



Protection of agricultural land against erosion in the Northern and Yorke Region

Seasonal Report November 2010

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Department of Environment and Natural Resources

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Summary

- Favourable growing conditions resulted in good growth of crops and pastures providing sufficient soil surface cover leading into summer.
- Surface cover levels in October were slightly poorer in October 2010 compared to October 2009. This is possibly due to a greater proportion of land sown to grain legumes which produce less biomass than cereals.
- Given the average rate of surface cover breakdown and losses over summer in the region, cover levels are not expected to fall below the level regarded as adequate for erosion protection by March 2011.
- It is possible that farmers will use burning, heavy grazing and tillage in the autumn to reduce residue levels in paddocks to alleviate problems at seeding time and to reduce mice numbers.

Seasonal Conditions

Rainfall deciles for the period May to October 2010 show that most of the Northern and Yorke Region received average to above average rainfall during the growing season this year (Figure 1).

Thunderstorms early in April yielded falls of up to 23 mm in the Upper North. These were followed by more thunderstorm activity around the 20th April when Wilmington received 55mm of rain. At Morchard it was estimated that 50 mm fell in less than 30 minutes causing rill, sheet and gully erosion on cultivated land. Tarlee (32 mm) and Rowland Flat (28 mm) also experienced downpours and some soil loss was observed over a small area near Rowland Flat. More gentle rain of up to 22 mm fell around the 25th of April.

Strong winds associated with weather changes raised dust from grain legume stubbles and over grazed areas.

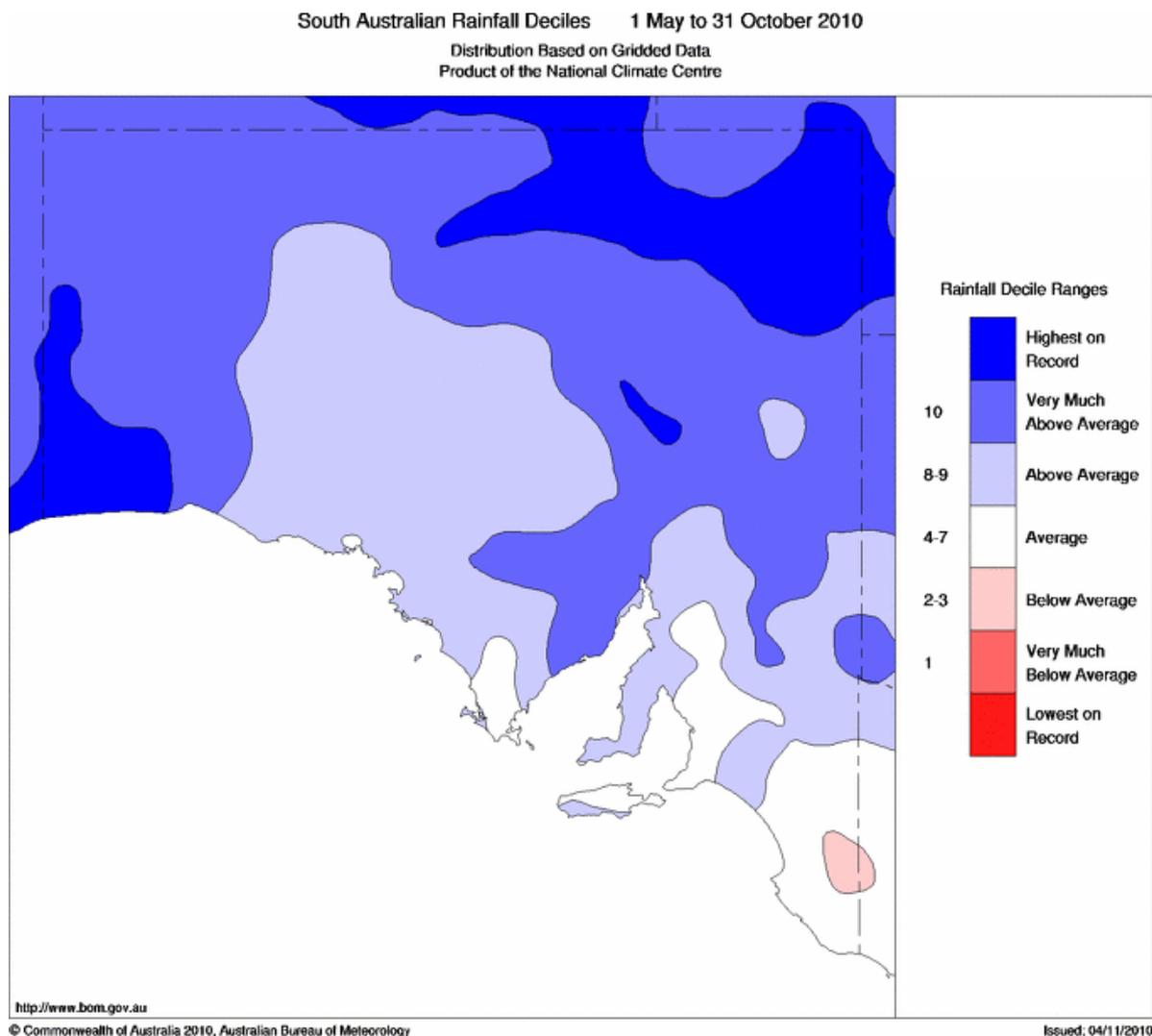
Widespread rain fell at the end of May, particularly in the northern areas. Bruce, Carrieton, Willowie, Wilmington, Jamestown and Port Wakefield recorded monthly

observations in the Decile 10 range (in the highest ten percent of observations on record).

A cool to cold dry spell prevailed during June and July. Heavy frosts occurred and strong winds on a few days caused damage to emerging crops on sandy soils. The Upper and Lower North recorded well below average rainfalls with Hallett, Mt Bryan, Whyte Yarcowie, Auburn, Mintaro and Balaklava recording Decile 1 observations. Rainfalls were around the average on Yorke Peninsula in June and below average in July.

Rainfall picked up in August with above average falls and Booboowowie, Burra, Gerogetown, Curramulka and Maitland observing falls in the Decile 10 range. Run-off from sloping crop and pasture paddocks occurred in the Lower North. The rain continued falling in September with some land in higher rainfall areas becoming waterlogged. Steady rain with falls of up to 50 mm early in the month generated large volumes of run-off and some damage to watercourses was noted. Port Wakefield, Ardrossan and Price observed highest-ever recordings for September while another 14 centres, mainly on Yorke Peninsula, recorded monthly rainfalls in the Decile 10 range.

Figure 1:



Some warmer days occurred in October but the majority were cool and windy or overcast. The northern areas again received some significant rainfalls with Black Rock, Mambray Creek, Melrose, Oodla Wirra, Port Germein, Willowie, Whyte Yarcowie and Hoyleton recording Decile 10 observations. Yorke Peninsula tended to receive below average to average falls.

Cumulative growing season rainfall data for selected sites across the Northern and Yorke Region are shown in Appendix 1.

Soil surface cover levels

The Department of Environment and Natural Resources conducts a Land Condition Monitoring Program that assesses the risk of wind and water erosion on susceptible land in the cropping areas four times a year. Surface cover levels and soil disturbance are visually rated during these surveys.

The surface cover rating system used is based on a scale of 1-8 where 1 = full cover and 8 = bare ground.

Seeding began in areas that received reasonable rainfall in April but stopped during the middle of May until more rain fell at the end of the month. Some burning was carried out in paddocks shortly before they were sown. Baiting for mice was undertaken in the coastal plains and on Yorke Peninsula but they were still a problem for farmers in the Crystal Brook – Warnertown area in June, causing damage to emerging crops. Some crops had to be resown.

Seeding was mostly completed by mid-June but cold conditions slowed growth until August. Wet or windy conditions in August and September hampered fertiliser and herbicide applications. Crops and pastures grew vigorously in September where waterlogging was not a problem. A large bulk of crop and pasture biomass was produced by the end of October.

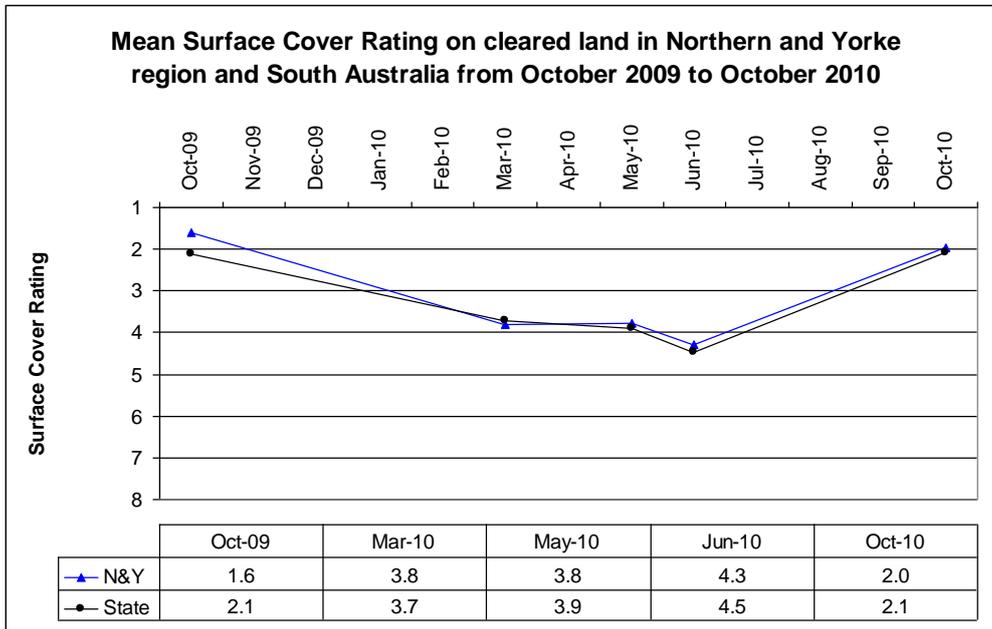
Some mechanical fallowing of land was undertaken in the northern-most cropping areas in October but a significantly larger area of land in the region was spray topped or chemically fallowed to reduce seed set of grasses and retain soil moisture which would otherwise be lost through evapotranspiration.

Appendix 2 provides estimated pasture growth in kilograms per hectare per day for district councils within the Northern and Yorke Region during the growing season. These estimates are derived using remote sensing of plant biomass combined with climate and soil data, and are available from the CSIRO's "Pastures From Space" program. The effect of cooler temperatures on plant growth during the winter months is evident in the higher altitude council areas of Goyder, Northern Areas, Orroroo-Carieton and Peterborough compared to the warmer, lower altitude, coastal councils of Barunga, Copper Coast, Port Pirie, Wakefield and Yorke Peninsula.

Figure 2 shows how surface cover ratings changed over the 13 months to October 2010. Surface cover levels approached the critical rating of 5 in June (a rating higher than 5 is regarded as being inadequate for erosion protection) however after crops and pastures germinated and grew, cover was re-established.

The average surface cover in October this year was 2.0 which indicates slightly less cover than the level of 1.6 in October 2009. The reasons for this are unclear however it is possible that a higher proportion of grain legumes, particularly lentils, have been grown this year. Grain legumes produce less biomass than cereals.

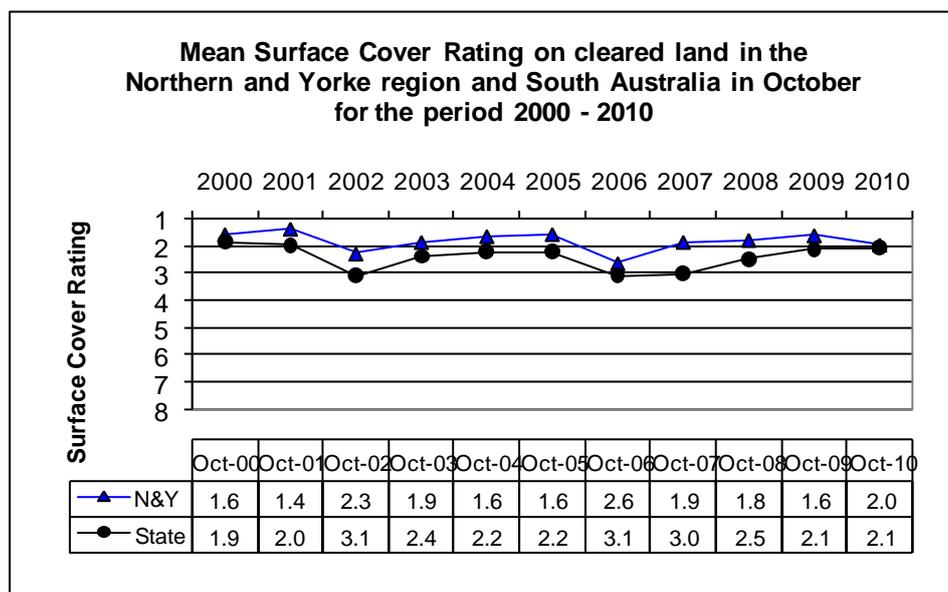
Figure 2:



Note: Cover rating of 1 = full cover; 8 = bare

Surface cover is usually at its maximum in October. Cover levels in spring decline over summer and into autumn as plant residues break down. Grazing reduces cover levels further. The average change in Surface Cover Rating between October and March in the Northern and Yorke Region since monitoring began is 2.3. If this change occurs over this summer, the average cover rating in the region in March 2011 is likely to be around 4.3, less than the critical rating of 5.0, above which land is considered to be at risk of erosion.

Figure 3:



Note: Cover rating of 1 = full cover; 8 = bare

The trend in soil surface cover levels in the Northern and Yorke Region in October since 2000 is shown in Figure 3. Surface cover in October this year was slightly less than in October 2009 but close to the average rating of 1.8 since monitoring began.

Protection of land from wind erosion

The area of cleared land inherently susceptible to wind erosion due to soil type, rainfall and topographic features (Class III_a, IV_a and V_a) is approximately 221,000 ha or 11% of cleared land in the Northern and Yorke NRM Region. This is mainly found on the sandier soil types on the plains west of the Barunga and Southern Flinders Ranges, Yorke Peninsula and the dune-swale systems in the Balaklava–Avon–Port Wakefield area.

The proportion of land protected from wind erosion in October 2010 was 100%.

At this time of the year, the main erosion risk is associated with lack of surface cover as there is little soil disturbance due to tillage.

Protection of land from water erosion

The area of cleared land inherently susceptible to water erosion due to soil type and topography (Class III_e, IV_e and V_e), is approximately 603,000 ha or 29% of cleared land in the Northern and Yorke NRM Region. It mainly occurs on the slopes of the Southern Flinders, Northern Mount Lofty, Barunga and Hummock Ranges.

The proportion of land protected from water erosion in October was 100%, which was equal to the average of 99% for the period 2000 to 2010 (Table 1).

Table 1: Proportion of cleared land (%) protected from water erosion in October in the Northern and Yorke Region and South Australia for the period 2000 – 2010

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
N&Y	99	100	97	99	100	99	98	99	100	100	100
State	100	100	99	100	100	100	99	100	100	100	100

Conclusions

A favourable start to the season was slowed a little by dry, cold conditions in winter however good rains in August and September and into October boosted growth providing sufficient soil surface cover heading into summer.

Surface cover levels in October were slightly poorer than the mean for October for 2000 to 2010. It is possible that a higher proportion of grain legumes, which do not produce as much biomass as cereals, have been grown this year resulting in the poorer cover level. However, given the average rate of breakdown and losses over summer, surface cover levels are not expected to fall below the level regarded as adequate for erosion protection by March.

The proportions of land protected from wind erosion and water erosion are at maximum levels, which is to be expected in October when crops and pastures reach maturity.

At this time of the year, the main erosion risk is associated with lack of surface cover as there is little soil disturbance due to tillage.

Soil surface cover levels will decline as the plant residues break down naturally and are grazed. Tillage can also reduce cover levels as most tillage implements tend to break up and / or bury plant residues. In the Northern and Yorke region, the change in cover levels between October and March, on average, is greater than for other regions in the State.

It is possible that producers will look to reduce the bulk of residues in paddocks to avoid problems with residues at seeding time. Mice problems are usually associated with high carryover of crop and pasture residues so farmers might also look to use tillage and burning to reduce mice numbers. Should surface cover levels be reduced to below that regarded as being adequate for erosion protection, erosion could occur.

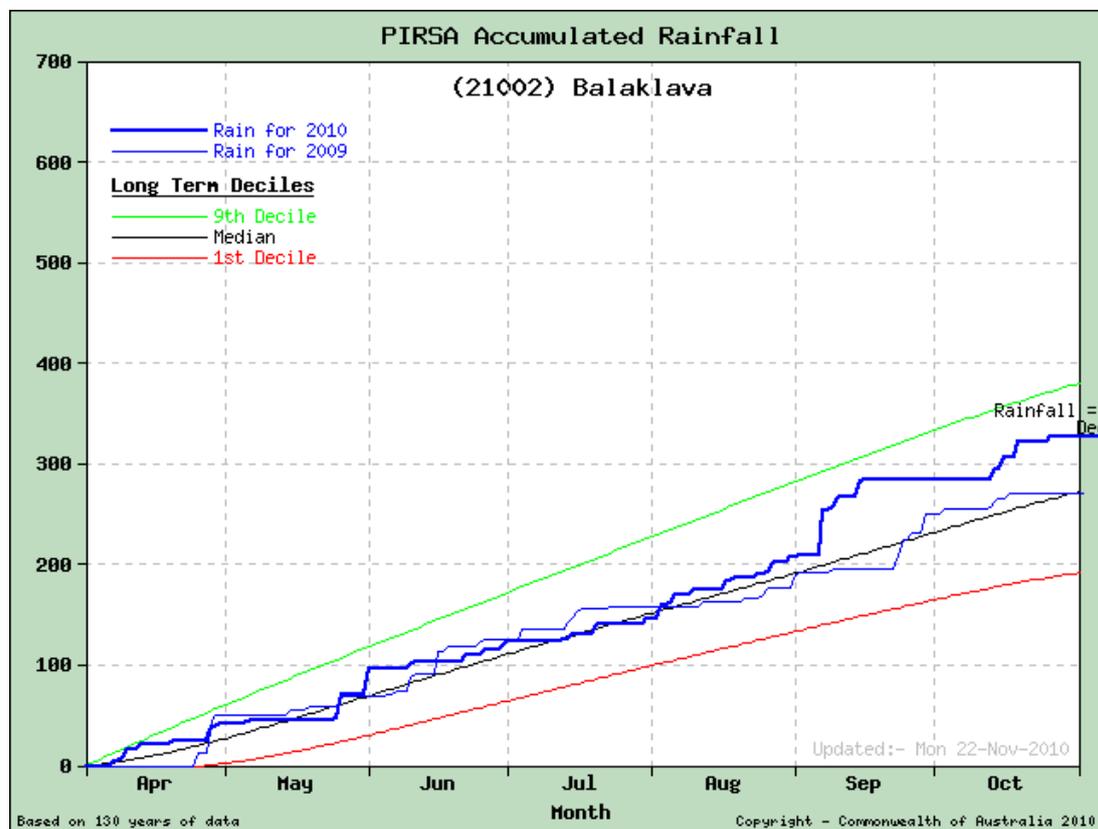
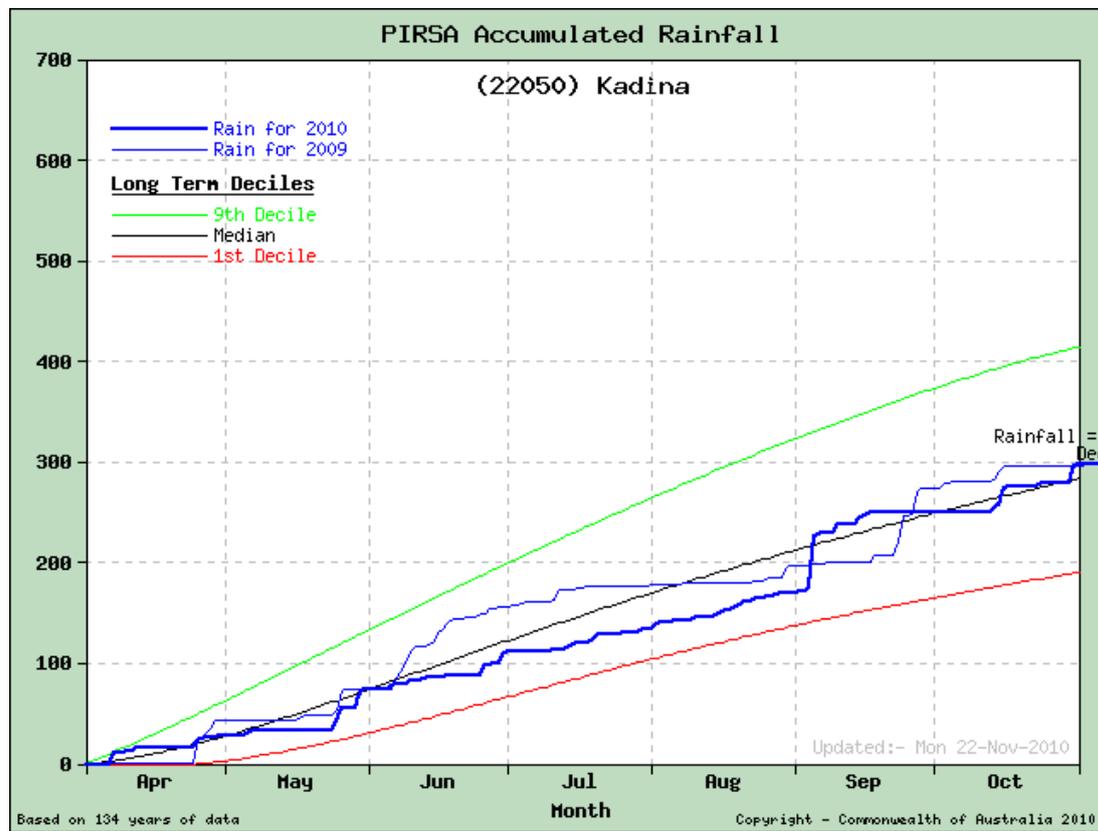
Producers' management of livestock grazing remains a critical factor in maintaining adequate levels of surface cover over summer and into autumn. The improved market for sheep is encouraging many producers to carry more stock so stock feed requirements have to be balanced against the need to retain adequate surface cover.

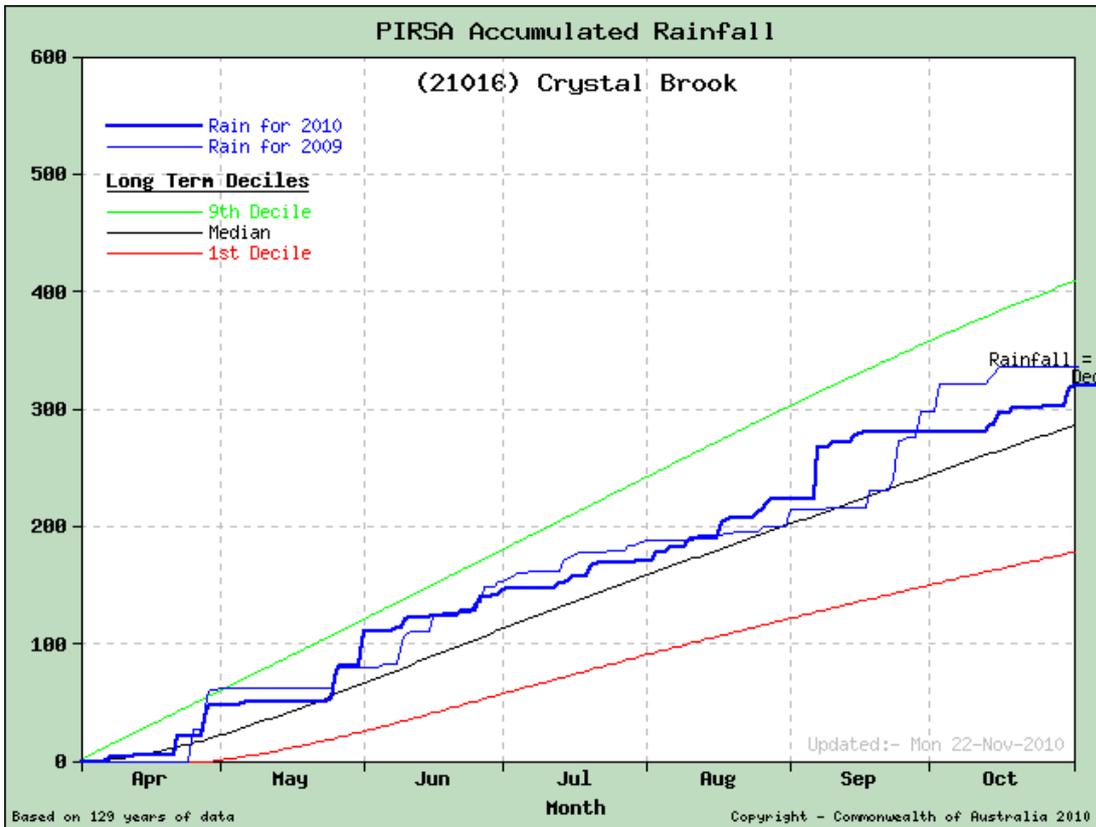
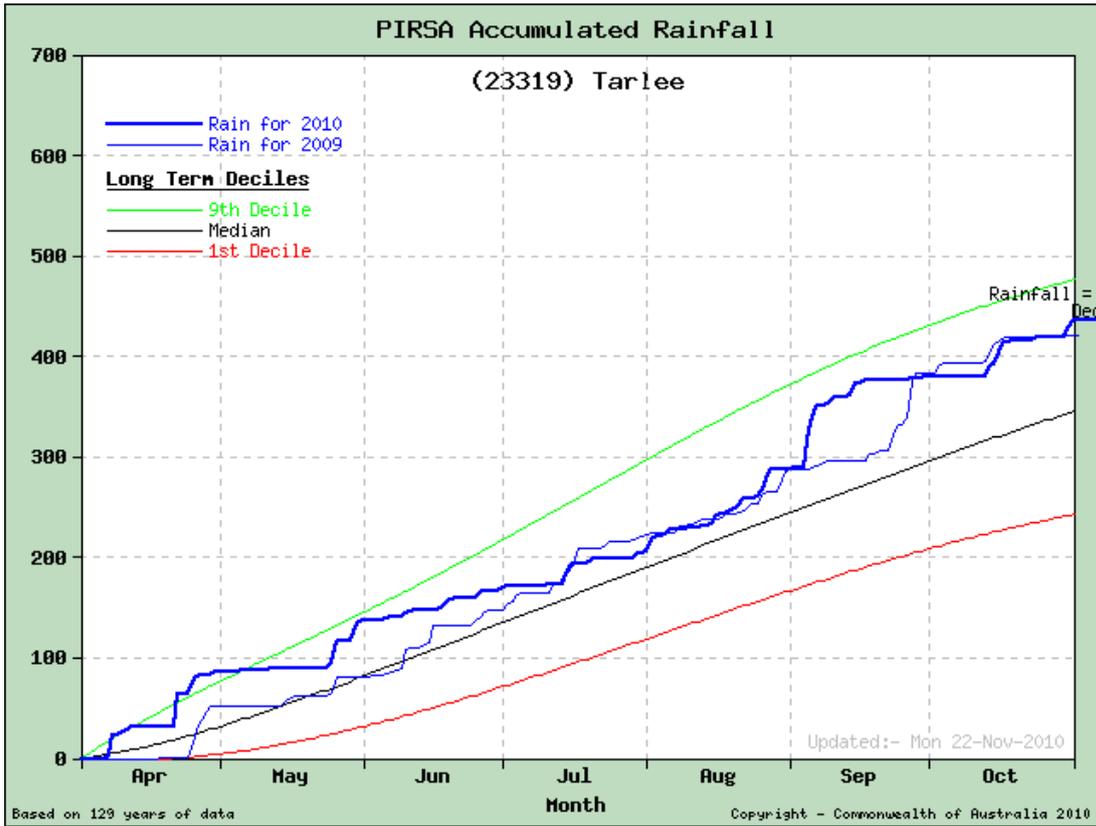
Cultivating land as close as practical to or at seeding time, will leave cover on the soil surface for a longer period of time. Summer rains can stimulate plant growth leading to better cover of the soil, however soil moisture retention and weed control is achieved by killing off this growth. Using herbicides rather than tillage to do this will be better for retaining surface cover. Where summer plant growth is grazed, attention will still have to be paid to maintaining adequate surface cover.

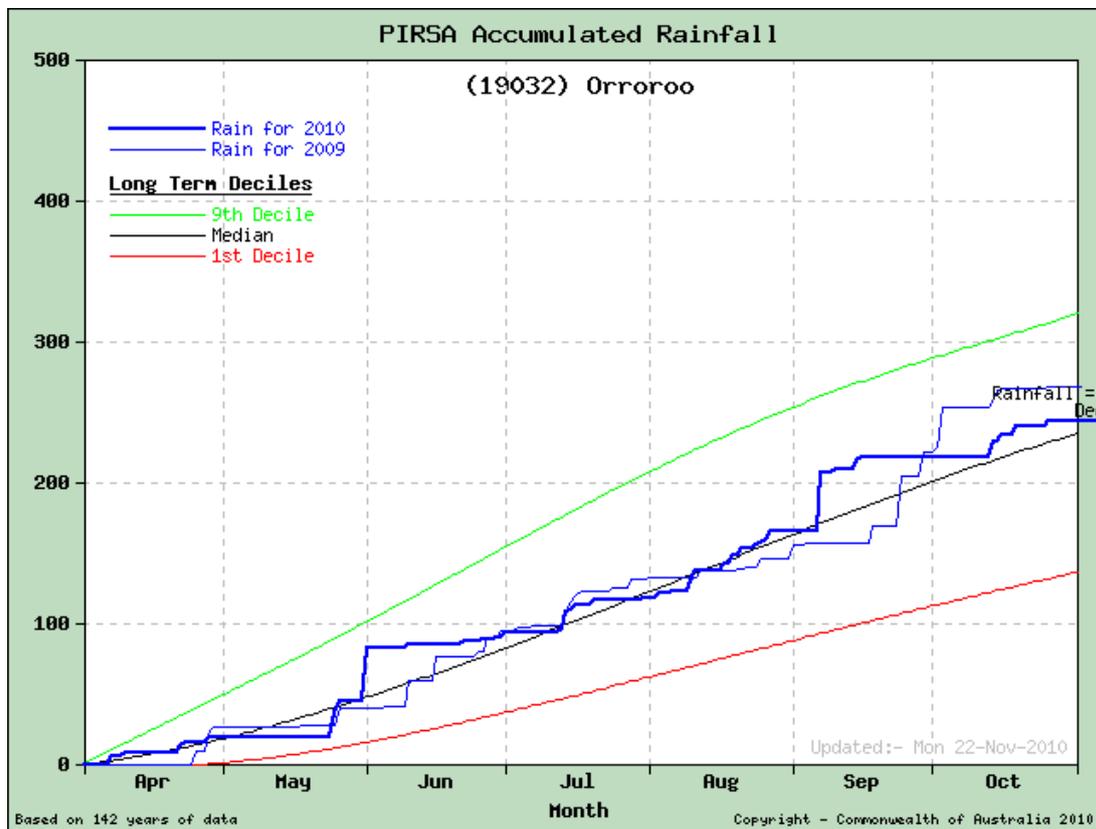
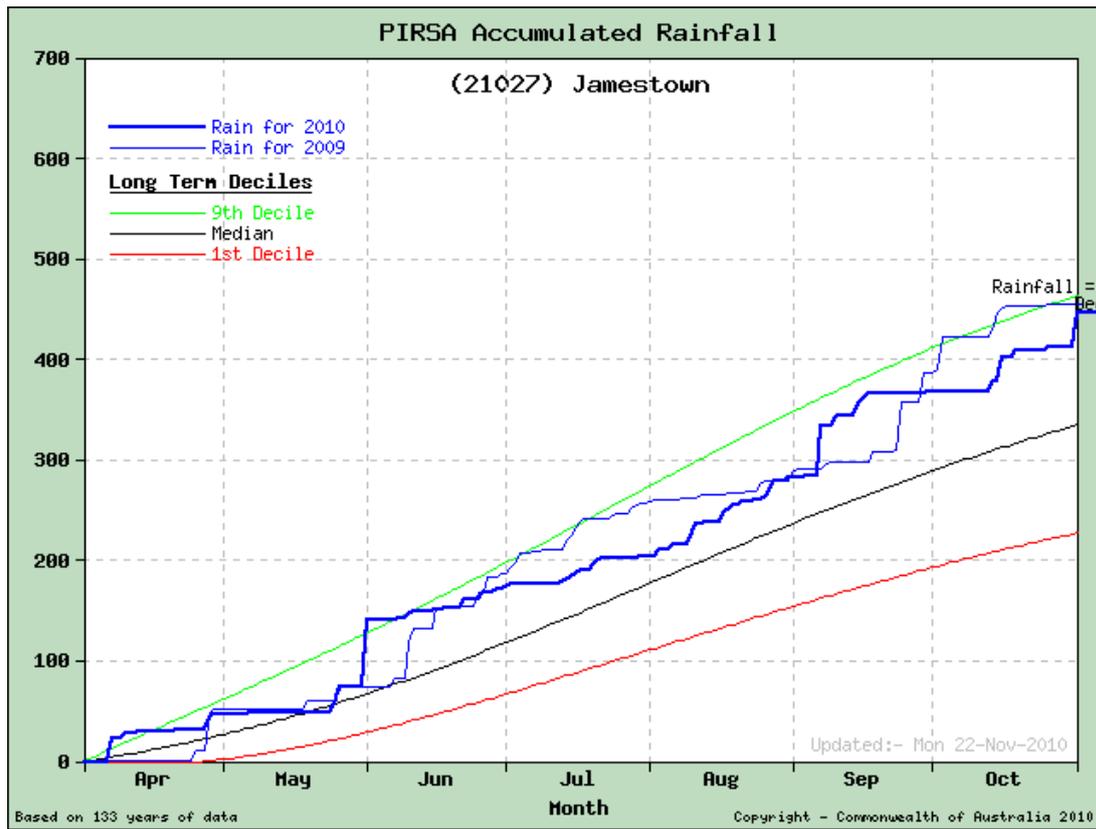
Appendix 1

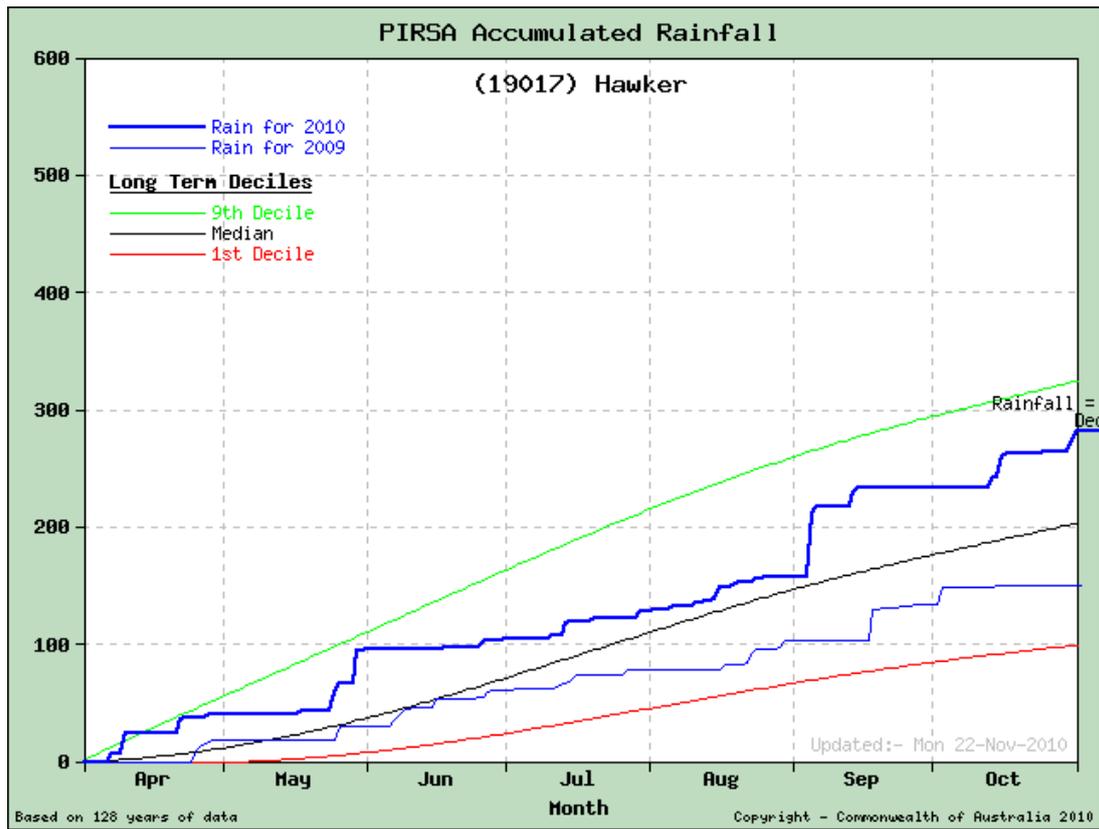
Cumulative rainfall data for selected sites across the Northern and Yorke Region

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Appendix 2

Estimated Pasture Growth Rates (kg/ha/day) during growing season for district council areas within the Northern and Yorke Region, 2010.
 CSIRO Pastures from Space Program (www.pasturesfromspace.csiro.au)

