



# Protection of agricultural land against erosion in the Northern & Yorke Region

## Seasonal Report April 2011

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DENR conducts observational field surveys to monitor trends in the protection of soil from the risk of erosion in the state's agricultural cropping regions. The surveys are undertaken in October, March, May and June each year. Seasonal erosion protection reports are produced twice yearly, following the October and March surveys.

The reports provide a summary of ground cover and soil protection levels in relation to seasonal conditions and land management activities undertaken in recent months, including comparison with the same period in previous years that monitoring was undertaken. They also indicate likely trends in ground cover levels over coming months based on previous years' data.

### Summary

- Rainfall recordings across the region for the 6 months from October 2010 to March 2011 were in the highest 10% of all recordings (Decile 10) for that period.
- A good and prolonged growing season in 2010 resulted in a large amount of annual crop and pasture biomass production.
- A number of significant rainfall events over late spring, summer and early autumn boosted growth of summer weeds, perennial plants and volunteer crop plants.
- The decline in surface cover levels due to the breakdown of stubble and pasture residues was compensated to some extent by this summer plant growth.
- While the proportion of land in a disturbed or loose condition is greater than average for this period, the overall erosion risk over the region is lower due to the higher amounts of surface cover.

## Seasonal Conditions

The period from October 2010 to March 2011 was characterised by heavy rains and milder temperatures.

Apart from a few warmer days in October, conditions were generally cold and wintry. Several localities recorded Decile 10 rainfall observations for the month, including Mambray Creek, Port Germein, Melrose, Black Rock, Oodlawirra, Whyte Yarcowie and Hoyleton. Highest falls in the region were Melrose 117 mm, Mambray Creek 104 mm, Hoyleton 99 mm, Clare 87 mm, and Whyte Yarcowie 84mm.

More rain fell in November, particularly in the Upper North, where falls of 25-50mm for the month were observed. Falls were around average in the Lower North although thunderstorms in late November occurred in the Tohill to Eudunda area. Temperatures remained cool to mild.

Downpours in December occurred with rainfalls of over 150 mm in the Lower North. Highest recordings were 197 mm at Riverton, Tarlee 184 mm, Stockport 179 mm and Lyndoch 160 mm. Nearly all Bureau of Meteorology observation sites recorded highest-ever or Decile 10 falls for the month throughout the Lower North and County Light regions. Rainfalls were also above average in the Upper North where Oodla Wirra, Orroroo and Yongala observed Decile 10 rainfalls. Flooding and damage to infrastructure occurred in the Lower North and erosion in watercourses was observed. Vineyards on cracking clay soils suffered significant erosion.

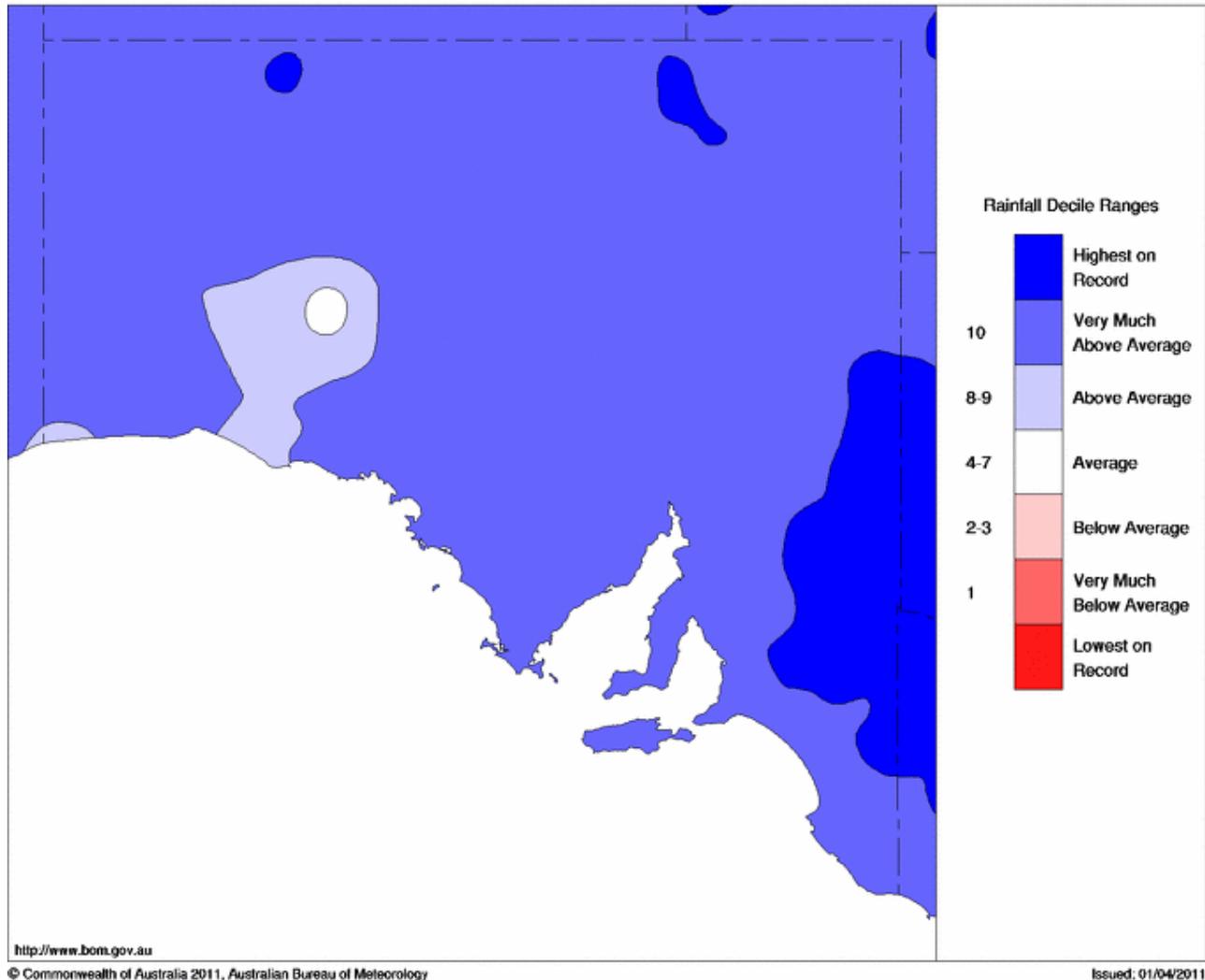
January was relatively dry and warm although a few locations in the Upper North experienced thunderstorms with isolated heavy downpours. The wet weather returned in early February with properties in the Hallett to Yongala and Yunta to Carrieton areas receiving up to 200 mm over a few days with flooding occurring on agricultural land and in townships. Some erosion occurred on cultivated land and canola stubbles that had little surface cover between canola stalks. Erosion was also noted in cultivated vineyards. Decile 10 or highest-ever rainfall recordings were reported for almost all stations in the Lower and Upper North for the month.

Decile 10 or highest-ever recordings for the month were also observed in March at nearly all sites in the region. Scattered, intense, rainfall events over a number of periods resulted in the region receiving 40 to 80 mm in the Upper North and 50 to 150 mm in the Lower North.

The extraordinary rainfall over the October to March period is depicted in the figure from the Australian Bureau of Meteorology showing rainfall deciles (Figure 1).

Figure 1

South Australian Rainfall Deciles 1 October 2010 to 31 March 2011  
Distribution Based on Gridded Data  
Product of the National Climate Centre



## Soil surface cover levels

Excellent growing conditions and a prolonged growing season in spring generated a large amount of crop and pasture biomass. Cereal stubbles were very dense and slow to break down as their nutrient levels were low, slowing decomposition by microbial processes and grazing animals.

Summer rains generated growth of weeds, volunteer cereal and grain legume plants. Follow up rains maintained this growth and surface cover. Grain legume stubbles in particular gained improved erosion protection from the surface cover provided by weed growth. Farmers generally used herbicides to kill summer growth and conserve soil moisture on paddocks going into crop this year however a number of farmers in the northern cropping areas cultivated land after heavy rainfall events to kill weeds. Some also worked up hard-setting ground to improve rainfall infiltration during subsequent rains. Repeated rainfall events saw producers spraying the same paddocks up to 4 times to control summer plant growth.

While livestock in some situations required supplementary feeding to maintain their nutritional requirements, they did not graze paddocks bare. Green growth of volunteer cereals and grasses provided valuable grazing in early autumn. Sheep could be seen standing in feed up to their bellies in March.

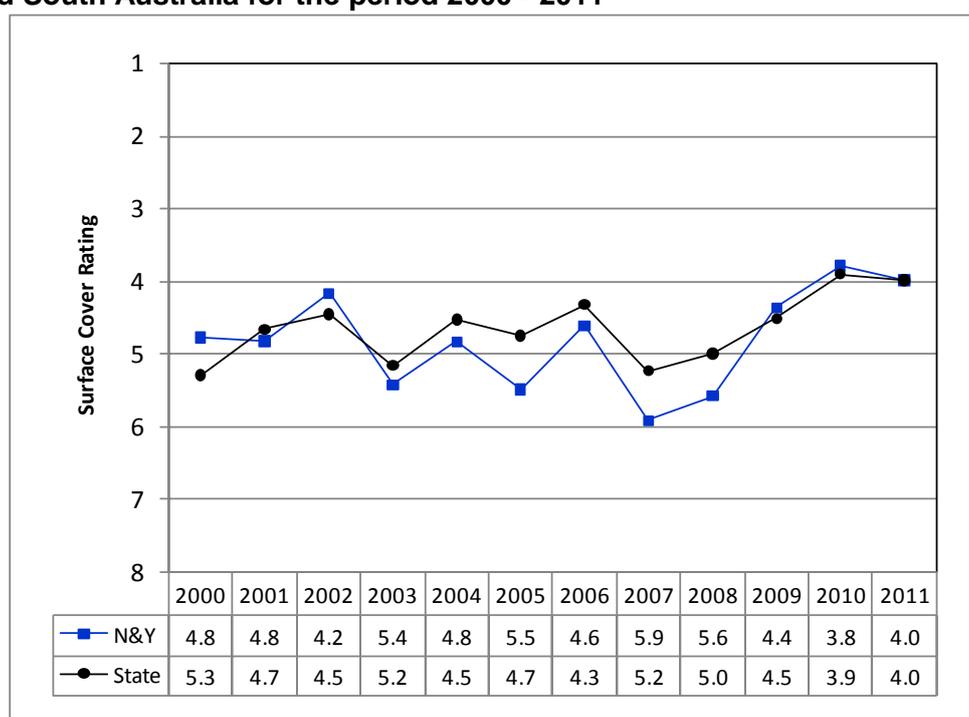
In the DENR erosion protection field surveys, surface cover levels and soil disturbance are visually rated. The surface cover rating system used is based on a scale of 1-8 where 1 = full cover and 8 = bare ground.

Assessments in October 2010 showed that surface cover levels then were slightly less than the average October level observed over the monitoring period of 12 years. The reasons for this, given the good growing conditions, were uncertain but it was thought that the slightly poorer cover levels were possibly due to the significantly increased area of crop sown to lentils on Yorke Peninsula.

Crop and pasture residues break down naturally over summer, particularly if there is rain that stimulates micro-organisms. Natural breakdown, combined with management practices, reduce surface cover levels. Based on the average change in cover ratings between October and March in previous seasons, it was anticipated that surface cover ratings in March 2011 would not be in the range considered to be at risk of erosion.

Data from the land condition field survey show that the mean surface cover rating in March 2011 was 3.1 (Figure 2). This is outside of the critical rating range for erosion risk (greater than 5) and better than the rating of 3.8 in March 2010 and the March average from 2000 to 2010 of 4.0. The change in the surface cover rating of 1.1 units from 2.0 in October 2010 to 3.1 in March 2011 was half the average change in cover ratings from October to March of 2.2 for the period 2000 to 2011.

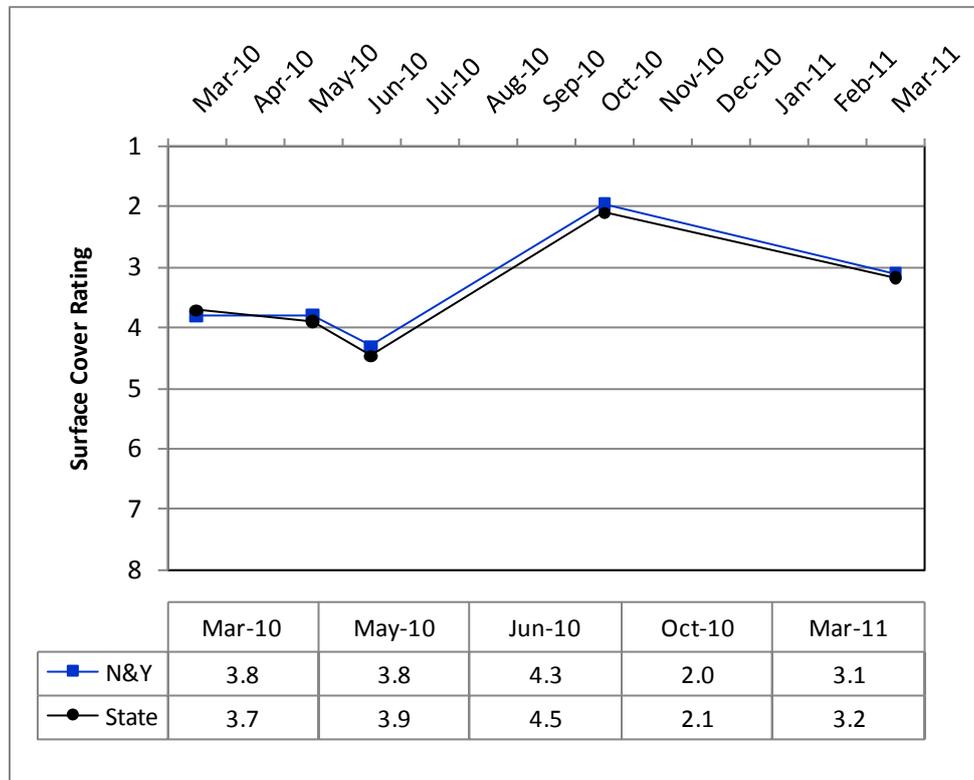
**Figure 2: Mean Surface Cover Rating on cleared land in March in the Northern and Yorke Region and South Australia for the period 2000 - 2011**



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

Figure 3 shows the change in surface cover in the 13 month period from March 2010 to March 2011.

**Figure 3: Mean Surface Cover Rating on cleared land in Northern and Yorke region and South Australia from March 2010 to March 2011**



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

It is estimated from the land condition field survey that about 3.4% of the region's land was cultivated at the time of the March observations. This is higher than the mean for March of 2.9% for the period 2000 to 2010.

Given the good levels of surface cover in March this year and the slow rate of breakdown of residues, adequate levels should remain until they are disturbed or removed by burning and/or tillage.

### 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<sub>a</sub>, IV<sub>a</sub> and V<sub>a</sub>) is approximately 221,000 ha or 11% of cleared land in the Northern and Yorke 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 March 2011 was 99%, which is the same as in March 2010, and is above the March average of 96% for the monitoring period (Table 1).

**Table 1: Proportion of cleared land (%) protected from wind erosion in March in the Northern and Yorke Region and South Australia for the period 2000 – 2011**

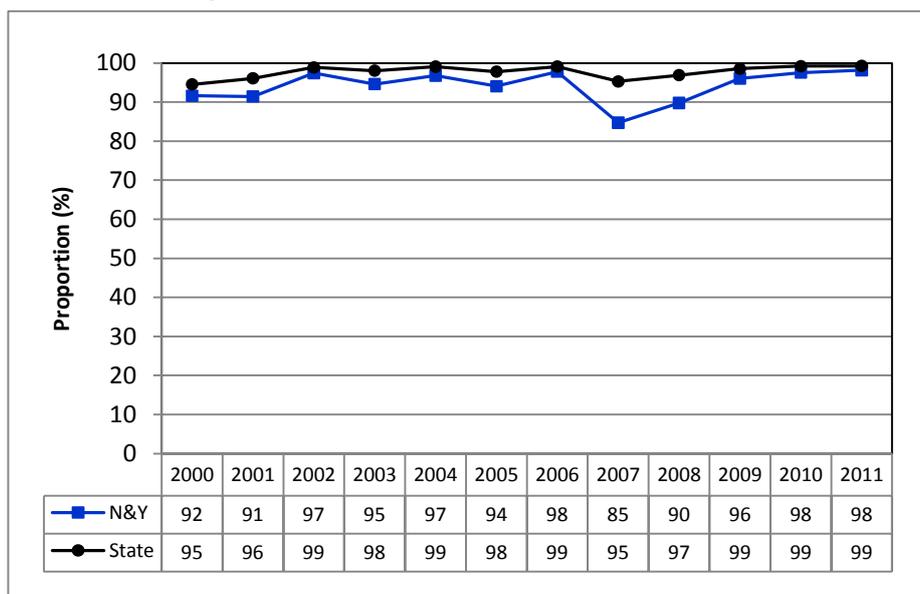
	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	Ave
<b>N&amp;Y</b>	94	94	99	92	96	95	98	95	92	98	98	99	96
<b>State</b>	78	85	92	80	91	91	96	87	91	94	97	97	90

## Protection of land from water erosion

The area of cleared land inherently susceptible to water erosion due to soil type and topography (Class III<sub>e</sub>, IV<sub>e</sub> and V<sub>e</sub>), is approximately 603,000 ha or 29% of cleared land in the Northern and Yorke region. It mainly occurs on the slopes of the Southern Flinders, North Mount Lofty, Barunga and Hummock Ranges.

The proportion of land protected from water erosion in March 2010 was 98%, which is above the March average of 94% over the monitoring period (Figure 4).

**Figure 4: Proportion of cleared land adequately protected from water erosion in March in the Northern and Yorke Region and South Australia for the period 2000 - 2011**



Practices that will reduce soil cover levels or disturb soil before seeding are burning, over-grazing or tillage. If these practices are to be undertaken, delaying them as long as possible will reduce the period of erosion risk.

## Conclusions

Significant rainfalls in late spring, over summer and into autumn, with generally cooler temperatures, resulted in a prolonged growing season for annual crops and pastures and a very high amount of biomass production by the end of the growing season.

Growth of summer weeds and volunteer crop species was boosted on several occasions by rainfall events and this maintained or slowed the loss of surface cover. Breakdown of residues by natural processes and livestock grazing was slower, resulting in better surface cover levels in March this year than for several years, second only to cover levels in March 2002.

Some land in northern districts was cultivated following rainfall events which did increase the risk of erosion on susceptible land. During heavy rainfall events, some water erosion occurred on cultivated paddocks and vineyards.

Herbicides were used widely to kill summer plant growth to conserve soil moisture and reduce the risk of disease carryover whilst still maintaining surface cover of soils.

It is expected that a higher number of paddocks than usual will be burned this year due to concerns that crop stubbles will be too dense to work through when sowing crops this year or to control pests such as snails and herbicide-resistant weeds. Mice also pose a threat due to the higher amount of seed present in the environment so burning or more tillage might be used to disturb their habitat.

The proportions of cleared land protected from wind and water erosion in March this year are 99 and 98% respectively, above the March averages for the period 2000 to 2011.

It is expected that farmers will not need significant rains to start sowing this year's crop given the amount of stored moisture in the soil profile. It is quite likely that some will sow at optimum sowing times for their crop types and local climates, rather than wait for opening rains. In this event, the length of time land will be exposed to erosion is expected to be quite short provided that adequate rains fall within a few weeks of sowing.

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