mary region and catchments - mean late-dry-season ground cover. Note the scale on the y-axis is between 50 per cent and 100 per cent ground cover.

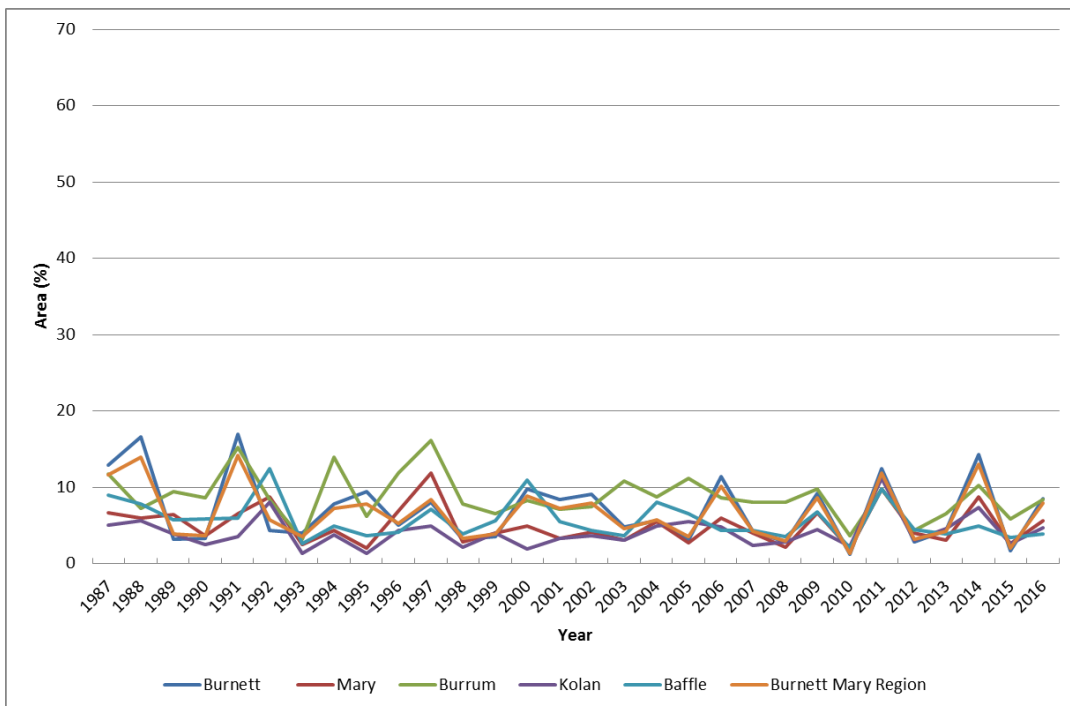


Figure 40: Burnett Mary region and catchments - percentage area with ground cover below 70 per cent (1987–2016)

The map of ground cover deciles (Figure 41) shows the spring 2016 ground cover in comparison to the long-term (1988–2012 baseline) spring cover. The map shows that, relative to the long-term baseline, in 2016 there were significant areas at their lowest comparative level of ground cover. This may indicate some localised areas which are at risk of erosion. However, given ground cover levels remain generally high in the region, these risk areas are likely to be minimal. Although, further investigation may be needed as to the cause for the relatively lower ground cover levels, given rainfall levels were similar to the long-term mean.

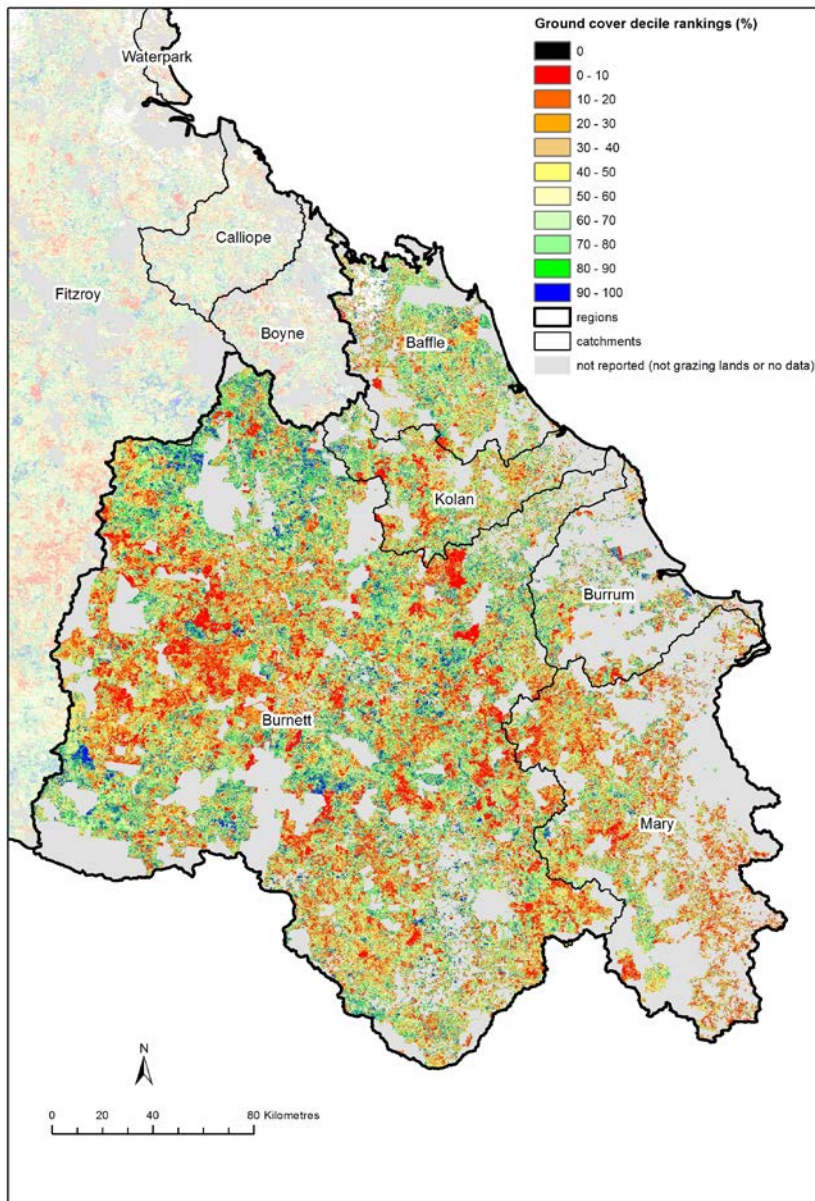


Figure 41: Burnett Mary region ground cover decile rankings. This map shows spring 2016 ground cover in comparison to the long-term (1988–2012 baseline) spring cover. The lowest decile (red) indicates where ground cover was at the lowest level relative to the baseline period, and the highest decile (blue) indicates where ground cover was at the highest level relative to the baseline period.

Mean annual rainfall for the Burnett Mary region over the period 1986 to 2016 is approximately 797 millimetres. Rainfall in 2015 was above the mean at 840 millimetres, and just below the mean in 2016 (759 millimetres) (Figure 42).

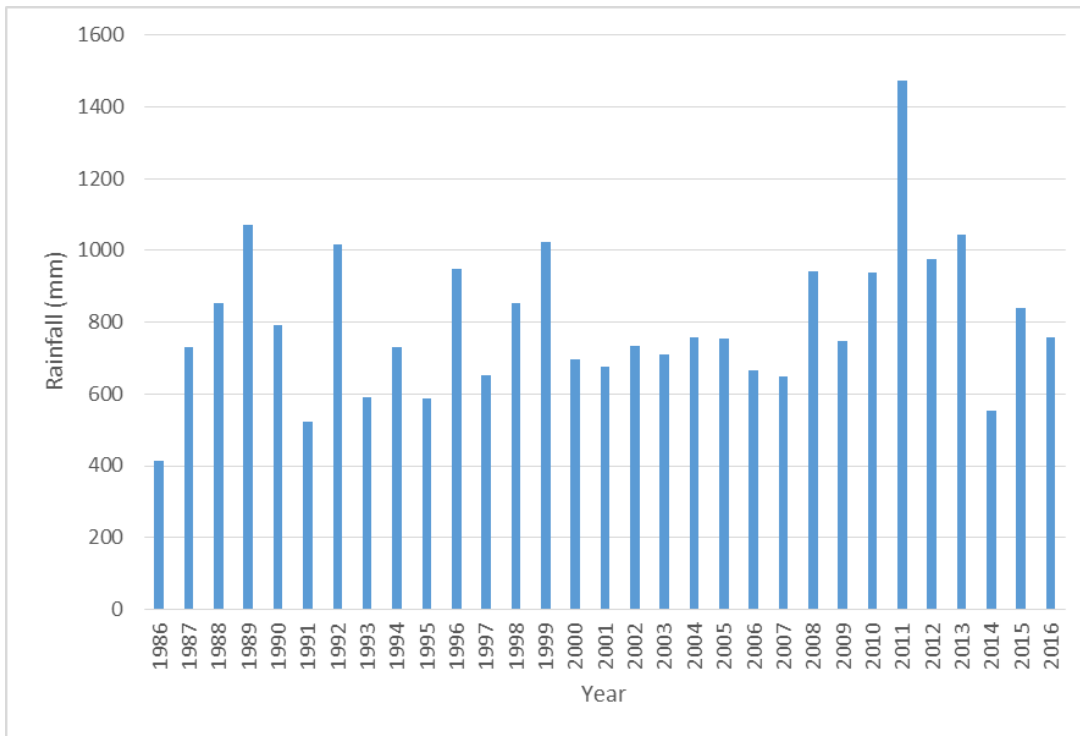


Figure 42: Mean annual rainfall for Burnett Mary region (1986–2016). Note that a year is from October to September to align with late-dry-season reporting.

References

Department of Science, Information Technology and Innovation 2017, *Ground cover technical report 2015-16: Great Barrier Reef catchments*, Queensland Department of Science, Information Technology and Innovation, Brisbane.

DSITI—see Department of Science, Information Technology and Innovation