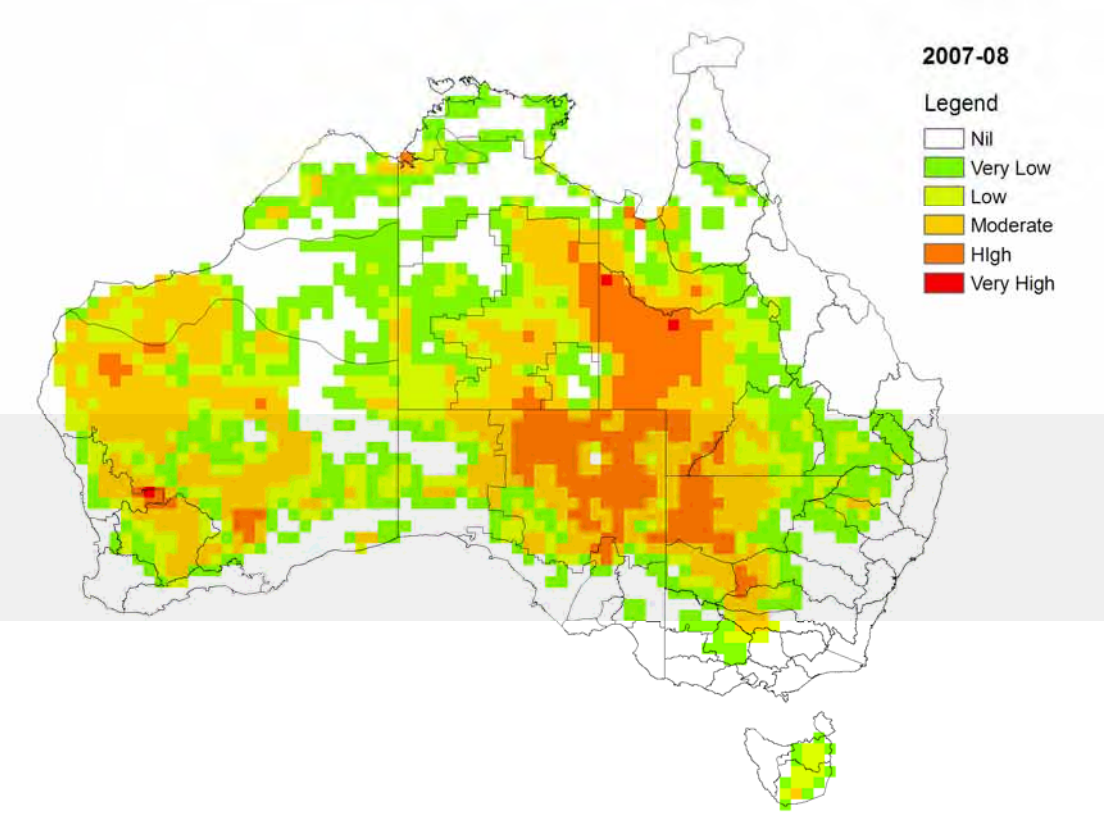
CEMSYS MODELLED WIND EROSION

PRN 0808 – 1220



CARING FOR OUR COUNTRY

USQ UNIVERSITY OF SOUTHERN QUEENSLAND

Prepared by:

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Executive Summary

The Leys report on wind and water erosion (Leys *et al.* 2009b) recommended that wind erosion modelling be undertaken to assist in reporting the extent and severity of wind erosion across Australia. The modelling could then be used by the Australian Government, states and Natural Resource Management (NRM) bodies for resource condition reporting. The same products could be used to assist in identifying areas for Caring for our Country (C4oC) investments.

Modelled monthly and annual wind erosion maps of Australia at 50-km resolution for the period July 2006 to June 2008 were compiled using the Computational Environmental Management System model (CEMSYS). CEMSYS comprises an atmospheric model, a land surface model, a wind erosion model, a transport and deposition model and a land surface database. It uses analysis data from the National Centre for Environmental Prediction, USA (NCEP) to calculate the atmospheric properties like wind fields, rainfall, radiation and clouds. Geographic Information Systems (GIS) are used to describe soils and vegetation data and monthly satellite data is used to calculate ground cover levels. In this study, the severity of wind erosion is described by the horizontal soil flux (TQ mg/m/s) output from CEMSYS. TQ is representative of the average amount of soil that is moved by wind within the pixel each month.

To aid with reporting, a modified map of NRM regions and subregions was developed by an expert panel to report wind erosion status. The severity of erosion, expressed as five erosion classes (very low to very high), was then calculated for each subregion, region, state and the continent for 24 months.

In the 2007–08 dust-year 11% of Australia was in the high and very high erosion classes. This compares to 9% of Australia in the 2006–07 dust-year; however, this 2% yearly difference is not statistically significant. NRM regions with the largest areas of erosion (high and very high classes) tend to be focused in arid and semi-arid rangelands of south-western Queensland, western NSW, north-central and north-eastern South Australia and western Western Australia. The semi-arid agricultural lands of eastern West Australia also had areas of high and very high class erosion. Notably, the non-agricultural lands of western South Australia, northern Northern Territory and eastern Western Australia all have low erosion levels.

The NRM regions, by state, with the highest amounts of soil moved (TQ) were:

- Desert Channels, South West, Border Rivers Maranoa–Balonne, and Condamine in Queensland
- Western, Border Rivers–Gwydir, Namoi, Lachlan, Murrumbidgee, Murray and Lower Murray–Darling regions in NSW
- the Arid Lands and Northern and Yorke regions of South Australia
- the Pastoral and Non-Pastoral regions of the Northern Territory, and
- the Rangeland regions of the Goldfields Nullarbor, Gascoyne Murchison and the mixed farming Northern Agricultural and Avon regions of Western Australia.

The CEMSYS map outputs produced in this study offer a greater temporal (monthly) and spatial resolution (50 km) and better statistical descriptions than the previous measure of wind erosion, the Dust Storm Index (DSI). DSI maps are derived from Bureau of Meteorology observer data from 110 sites across Australia at annual time steps. Maps are then created by interpolating between the 110 sites. Despite the temporal and spatial limitations of the DSI, it still remains a very valuable cross validation for CEMSYS and it has the major advantage of a longer time series (1960 to the present).

With the exception of the annual DSI data, there is a lack of wind erosion data to test the model outputs against at the 50 and 10-km scales. Roadside survey data from NSW is one-hectare scale data and was used to determine the five erosion severity classes and therefore could not be used to test the model. Future testing is planned after the compilation of DustWatch data and roadside survey data from other states (South Australia and Western Australia).

Model outputs appear to be most reliable in the south-eastern Australian rangelands. Outputs for the savannas and grasslands of northern Australia seem less reliable due to the lack of accuracy of the satellite ground cover product's ability to detect dead or senescing vegetation. This error in cover estimates results in an over-prediction of erosion in northern Australia. Under-prediction of erosion in the winter cropping areas of southern Australia is noted and possibly relates to the simplification of soil types used in the model. The model's performance will be improved by using better ground cover and soils data and projects are underway to address these data issues.

The issue of scaling needs to be appreciated and this project shows the problems of comparing data measured at different scales (10 and 50 km) and the loss of precision at 50 km. Larger pixels involve greater averaging of underlying information and as such the likelihood of reporting high and low values is reduced. Therefore, the chance of locating areas with high levels of wind erosion is reduced. In this study, the scalded river margins along the Edward and Wakool Rivers in the western end of the Murray catchment management area were classified 'High' and 'Very High' at 10-km resolution and 'Low' and 'Moderate' with the 50-km resolution. With the 50-km data, this priority area would not have been identified.

This study concludes with an implementation plan that proposes improvements to the modelled wind erosion data through the provision of a longer time series of maps (2000 to the present) and increasing the resolution of the modelling from 50 to 10 km.

1. Introduction

The Leys report on wind and water erosion (Leys *et al.* 2009b) recommended that wind erosion modelling be undertaken to assist in reporting the extent and severity of wind erosion across Australia. The modelling could then be used by the Australian government, states and Natural Resource Management (NRM) bodies for resource condition reporting. The same products would also assist in identifying areas for Caring for our Country (C4oC) investments.

This report was commissioned by the Australian Government as represented by the Department of the Environment, Water, Heritage and the Arts with funding from the Caring for our Country initiative.

This project aims to make available monthly maps of wind erosion and statistics on wind erosion rates. The maps and statistics are based on modelled data produced at 50 km resolution for the Australian continent, state and NRM regions for period July 2006 to June 2008.

1.1 PROJECT TEAM

A collaborative effort between the Department of Environment, Climate Change and Water NSW (DECCW) and the University of Southern Queensland (USQ) was required to complete this project. Protect team members were Dr John Leys (DECCW), Dr Harry Butler (USQ), Dr Xihua Yang (DECCW) and Mr Stephan Heidenreich (DECCW).

1.2 PROJECT OBJECTIVES

The objectives of this project were:

- to provide modelled monthly maps and statistics on the intensity and extent of wind erosion at Australian continental, state and NRM scales for July 2006 to June 2007, and
- to develop a four-year implementation plan (2009–12) outlining the provision of higher resolution (10 km grid) maps and statistics for NRM bodies for the period 2000 to 2010.

Both objectives have been successfully completed. In addition to the contracted period of July 2006 to June 2007, an additional year was modelled (July 2007 to June 2008), thus providing two years of monthly data.

2. Study Methods

Several steps were required to complete the project's objectives. These are described in detail in this section and are summarised as:

- Run the CEMSYS model and create the American Standard Code for Information Interchange (ASCII) output files.
- Produce an NRM region map of the country suitable for reporting the statistics on wind erosion.
- Convert the ASCII files to ArcGIS grid files and write ArcGIS script files to calculate the monthly and dust-year statistics for each NRM region, state and national area.
- Produce maps of wind erosion for each month and dust-year.

2.1 MODEL SIMULATION

The Computational Environmental Management System model (CEMSYS) (Shao *et al.* 2007) was used to model wind erosion for the period 1 July 2006 to 30 June 2008. The following summary of the model is from Leys *et al.* (2009b p.18) and Butler *et al.* (2008).

'CEMSYS has been under development since the early 1990s (Shao *et al.* 1996; Shao and Leslie 1997; Shao 2003; Shao *et al.* 2007). As Figure 1 shows, CEMSYS comprises an atmospheric model, a land surface model, a wind erosion model, a transport and deposition model, and a land surface database. The atmospheric model has treatments for atmospheric dynamic and physical processes, including radiation, clouds, convection, turbulent diffusion, and the atmospheric boundary layer (Leslie and Wightwick 1995).

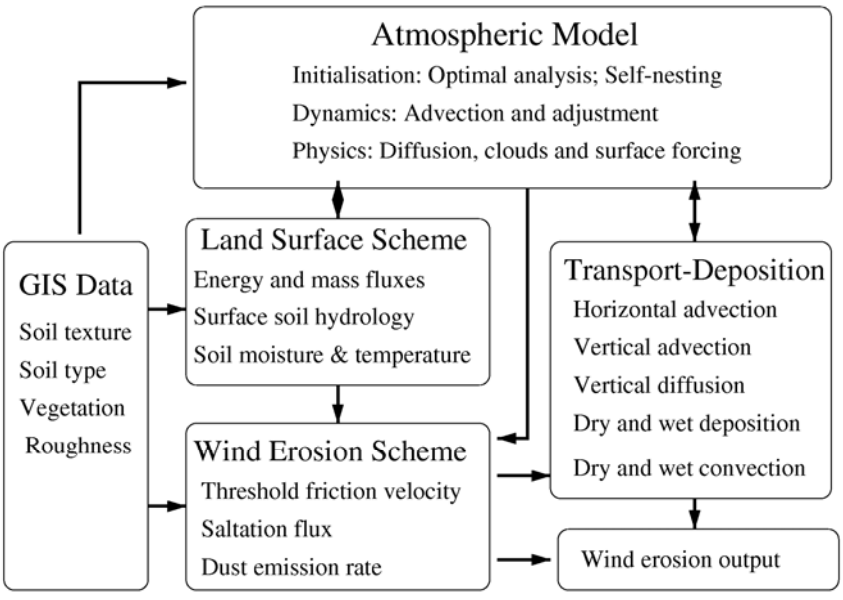


Figure 1. The framework of the CEMSYS model

The land surface model simulates energy, momentum, and mass exchanges between the atmosphere, soil, and vegetation. The land surface model is based on the 'Atmosphere and Land Surface Interaction Scheme' (Irannejad and Shao 1998). For wind erosion modelling, CEMSYS produces friction velocity and soil moisture as outputs.

The wind erosion model obtains friction velocity and soil moisture from land surface models, and other spatial parameters from the GIS database, and predicts sand and dust fluxes. To predict dust motion, the transport and deposition model obtains wind fields, turbulent diffusivities and precipitation from the atmospheric model, and dust flux and particle size information from the wind erosion model. The atmospheric model is run first, followed by the land surface model and the wind erosion model. Finally, calculations of dust transport and deposition are done.'

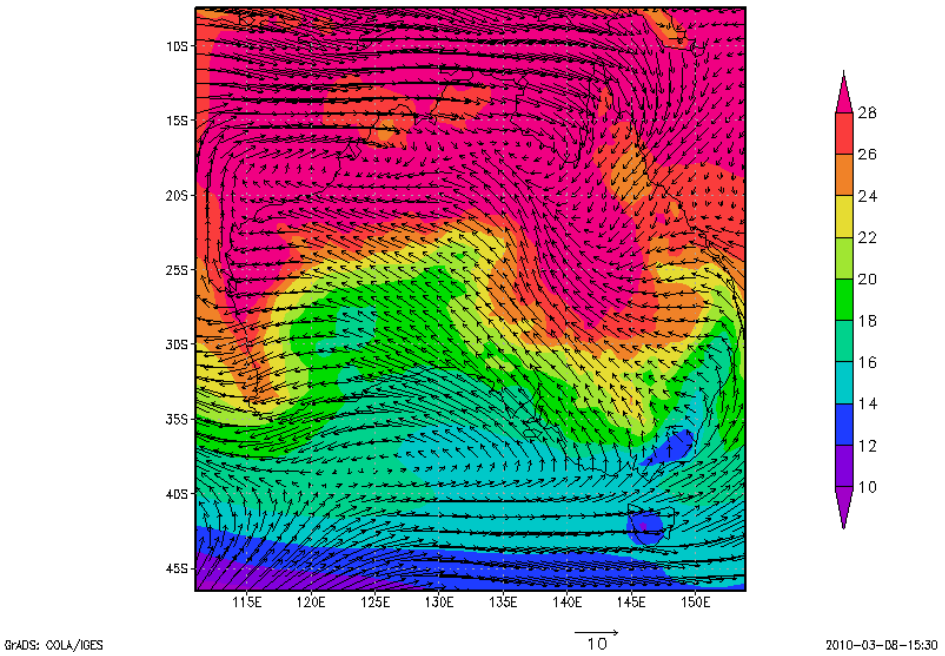
The sub-models are outlined in more detail in the following sections.

2.1.1. The atmospheric model

The simulation is completed in two stages. In Stage 1 CEMSYS is run over the Australian region at 50 km horizontal resolution and 25 levels in vertical. The atmospheric boundary layer is resolved using 10 levels from 850 hPa to the surface, with the lowest level at a few metres. Initial and boundary conditions for this atmospheric model are obtained using analysis data from the National Centre for Environmental Prediction, USA (NCEP).

Stage 2 involves running CEMSYS at a finer 10 km horizontal resolution. In this stage, the atmospheric model is self-nested; that is, the atmospheric model derives its initial and boundary conditions from the first-stage model predictions. Figure 2 illustrates the procedure. In Figure 2a, the flow field based on the NCEP analysis is shown for the Australian region while in Figure 2b, the flow field based on the first stage simulation is shown.

a) Average Temperature (^{o}C) and Average Wind Speed (m/s) on 10 February 2008.



b) Average Temperature (^{o}C) and Average Wind Speed (m/s) on 10 February 2008.

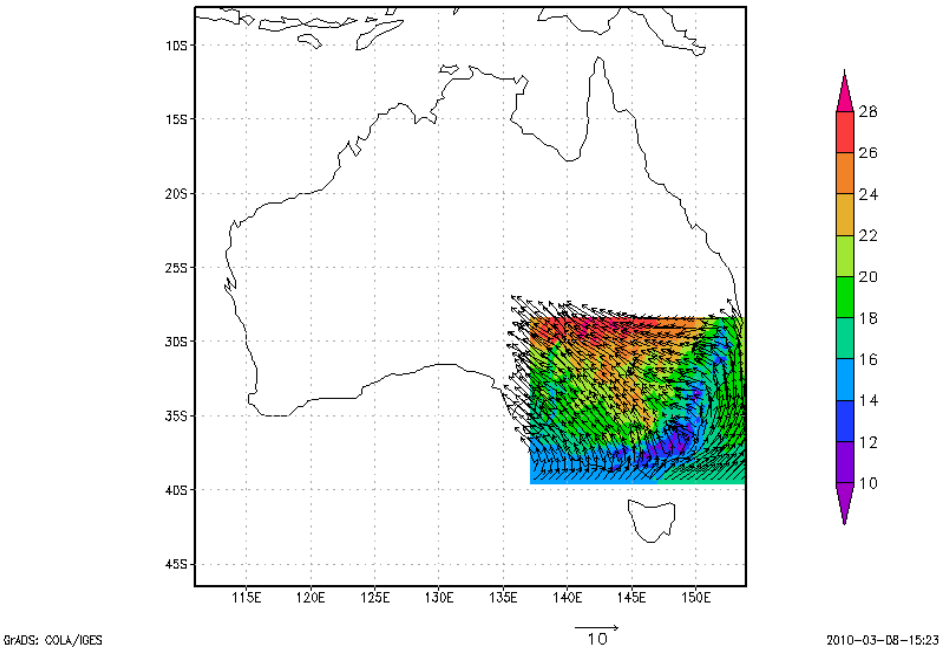


Figure 2. The nesting procedure of the atmospheric model:

a) the simulation was first run over the Australian region with a resolution of 50 km, using the NCEP analysis data for the initial and boundary conditions for the atmospheric fields. b) The simulation was then run for the SE Australian region with a resolution of 10 km, using the first stage output (a) for the initial and boundary conditions

2.1.2. The land surface model

The wind erosion threshold friction velocity (u_{*t}) is strongly related to soil moisture. The evolution of soil moisture depends on surface hydrological processes and the interactions between the atmosphere and the land surface, because such interactions determine the evaporation, and to a certain degree, precipitation. In this study, soil moisture is simulated within the land surface model using atmospheric and land surface data.

The land surface model can incorporate as many soil layers as required to provide a better vertical resolution of soil moisture and better treatment of heterogeneity (in the vertical) of soil hydraulic properties. This flexibility in choosing the number of soil layers also facilitates a better simulation of soil moisture close to the surface, which is important in estimating threshold friction velocity.

In the model, the land surface is divided into areas of bare soil and vegetation. The energy transfer processes over bare soil surfaces and canopies are described using aerodynamic resistance laws (Irannejad and Shao 1998).

2.1.3. The wind erosion model

The friction velocity (u_*) is calculated from the land surface data and the atmospheric data. The surface resistance is represented by the threshold friction velocity (u_{*t}) and is dependent on the particle size of the soil surface, atmospheric conditions and surface conditions such as soil moisture, vegetation cover and soil type as described by (Shao and Lu 2000).

Under natural conditions, silt and clay particles may occur as individual grains, as aggregates, or as coatings upon sand grains. During a minor wind erosion event, soil aggregates behave in a similar fashion to sand particles. However, as wind erosion intensifies, these aggregates can break or abrade, releasing dust into the air. Therefore, CEMSYS uses two types of particle size-distributions. The first particle size-distribution involves as little as possible disturbance to the soil sample (minimally dispersed). The second particle size-distribution reduces the soil to its fundamental particle sizes (fully dispersed). The dispersed particle size-distribution approximates a sediment particle size-distribution during strong wind erosion events. Both the minimally dispersed and fully dispersed particle size-distributions are used in the computation of the streamwise saltation flux of sand particles and the emission rate of dust particles. In this study, only five of the 12 soil classifications used were available for both minimally and fully dispersed distributions. This simplification of the soils data is recognised and more soils are being analysed as part of a sister project to overcome this limitation (McTainsh *et al.* 2010).

The soil and vegetation types are derived from the geographic data from the *Atlas of Australian Resources* (AAR) Volumes 3 (NATMAP 1980) and 6 (AUSLIG 1990). The spatial resolution of the data is 5x5 km.

Australian soils are classified into 28 soil-map classes within AAR, with 21% being shallow permeable sandy soils, 17% deep massive earths, 11.2% cracking clay soils with low permeability when wet, 11% shallow loam soils, 8.4% sandy soils, 5.4% calcareous earths and the rest of the soil types occupy 26%. Based on the qualitative description of the soil properties and associated landforms of each soil, the 28 soil-map classes are regrouped into the 12 United States' Department of Agriculture (USDA) soil-texture classes (Table 1) ranging from sand to clay. Table 2 gives a summary of the soil-map classes and the

corresponding soil-texture classes. For soil moisture simulation, each soil class is also assigned a set of hydrological parameters.

Table 1. USDA soil classifications

Soil class	Map key for Figure 3a
Sand	1
Loamy sand	2
Sandy loam	3
Silty loam	4
Loam	5
Sandy clay loam	6
Silty clay loam	7
Clay loam	8
Sandy clay	9
Silty clay	10
Clay	11
Non-erodible	12

Table 2. Summary of soil mapping units and soil properties

Note that the descriptions of the soil properties are extracted from more detailed descriptions given in *Atlas of Australian Resources* Volume 3 (NATMAP 1980). The corresponding CEMSYS classes and USDA soil texture classes are also listed.

Mapping class for CEMSYS	AAR mapping class	AAR mapping units	Soil properties	USDA classes
5	1	A1	Deep loam soils	Loam
8	2	A2	Deep duplex soils	Clay loam
6	3	Ba1	Deep highly structured loams	Sandy clay loam
7	4	Ba2	Deep highly structured clays	Silty clay loam
3	5	Ba3	Deep highly structured earths	Sandy loam
6	6	Bb1	Deep massive porous loams	Sandy clay loam
3	7	Bb2	Acid organic loam soils	Sandy loam
7	8	Bb3	Similar to Bb1, with unknown clays	Silty clay loam
8	9	Bb4	Deep massive earths	Clay loam
8	10	Bb5	Duplex soils, large amounts of gravels	Clay loam
1	11	Bc1	Deep calcareous sands	Sand
5	12	Bc2	Calcareous earths	Loam
5	13	Bd1	Young loam soils	Silty loam
11	14	Bd2	Clay soils, highly saline	Clay
11	15	Bd3	Red duplex soils	Clay
1	16	Ca1	Sandy soils	Sand
10	17	Cb1	Cracking clay	Silty clay
10	18	Cb2	Cracking clay	Silty clay
11	19	Cc1	Duplex soils with thin surface soils	Clay
1	20	Cd1	Sand soils with hardpans	Sand
7	21	Cd2	Duplex soils with surface soil ranging from sand to loam	Silty clay loam
11	22	Ce1	Clay soils with gleyed subsoils	Clay
11	23	Ce2	Duplex gley soils	Clay
1	24	Cf1	Sand soils	Sand
1	25	Cf2	Sandy soils	Sand
2	26	Cf3	Shallow depth loam soils	Loam sand
9	27	Cf4	Friable clay soils	Sandy clay
11	28	Cf5	Quaternary basalts with pockets of organic debris	Clay

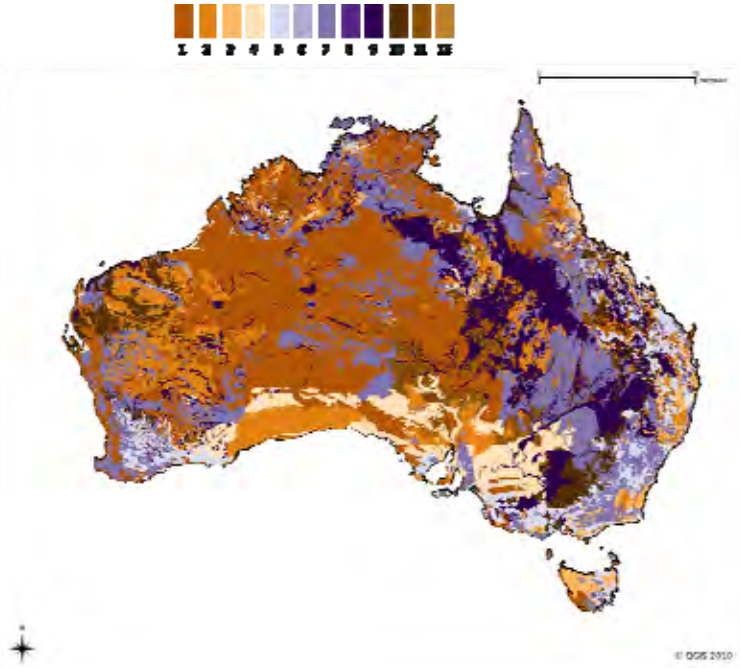
Table 3. Summary of vegetation mapping units

See *Atlas of Australian Resources* Volume 6 for details (AUSLIG 1990).

AAR mapping class	AAR mapping unit	Canopy height (m)	Description
1	T4	40	Tall closed forest
2	T3	35	Tall open forest
3	T2	35	Tall woodland
4	M4	25	Closed forest
5	M3	10	Open forest
6	M2	0.5	Woodland
7	M1	7.5	Open woodland
8	L4	7.5	Low closed forest
9	L3	7.5	Low open forest
10	L2	3.0	Low woodland
11	L1	0.5	Low open woodland
12	S4	3.5	Closed shrub
13	S3	3.5	Open shrub
14	S2	2.0	Tall shrubland
15	S1	0.4	Tall open shrubland
16	Z4	1.0	Closed heath
17	Z3	0.8	Open heath
18	Z2	0.5	Low shrubland
19	Z1	0.05	Low open shrubland
20	H2	0.25	Hummock grassland
21	G4	0.5	Closed tussock grassland or closed sedgeland
22	G3	0.5	Tussock grassland or sedgeland
23	G2	0.25	Open tussock grassland
24	G1	0.025	Sparse open tussock grassland
25	F4	0.2	Dense sown pasture
26	F3	0.15	Sown pasture
27	F2	0.075	Open herbfield
28	F1	0.015	Sparse open herbfield
29	N/A	10	Paren lake (e.g. mangroves, low shrubs etc.)
30	N/A		Peaty sand
31	N/A		Saline lake
32	xM4	20	Mixed
33	xZ3	2	Mixed shrubs
34	dG3	0.5	Bluegrass (tufted grass)
35			Other

The soil-map classes used in Australia are shown in Figure 3a. Some soils are known to be non-erodible (e.g. areas covered largely by bare rocks) and are excluded from the calculations of wind erosion. The erodibilities of the rest of the soils are determined by the threshold friction velocity, which is calculated in CEMSYS.

a) Soil map based on USDA classifications



b) Vegetation map

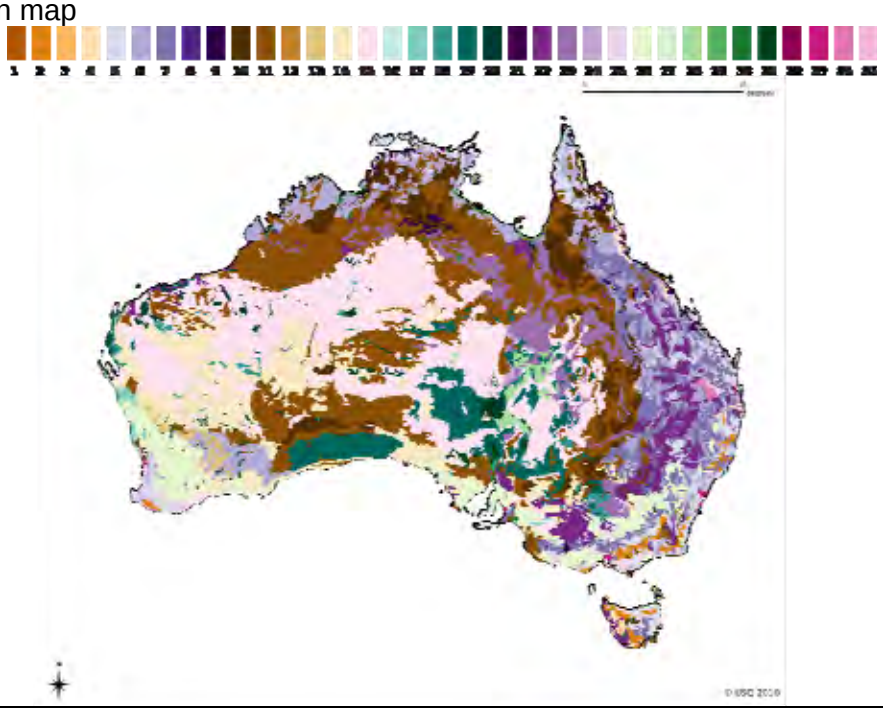


Figure 3. The soil (a) and vegetation (b) map classes used in CMESYS for Australia.

The vegetation type data in the GIS database provide a range of parameters such as vegetation height, minimum vegetation stomatal resistance, vegetation albedo, etc. The source of vegetation data is the *Atlas of Australian Resources* Volume 6 (AUSLIG 1990). Vegetation is divided into 35 classes according to height, density and number of canopy layers. The vegetation types for the Australian region are shown in Figure 3b.

The calculation of u_{*t} requires the frontal area index of roughness elements and the soil moisture as inputs. The former is slowly varying with time and hence is assumed to be constant for individual months and is updated monthly. In this study, frontal area index is derived via an empirical relationship from a combination of satellite NDVI (Normalised Differential Vegetation Index) data and GIS data for vegetation types.

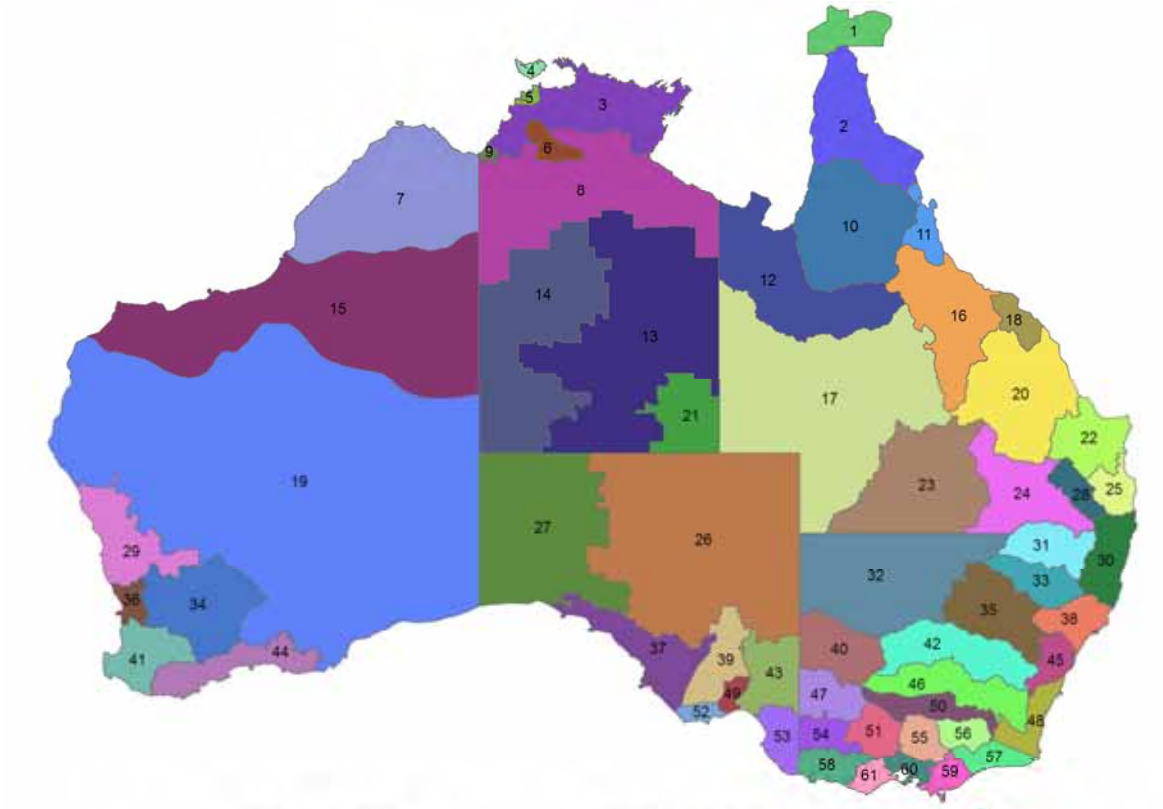
The only new data incorporated into the model compared to previous publications using CEMSYS was the NDVI data. Previously NDVI data has been used that was calculated from the Advanced Very High Resolution Radiometer (AVHRR) Bpal series. Due to problems with the Bpal data, this study used Moderate Resolution Imaging Spectroradiometer (MODIS) NDVI data (MOD13Q1) at 16-day intervals derived from MODIS Land Products (http://lpdaac.usgs.gov/modis/dataproducts.asp) and further processed and distributed for the Australian region via CSIRO Land and Water (Paget and King 2008). The CSIRO mosaic NDVI archive and report can be accessed at http://www-data.wron.csiro.au/rs/MODIS/LPDAAC.

Monthly NDVI data from 2000–2008 were calculated from the 16-day NDVI time-series data using the mean values. Abnormal values (e.g. null) were filled using neighbourhood values or adjacent images using GIS focal function. Any negative NDVI values were set to zero. The monthly NDVI data was resampled to the specific pixel size and dimensions required by the CEMSYS model and then exported to ASCII grid format. Automated GIS programs were developed to produce the required monthly NDVI and CEMSYS inputs.

Modelled CEMSYS six-hourly horizontal soil flux (TQ mg/m/s) data was averaged to give the monthly data sets. TQ is representative of the wind erosion rate at a site, or in this case, the average for the pixel. Pixel size was 50 x 50 km. CEMSYS can be run at a resolution of 10 x 10 km, as has been done for NSW.

2.2 DEVELOPING THE NRM REGIONAL MAP FOR WIND EROSION REPORTING

During the development of the wind erosion priority area maps for the 2009–10 Caring for Our Country (C4oC) Business Plan (see http://www.nrm.gov.au/publications/factsheets/target-info-sheet-landmanagement.html), the expert panel suggested that the standard 56 NRM regions where not applicable to the prioritisation process because some NRM regions were too large, e.g. those in the Northern Territory and Western Australia. The 2008 C4oC prioritisation working group divided the Northern Territory in to nine subregions and the Western Australian Rangelands into three subregions. During the production of this report the ‘North’ NRM region in Tasmania was also divided into two subregions to delineate the Tasmanian mainland area from the Flinders Island area. The result was a total of 65 NRM region and subregions. These are shown in Figure 4 and listed in Appendix 1.



NRM ID	NRM Name
1	Torres Strait
2	Cape York
3	NT - Top End
4	NT - Melville Island
5	NT - Darwin
6	NT - Katherine-Douglas
7	Rangelands - Kimberley
8	NT - Savanna
9	NT - Victoria River
10	Northern Gulf
11	Wet Tropics
12	Southern Gulf
13	NT - Arid Centre - Pastoral
14	NT - Arid Centre - Non Pastoral
15	Rangelands - Gascoyne Murchison
16	Burdekin
17	Desert Channels
18	Mackay Whitsunday
19	Rangelands - Goldfields Nullarbor
20	Fitzroy
21	NT - Arid Centre Simpson
22	Burnett Mary
23	South West Queensland
24	Border Rivers Maranoa - Balonne
25	South East Queensland
26	South Australian Arid Lands
27	Alinytjara Wilurara
28	Condamine
29	Northern Agricultural
30	Northern Rivers
31	Border Rivers-Gwydir
32	Western

NRM ID	NRM Name
33	Namoi
34	Avon
35	Central West
36	Swan
37	Eyre Peninsula
38	Hunter-Central Rivers
39	Northern and Yorke
40	Lower Murray Darling
41	South West
42	Lachlan
43	South Australian Murray Darling Basin
44	South Coast
45	Hawkesbury-Nepean
46	Murrumbidgee
47	Mallee
48	Southern Rivers
49	Adelaide and Mount Lofty Ranges
50	Murray
51	North Central
52	Kangaroo Island
53	South East
54	Wimmera
55	Goulburn Broken
56	North East
57	East Gippsland
58	Glenelg Hopkins
59	West Gippsland
60	Port Phillip and Westernport
61	Corangamite
62	Tas - Flinders
63	Tas - North West
64	Tas - North
65	Tas - South East

Figure 4. NRM regions and subregions

2.3 CALCULATION OF STATISTICS

Statistics are presented at two time scales and three spatial scales. The time scales are:

- Monthly (average of 6-hourly data), and
- Dust-year (July to June) (average of monthly data).

The three spatial scales are:

- continental
- state, and
- NRM region.

ASCII model outputs from CEMSYS were imported into ArcGIS 9.3 and converted to raster/grid files. These files were cookie-cut to 64 NRM regions, subregions, state and national areas. The modelled monthly raster/grid data was then used to calculate the percentage of each area within five erosion classes.

The monthly raster/grid data used the five-class system below.

- Very Low (when TQ < 20 mg/m/s)
- Low (when TQ > 20–40 mg/m/s)
- Moderate (when TQ > 40–160 mg/m/s)
- High (when TQ > 160–640 mg/m/s)
- Very High (when TQ > 640 mg/m/s)

Different thresholds were applied to the dust-year data due to the longer averaging period; that is a year vs. one month. The dust-year raster/grid data used the five-class system below.

- Very Low (when TQ < 10 mg/m/s)
- Low (when TQ > 10–20 mg/m/s)
- Moderate (when TQ > 20–80 mg/m/s)
- High (when TQ > 80–160 mg/m/s)
- Very High (when TQ > 160 mg/m/s)

The threshold levels set for the erosion classifications for the 50 km pixel size were based on previous experience with CEMSYS using 10 km pixel sizes. The classification thresholds have been set using the 10 km data and the roadside survey (RoS) data from the Lower Murray–Darling, Murray and Lachlan Catchment Management Authorities (CMAs) (Leys *et al.* 2009a). RoS data estimates erosion at a site using a five-class system:

- Low (no erosion evident)
- Moderate (evidence of erosion but eroded sediment remains within the paddock)
- High (evidence that sediment is being exported off site)
- Severe (surface lowering of up to 10 cm)
- Extreme (surface lowering greater than 10 cm).

Comparison of the 10-km CEMSYS data with RoS data at the pixel scale is problematic because the roadside data is representative of a 100 m x 100 m area, which is considerably

smaller than a 10-km pixel. Also, there can be several RoS sites with a range of erosion values within a single 10-km pixel. Therefore, the approach was to set the threshold for the modelled moderate erosion class proportional to the RoS moderate class results; that is, if the RoS data indicated that 10% of the CMA area was in the moderate class, then the threshold for the modelled moderate class was set to equal 10% of pixels for that CMA.

Due to the large pixel size of 50 km, it was difficult to use the RoS data to set the classification thresholds as was done for the 10-km data. There is no equivalent Australian monthly wind erosion data at any scale for testing the 50-km classifications. As such, these classifications should be seen as a first step in the development of a robust classification system.

The raster/grid data was also used to create 24 monthly maps for the period July 2006 to June 2008 and two dust-year (July to June) maps in ArcGIS.

3. Results and Discussion

CEMSYS is a modelling system that has gained acceptance via field testing (Shao *et al.* 1996) and against dust events of short duration of three to four days (Shao *et al.* 2007). To date, CEMSYS has not been validated over longer time scales such as months and years as presented here; therefore some caution must be used when interpreting this data. Despite this, there is a 'sensible' distribution of erosion activity both in space and time. In this context 'sensible' is taken to mean that the extent and severity of the modelled erosion data conforms to our knowledge of wind erosion. For example, we would expect the arid lands to have higher levels of erosion than the humid lands and we would expect certain areas to have erosion in summer and others in spring. These patterns are observed in the modelled data.

Results are presented for two time scales and three spatial scales as listed below.

The time scales are:

- Monthly (average of 6-hourly data), and
- Dust-year (July to June) (average of monthly data).

The three spatial scales are:

- continental
- state, and
- NRM region.

3.1 MONTHLY DATA

The model output for the monthly data is displayed as maps for 2006–07 in Figure 5 and for 2007–08 in Figure 6. The statistics for each NRM region, state and national area are listed in Appendix 2.

The occurrence of erosion is greatest just before the rainfall season, i.e. when ground cover is generally lowest. In the northern parts of Australia, erosion commences before the wet season in late spring/early summer. In the south of Australia, erosion commences in late summer/early autumn.

If we define the erosion season as commencing when the high and very high classes exceed 5% of the nation within one month, then in 2006–07 the erosion season commenced in October 2006 and finished in March 2007 (Figure 5). In 2007–08, the erosion season commenced earlier in August 2007 and is high through to June 2008 with the exception of May 2008 (Figure 6). The NRM regions with very high and high erosion during this period are:

- Queensland NRM regions of Desert Channels, South West, Border Rivers Maranoa–Balonne, and Condamine
- NSW regions of Western, Border Rivers–Gwydir, Namoi, Lachlan, Murrumbidgee, Murray and Lower Murray–Darling
- South Australian Arid Lands region
- Northern Territory Pastoral and Non-pastoral regions, and
- Western Australian regions of Rangelands – Goldfields Nullarbor, Rangelands – Gascoyne Murchison and Avon.

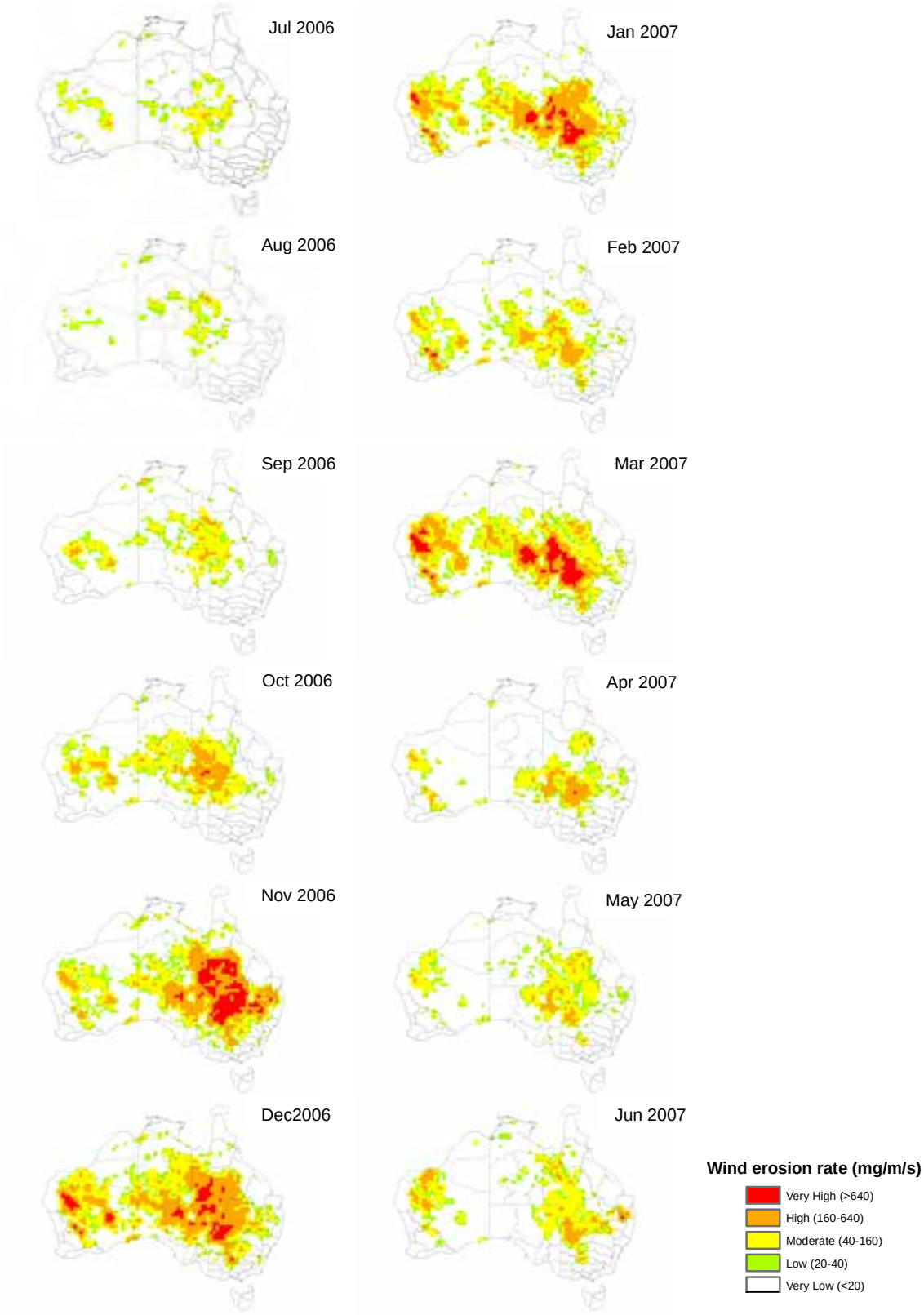


Figure 5. Modelled monthly wind erosion maps for the period July 2006 to June 2007

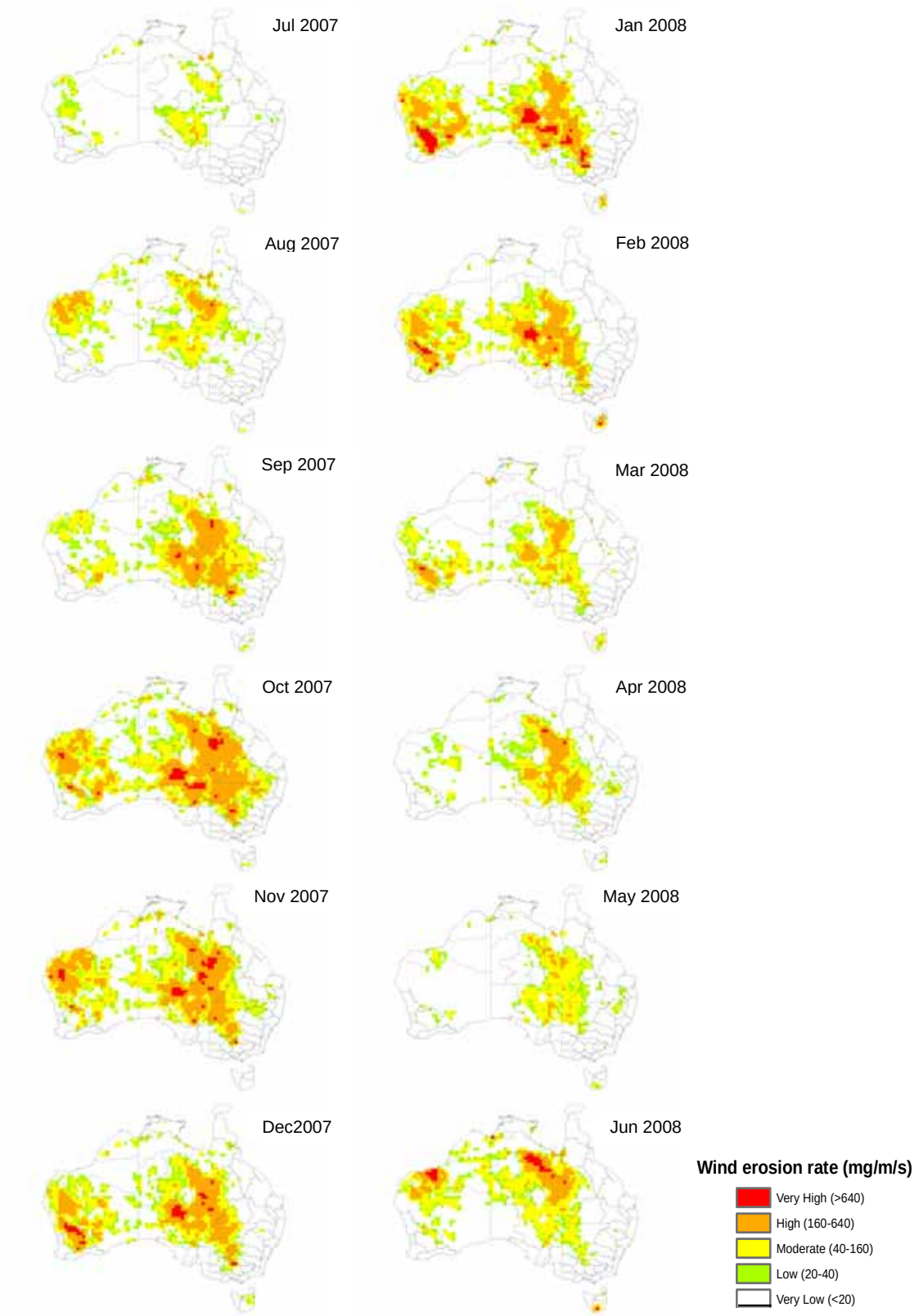


Figure 6. Modelled monthly wind erosion maps for the period July 2007 to June 2008

Other smaller regions also have high or very high erosion through the simulation period, e.g. Northern and Southern Gulf in Queensland during July 2007 and North and South-east of Tasmania during February and June 2008.

The months with the highest levels of erosion are December 2006 and October 2007 with 24% of pixels in the high and very high class. Peak erosion levels at the NRM level were in November 2006 when the model predicted that the Desert Channels in Queensland had 96%, South West Queensland had 94% and Western NSW had 91% of their areas in the high and very-high classes. These levels appear to be unrealistic which indicates that the thresholds in the monthly five-class classification maybe set too low for northern NRM regions. Another possible explanation lies in the use of the NDVI data to derive the frontal area index (i.e. ground cover).

Previous studies (Lu *et al.* 2001) have indicated that NDVI is not a good index for the estimation of dead or senescent vegetation which can often form a large proportion of the ground cover. When vegetation is dead the NDVI value is low and this results in a correspondingly low frontal area index. As such the frontal area index is underestimated and the erosion level is over estimated. We suspect that this underestimation of frontal index in northern Australian grasslands in late spring occurs because the grass lands are covered in dead or senescent cover that results in a low NDVI value. After the rains arrive in summer, estimates are more realistic and we see a decline in erosion levels as seen in the 'Desert Channels' region 17-monthly data in Appendix 2.

As pointed out in section 2.3, the monthly thresholds were based on previous CEMSYS 10-km data from NSW. From 2006 to 2008, there is CEMSYS modelled data at the 10-km resolution for NSW. A comparison of the 10-km vs. 50-km data for the sum of the very high and high erosion classes for the Lower Murray–Darling, Lachlan and Murray CMAs in NSW is presented in Figure 7. The results show that for the percentage area of each CMA in the high plus very high classes, the areas are three to six times higher for the 50-km results compared to the 10-km results. This is most likely a function of scaling and is explained below.

Understanding the operational concepts of the CEMSYS model helps explain the scaling differences. Wind erosion is a complex process which depends on land cover, soil type, soil moisture and wind conditions. Each of these dependences has significant spatial variability across the Australian continent. In addition, both soil moisture and wind can be influenced by local atmospheric conditions. Several researchers have identified this spatial variability as a key issue in modelling wind erosion at continental and regional scales (Butler *et al.* 2005, Walker *et al.* 2006, Reid *et al.* 2008). To account for this variability, CEMSYS is run at two scales (i.e. 50-km and 10-km scales).

In the initial run, atmospheric data from the United States' National Oceanic and Atmospheric Administration (NOAA) is used to calculate the wind speed and direction, surface temperature and rainfall within each 50-km pixel. This data is then used to calculate the soil moisture content (which includes evaporation and rainfall) and the wind erodibility of the soil surface. Each pixel is partitioned into its component soil types, and the erosion levels are calculated based on vegetation types, soil moisture and particle-size characteristics of each component soil.

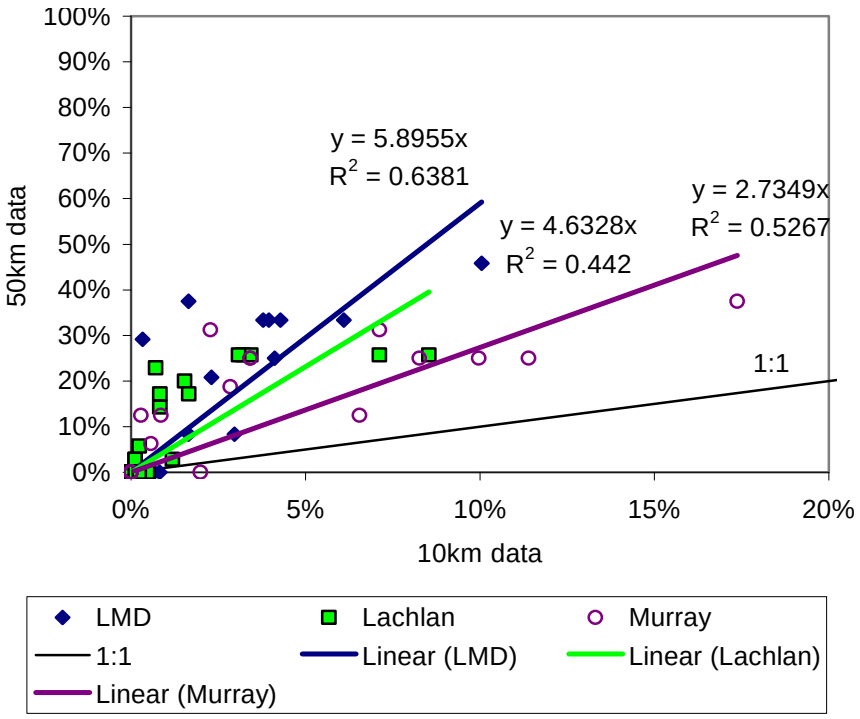


Figure 7. Comparison of 10-km and 50-km CEMSYS products for the percentage of the CMA area in the high and very-high erosion classes

As Figures 8a and 9a show, the 50-km wind field does not show any localised wind effects, thus the initial 50-km wind field just describes the general circulation pattern. To increase the resolution of the model, a finer wind field is calculated using the initial 50-km data for use in the 10-km model. The new 10-km wind field accounts for localised affects due to ranges etc. as illustrated in Figures 8b and 9b. As wind erosivity varies with the cube of the wind speed, these localised variations in wind speed can have a significant effect on wind erosion level within each 50-km pixel.

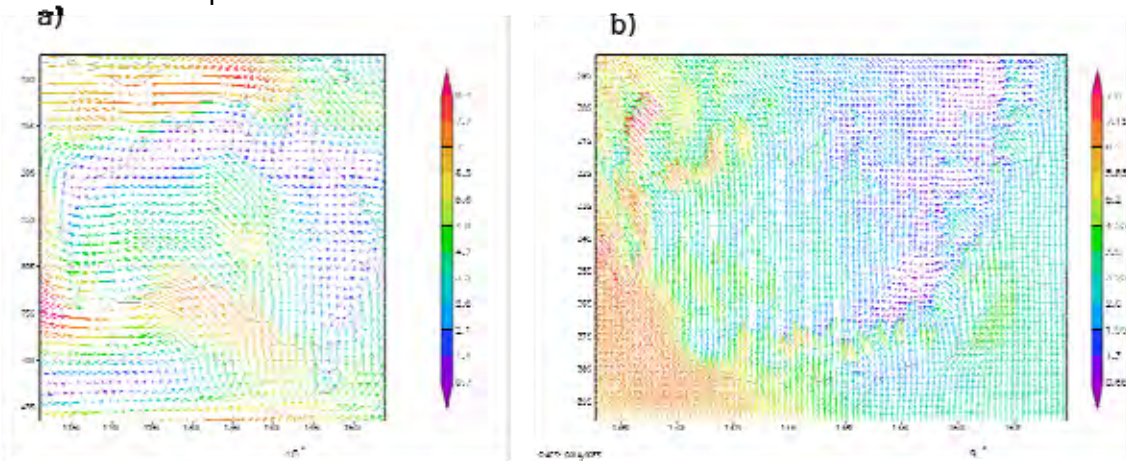


Figure 8. Calculated monthly average wind fields (m/s) for February 2008 at 50-km resolution (a) and 10-km resolution (b).

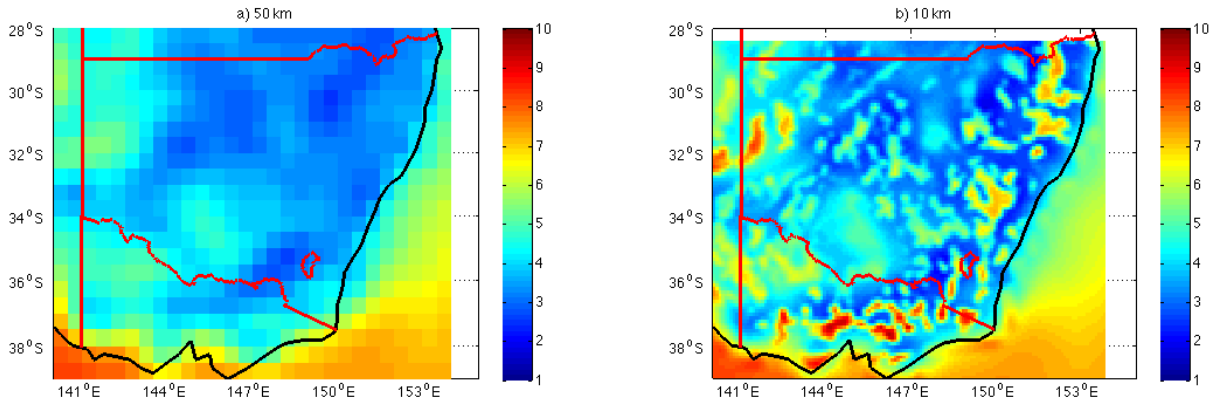


Figure 9. Contour maps illustrating the spatial variability in wind speed (m/s) for February 2008 at 50-km (a) and 10-km (b) resolutions

In addition, the percentage composition of erodibility land types within each of the 10-km pixels can be significantly different from each other and the overlying 50-km pixel. As stated by McTainsh *et al.* (1996) and Butler *et al.* (2005), small variability in the percentage of erodible land types can have a significant impact on the soil erodibility calculations. The McTainsh *et al.* (1996) study looked at three erodibility scenarios within the Channel Country of western Queensland. Scenario 1 assumed that the three main land types were eroding at uniform rates; Scenario 2 assumed that the three land types were eroding at different rates; while Scenario 3 assumed that the area of dunes was increased by 5%, while the area of alluvium decreased by 5% in comparison to Scenario 2. Table 4 shows the results of this study.

Table 4 Estimated soil loss rates in t/km^2 under three erodibility scenarios in the Channel Country of western Queensland

Source: McTainsh *et al.* (1996).

Land type	Scenario 1 (t/km^2)	Scenario 2 (t/km^2)	Scenario 3 (t/km^2)
Dunes		389.2	124.4
Alluvium	38.1	151.2	208.8
Downs		1.9	1.9

Two significant results from this study are relevant to this report. The first is that each land type within a pixel can be eroding at significantly different rates. Secondly, a small change in percentage composition of the pixels can result in a significant change in the overall erodibility. Thus, the variability in the composition of the pixels, when combined with localised changes in wind field, are the most likely reasons for the differences observed in the 50-km and 10-km data. This scaling issue is well documented (Walker *et al.* 2006, Reid *et al.* 2008) and indicates the importance of comparing data of like scales.

While the 50-km data might not be ideal for detailed statistics at a region or catchment scale (as detailed later in this report), it does provide a good measure of the broad trends in wind erosion activity at a continental scale and allow comparisons between regions and years. It is also is very cost effective.

Currently the 10-km data is being validated against the NSW DustWatch Node data which has 26 stations with dust concentration at 1-hour resolution. This will provide information on the accuracy of the 10-km data, and may suggest ways to improve the 50-km data.

3.2 ANNUAL DUST-YEAR DATA

There are differences in the spatial distribution of the 2006–07 and 2007–08 dust-years (Figure 10). The full annual statistical data is presented in Appendix 3. If we consider only the high and very high classes within each NRM region as the percentage of the NRM with erosion levels of concern, then there are several NRM regions that reached this level in either of the two years and they are listed in Table 5. Due to the low sample number of individual months (e.g. only two January readings) there is not adequate data to determine statistical differences between individual months. However if we treat the months as replicates within a dust storm year (DSY) then preliminary annual comparisons are statistically possible. The underlying assumption for the paired t-test with equality of means is that the months are replicates; however, in this case we know there is a season variation of erosion through the year and so this assumption is not up held. Despite that the t-test data is presented in Table 5. The results indicate that only six NRM regions were statistically different ($P<0.05$) between DSY 06-07 and 07-08 and that there were no statistical differences between DSY at the national and state levels. The most important features are described below.

Table 5. National, state and NRM monthly percentages of high and very high class erosion

Month	Year	National	NT	WA	SA	Qld	Vic	NSW	NT Arid Centre-Pastoral (r13)	Gascoyne Murchison (r15)	Desert Channels (r17)	Goldfields Nullarbor (r19)	South West Queensland (r23)	S.A. Arid Lands (r26)	Western (r32)	Namoi (r33)	Lower Murray Darling (r40)	Lachlan (r42)	Murray (r50)
Jul-06	0607	0	0	0	1	0	0	0	0	0	0	1	1	2	0	0	0	0	0
Aug-06	0607	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0
Sep-06	0607	2	0	2	2	3	0	0	0	0	7	3	1	5	1	0	0	0	0
Oct-06	0607	7	2	4	13	13	0	5	3	0	40	7	16	26	18	0	0	0	0
Nov-06	0607	21	4	5	30	47	1	43	10	0	96	7	94	58	91	53	38	23	31
Dec-06	0607	24	13	16	35	36	1	30	26	2	92	25	79	62	76	13	33	20	31
Jan-07	0607	17	5	12	32	23	1	27	9	1	64	17	46	59	75	7	21	14	25
Feb-07	0607	6	0	5	10	4	1	14	1	0	13	7	3	20	47	0	0	3	19
Mar-07	0607	18	7	20	32	13	1	27	11	15	39	27	22	62	75	7	29	17	25
Apr-07	0607	4	0	1	9	3	0	16	0	0	6	1	11	18	57	0	0	0	0
May-07	0607	2	0	1	7	2	0	6	0	1	7	1	1	14	21	0	0	0	6
Jun-07	0607	4	0	5	1	5	0	15	0	9	3	5	7	2	45	13	8	3	13
Jul-07	0708	1	0	0	2	1	0	0	0	1	1	0	0	3	0	0	0	0	0
Aug-07	0708	5	3	6	3	8	0	0	8	15	26	6	0	6	0	0	0	0	0
Sep-07	0708	12	3	1	30	19	0	23	8	1	63	2	11	60	60	0	33	26	0
Oct-07	0708	24	10	18	39	36	0	32	26	10	85	25	59	67	75	27	33	26	25
Nov-07	0708	20	10	17	35	26	1	20	26	16	74	23	9	60	47	0	25	26	25
Dec-07	0708	15	5	14	28	17	1	21	14	0	56	16	13	52	54	0	8	26	26
Jan-08	0708	17	5	19	38	12	1	24	12	0	41	24	9	66	49	0	46	25	38
Feb-08	0708	14	6	13	30	11	1	16	15	0	37	16	7	56	35	0	33	17	13
Mar-08	0708	5	1	5	13	7	0	3	2	0	24	3	0	26	8	0	0	3	13
Apr-08	0708	7	4	0	15	13	0	10	12	0	42	0	13	29	32	13	0	6	0
May-08	0708	2	2	0	3	4	0	1	6	0	11	0	0	5	4	0	0	0	0
Jun-08	0708	8	13	7	1	15	0	0	36	18	39	6	0	2	0	0	0	0	0
Mean	0607	8.8	2.6	5.9	14.3	12.5	0.4	15.3	5.0	2.3	30.7	8.4	23.4	27.3	42.2	7.8	10.8	6.7	12.5
Stdev		8.7	4.1	6.6	13.9	15.3	0.5	14.0	7.9	4.7	35.6	9.4	32.4	25.6	33.3	15.1	15.1	9.0	13.0
Mean	0708	10.8	5.2	8.3	19.8	14.1	0.3	12.5	13.8	5.1	41.6	10.1	10.1	36.0	30.3	3.3	14.8	12.9	11.7
Stdev		7.3	4.0	7.5	15.1	9.7	0.5	11.5	10.7	7.4	24.8	10.0	16.3	26.8	27.0	8.3	17.7	12.3	13.7
Paired t		0.39	0.15	0.30	0.20	0.69	0.34	0.55	0.04	0.29	0.24	0.62	0.21	0.25	0.30	0.43	0.54	0.09	0.79

Month	Year	NT Non Pastoral (r14)	BR Maranoa- Balonne (r24)	Condamine (r28)	Northern Agricultural (r29)	Border rivers-Gwydir (r31)	Avon (r34)	Northern and Yorke (r39)	Murrumbidgee (r46)
Jul-06	0607	0	0	0	0	0	0	0	0
Aug-06	0607	0	0	0	0	0	0	0	0
Sep-06	0607	0	0	0	0	0	0	0	0
Oct-06	0607	3	0	0	0	0	0	0	0
Nov-06	0607	2	54	100	7	66	13	10	8
Dec-06	0607	15	5	0	6	10	18	10	8
Jan-07	0607	8	3	0	7	0	24	0	4
Feb-07	0607	1	3	0	6	0	28	0	0
Mar-07	0607	15	3	0	7	0	24	10	4
Apr-07	0607	0	0	0	3	0	11	0	0
May-07	0607	0	0	0	0	0	0	0	0
Jun-07	0607	0	17	60	7	0	0	0	0
Jul-07	0708	0	0	0	3	0	0	0	0
Aug-07	0708	0	0	0	0	0	0	0	0
Sep-07	0708	0	0	0	3	0	0	19	8
Oct-07	0708	0	5	0	13	5	16	29	19
Nov-07	0708	0	0	0	13	0	13	24	12
Dec-07	0708	0	0	0	40	0	67	10	12
Jan-08	0708	0	0	0	40	0	80	29	19
Feb-08	0708	0	0	0	50	0	60	19	8
Mar-08	0708	0	0	0	26	0	47	5	0
Apr-08	0708	0	0	0	0	0	0	10	0
May-08	0708	0	0	0	0	0	0	5	0
Jun-08	0708	0	0	0	3	0	0	5	0
Mean	0607	3.7	7.1	13.3	3.6	6.3	9.8	2.5	2.0
Stdev		5.8	15.5	32.3	3.3	19.0	11.2	4.5	3.2
Mean	0708	0.0	0.4	0.0	15.9	0.4	23.6	12.9	6.5
Stdev		0.0	1.4	0.0	18.3	1.4	30.8	10.7	7.6
Paired-t		0.05	0.17	0.18	0.02	0.31	0.05	0.01	0.04

The differences in erosion levels between the 2006–07 and 2007–08 dust-years for the NRM regions were as follows.

- Queensland regions: Desert Channels increased from 31 to 42%, South West decreased from 23 to 10%, Border Rivers Maranoa-Balonne decreased from 7 to 0.5% and Condamine 13 to 0%.
- NSW regions: Lower Murray Darling increased from 11 to 15%, Lachlan 7 to 13%, Murrumbidgee 2 to 7% (significantly different) and Western decreased from 42 to 30%, Murray 13 to 12%, Border Rivers Gwydir 6 to 1% and Namoi from 8 to 3 %.
- South Australian regions: Arid Lands increased from 27 to 36%, and Northern and Yorke increased from 2 to 13 % (significantly different).
- Northern Territory regions: NT Arid Centre Pastoral increased from 5 to 14% (significantly different) and NT Non Pastoral decreased from 4 to 0% (significantly different).
- Western Australia: Gascoyne Murchison increased for 2 to 5%, Goldfields Nullarbor 8 to 10%, Northern Agricultural from 4 to 16% (significantly different) and Avon 10 to 24% (significantly different).

At a state scale, South Australia increased its percentage area in 2006–07 to 2007–08 from 14 to 20%, Queensland increased from 12 to 14%, NSW decreased from 15 to 12% and the Northern Territory increased from 6 to 8%.

Nationally, 2007–08 had higher erosion levels of 11%, compared to 2006–07 with 9% (not significantly different**Error! Reference source not found.**).

NRM regions with erosion level of concern (high and very classes) tend to be focused in arid and semi-arid rangelands and the agricultural (farming) land in parts of South Australia and Western Australia. The non-agricultural lands of western South Australia, northern Northern Territory and eastern Western Australia all have low erosion levels.

Erosion patterns are not consistent between NRM regions with some regions showing an increase from 2006-07 to 2007-08 while adjacent regions show a decrease. The cause of these trends is a mixture of climate, soil erodibility, land use and land management practices. Differentiating the cause of the erosion is goal of many researchers but is beyond the short time series presented here; however, the following paragraphs explain some of the major drivers of the erosion and uncertainties in the model.

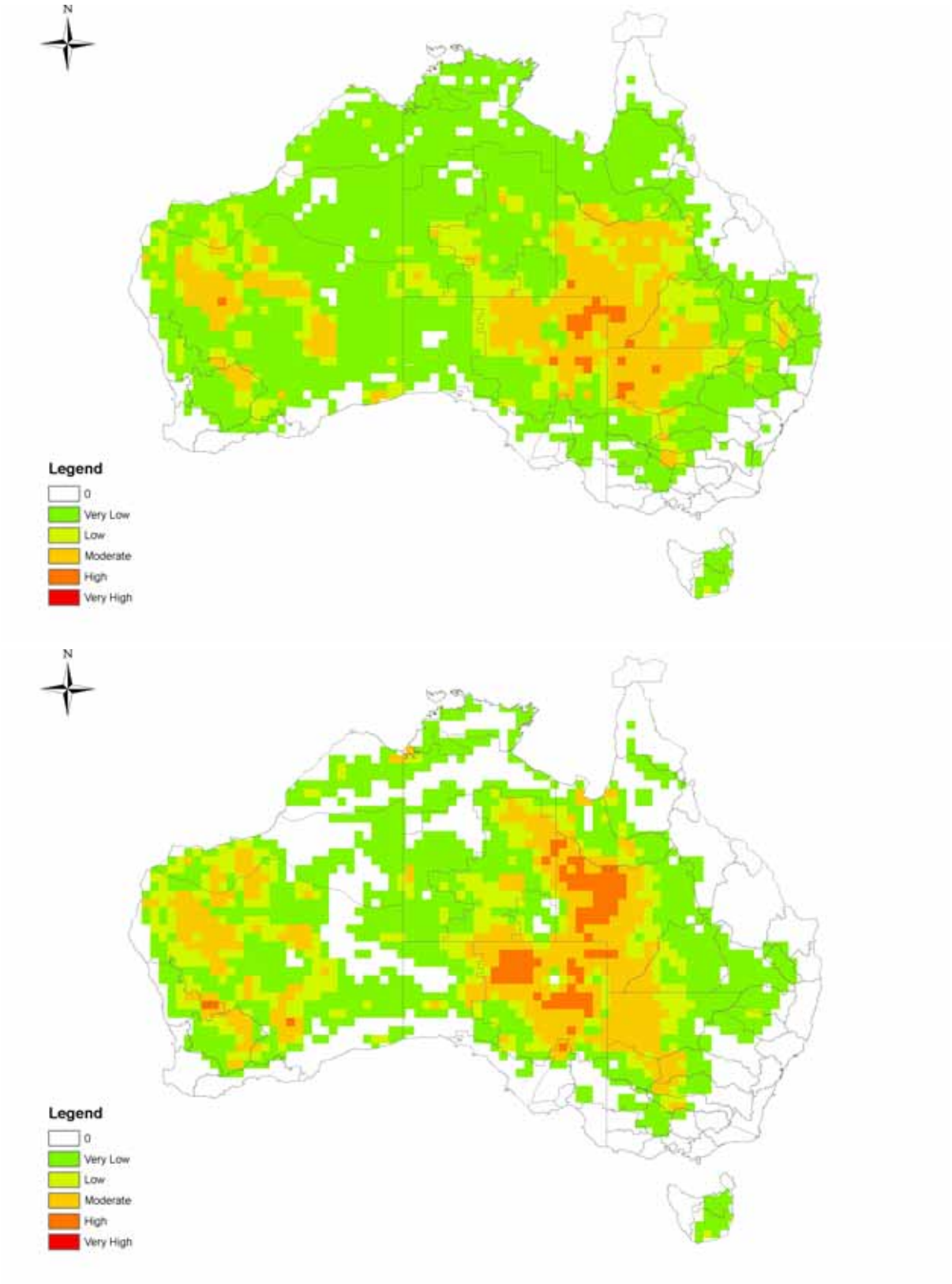


Figure 10. Wind erosion classes for national annual average dust storm years for 2006–07 and 2007–08 at 50-km resolution

Rainfall is a key driver of wind erosion. The rainfall data in Figure 11 shows that as the Northern Territory, Queensland and South Australia dried out in 2007–08, they experienced increased erosion, although not as much as one might expect for the Northern Territory, which had low levels of erosion despite the very much below average rainfall. Interestingly, the relationships in NSW and Western Australia are not so obvious. Areas with average rainfall in NSW had erosion predicted, and areas with very much below average rainfall in Western Australia had little erosion predicted. One explanation could be the timing of the rainfall and high wind events. For example, rainfall just before a high wind event would result in lower erosion rates. Another explanation is land management effects that can decrease or accelerate erosion levels.

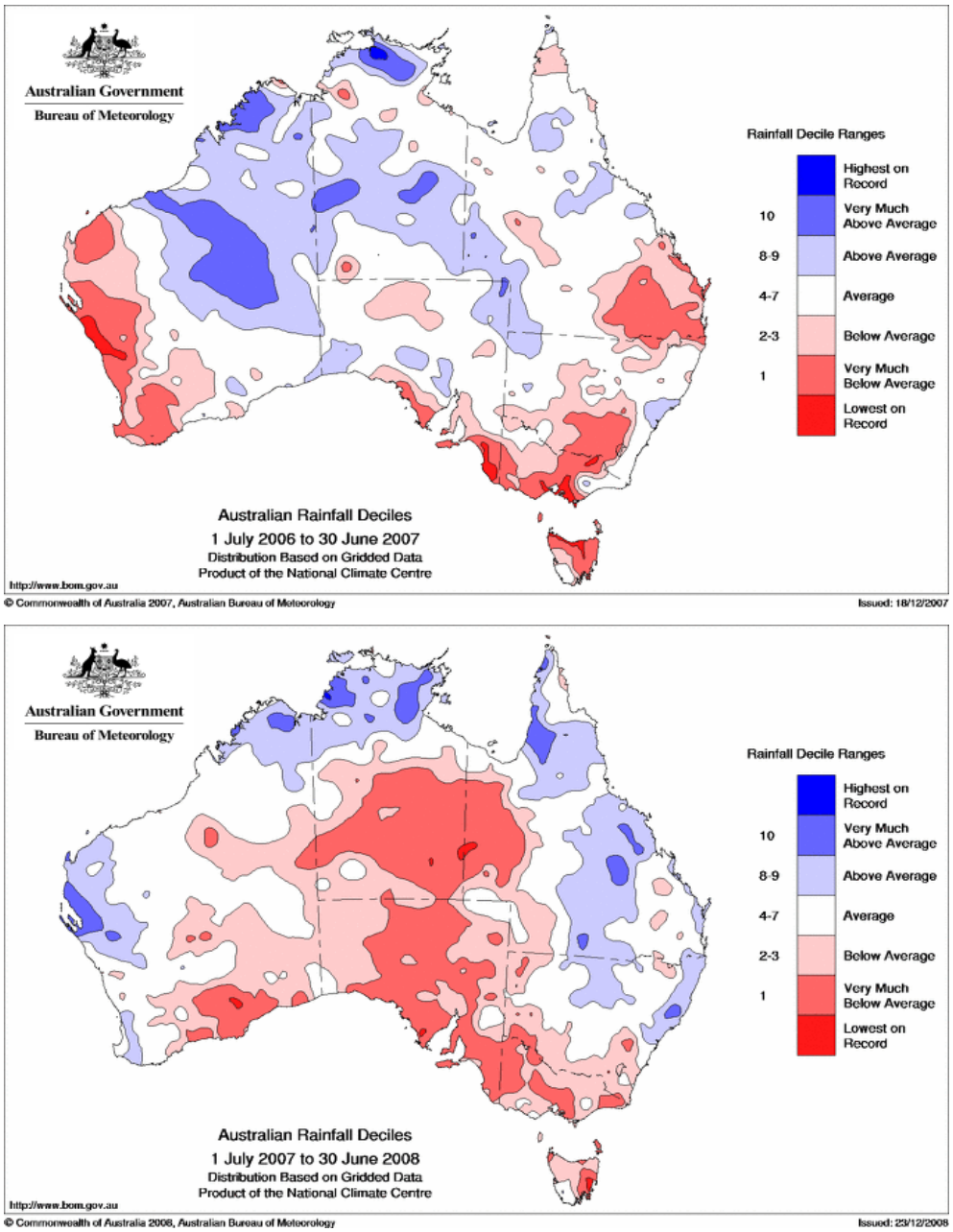


Figure 11. Rainfall decile maps for the 2006–07 and 2007–08 dust-years

Another feature of the modelling is that at the yearly and monthly time scales there is a lack of erosion predicted for the cropping areas in the Mallee landscapes of north-western Victoria and South Australia and NRM regions in the drier cropping areas of Western Australia. We suspect this is related to known issues with the soils data used in CEMSYS and the use of NDVI to derive the cover fraction. These limitations appear to be leading to underestimation of the erosion in these agricultural areas. The solution lies in improving the soils and ground cover data as recommended in the Leys report (Leys *et al.* 2009b).

C4oC has funded projects such as the 'Wind Erosion Histories, Model Input Data and Community DustWatch' project (McTainsh *et al.* 2010) to improve the soil particle data used in CEMSYS. The soil particle-size data is not the standard four-class data derived from most soil surveys; rather it is 256-class data of soils that are analysed after being minimally and fully dispersed (McTainsh *et al.* 2010). This special analysis is the reason for the specific funding for soil particle analysis. C4oC is also in the process of funding a project to provide fractional ground cover data (TERN, AusCover project) that should provide better estimates than the current NDVI method. These investments will assist in improving the modelling once the results are available and have been incorporated into the model.

Despite these limitations, CEMSYS appears to provide information on the spatial and temporal trends of erosion in Australia and at the state and NRM regional level. The only other data available at the national scale to compare the CEMSYS data against is the Dust Storm Index (DSI) (McTainsh 1998). DSI is based on the annual frequency and intensity of dust visibility reduction at 110 Bureau of Meteorology (BoM) sites (Figure 12).

There are obvious methodological differences between the two products. CEMSYS estimates erosion for every pixel (2,891 for Australia) and DSI reports a dust level at 110 BoM sites (Figure 12) and then extrapolates the intervening areas using nearest-neighbour fitting. When comparing the two methods it is important to note that if DSI reports dust then there should be erosion calculated by upwind of where it was measured with DSI. Conversely if CEMSYS does predict erosion and DSI does not measure dust, this could be due to the fact that there maybe no BoM stations in that area or no observation was made at the time of day dustpassed. Considering the differences and scales of the two methods, there is general agreement (Figure 13) which gives us confidence in the CEMSYS and the DSI data.

The CEMSYS results offer greater resolution in the rangeland areas due to the reduced number of sites the BoM has to record visibility data. For example, in region 21 (NT Arid Centre Simpson) DSI maps this region as high erosion. This is because DSI extrapolates between Alice Springs and Birdsville (Figure 12). Conversely, CEMSYS predicts very low erosion in region 21 which is more likely because this is area is not used for extensive grazing and tends to have an adequate vegetation level to control the erosion and this is predicted by CEMSYS. If a BoM station was located in the Simpson Desert, then the DSI prediction would be more accurate. Similarly the West Australian Rangelands have few BoM stations and there appears to be more detail in this region with CEMSYS.

These spatial limitations with the DSI, plus the challenge of maintaining the observational data that DSI uses, need to be weighed against its advantage in having a longer time series from 1960 to the present. We therefore see DSI as a complementary data source for cross-validation of the CEMSYS product, plus a way of putting current wind erosion activity into perspective.

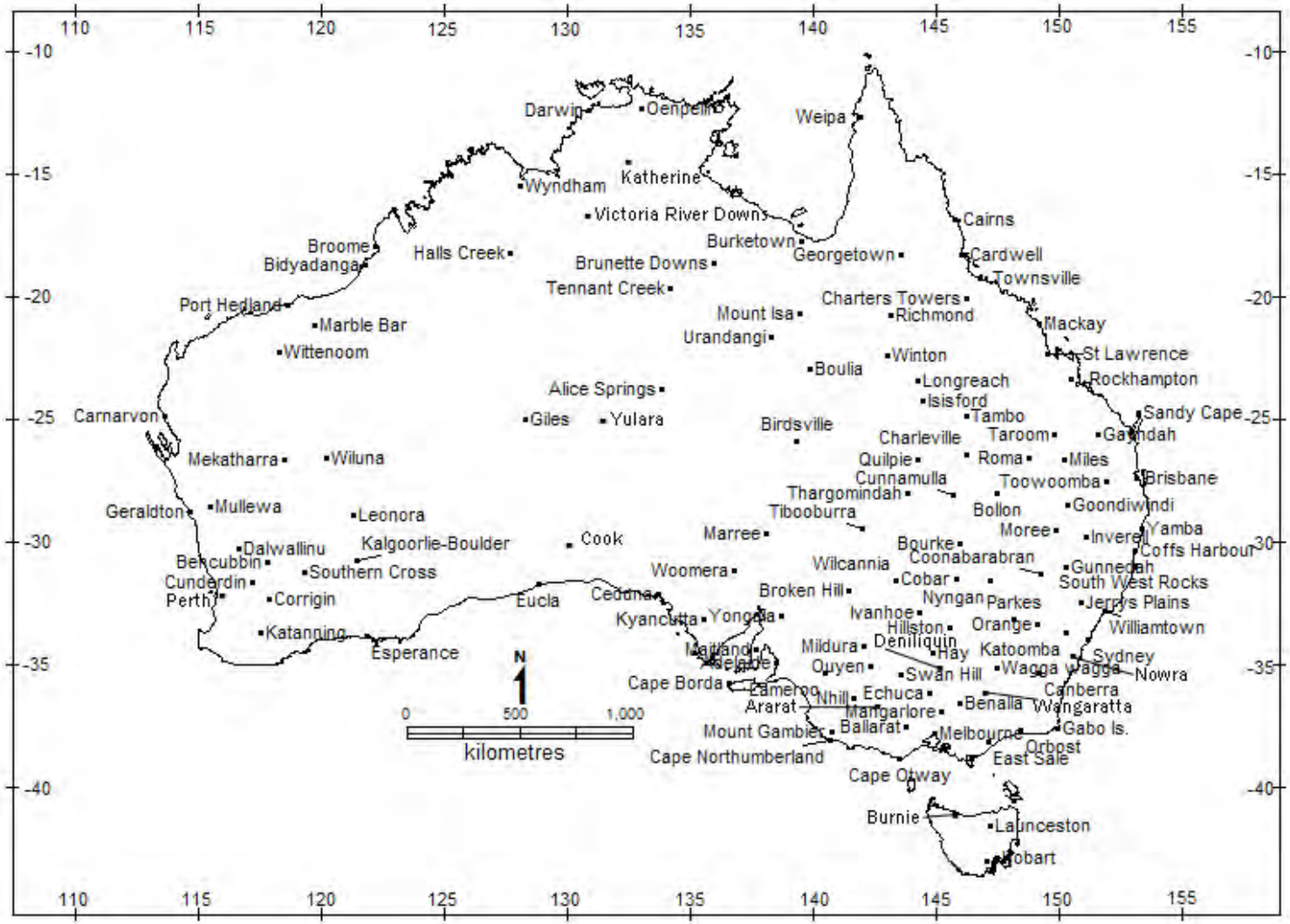


Figure 12. Location of 110 BoM stations used to map DSI (After McTainish *et al.* 2010)

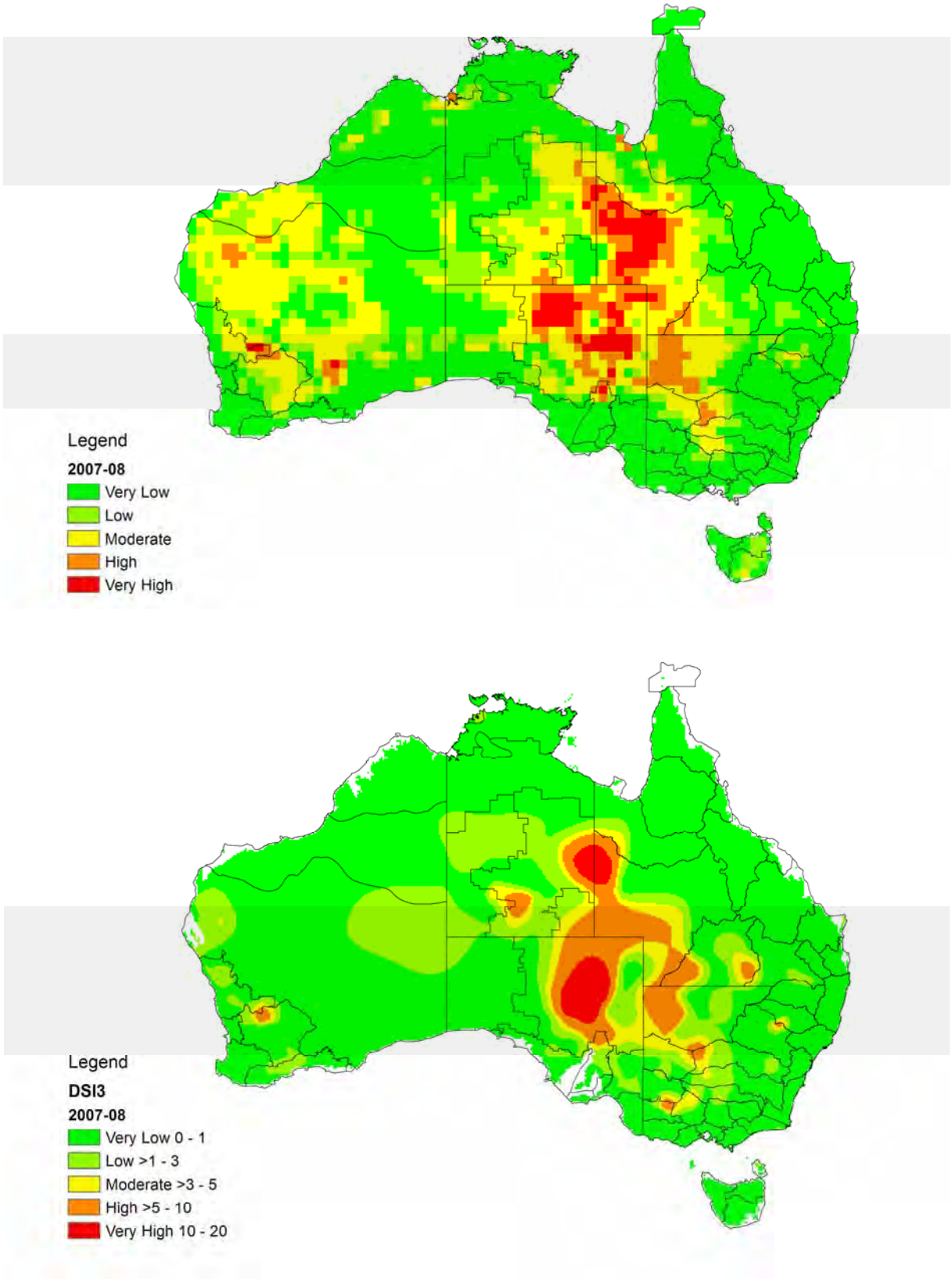


Figure 13. CEMSYS (above) and DSI (below) maps for 2007–08

4. CEMSYS Implementation Plan

4.1 BACKGROUND

This section outlines a way of implementing national wind erosion modelling using CEMSYS at a finer scale (10-km grid). This was one of the recommendations of the Leys report (Leys *et al.* 2009b, p. xii). It stated that a four-year project should be done that provided:

> *Annual modelled wind erosion maps (2000 to present) suitable for use at national and state scales identifying which areas are affected by wind erosion and the severity of this problem. These will help target future investments and provide trends in erosion at NRM regional level ($150K p.a.).*

The 50-km grid data presented here has proven useful at the national and state scale, but the coarse scale limits its application to smaller NRM regions and those with more complex landscapes.

CEMSYS has been applied at 10-km resolution in NSW (and the northern part of Victoria) since June 2006. Several inland NSW CMAs (Lower Murray–Darling, Lachlan and Murray) have contributed to the funding of this work for their monitoring and evaluation programs.

Figure 14 shows the improved output for NSW for 2007–08. The 10-km data shows greater detail and allows for the identification of landscape features with higher erosion levels, such as the Barrier and Grey Ranges in western NSW. Another example is the scalded river margins along the Edward and Wakool Rivers in the western end of the Murray CMA which are classified High and Very High with the 10-km data and Low and Moderate with the 50-km data. The 10-km data makes it clearer that it is the river margins and not the whole of the western end of the CMA that would benefit from investment.

Another advantage of smaller pixel size is that better statistics can be calculated. By having a greater number of pixels of smaller size, there is an increased chance of identifying lower and higher values of erosion. This is related to the scaling issue described in section 3.1. Smaller pixels are more likely to have similar characteristics (be homogeneous) over the whole area than larger pixels. For example, there is a greater chance of finding a totally bare patch of ground that is 1 m^2 than a patch of bare ground 1 km^2. Similarly, there is a greater chance of finding small areas of one soil type than in larger areas. The result is that larger areas tend to be averages of various surfaces and this decreases the chance of recording conditions that provide maximum and minimum erosion. Finally, the greater number of pixels in a catchment the more representative the sampling is for the catchment, for example Lachlan catchment management area increases from 35 to 843 pixels for 50 and 10-km grids.

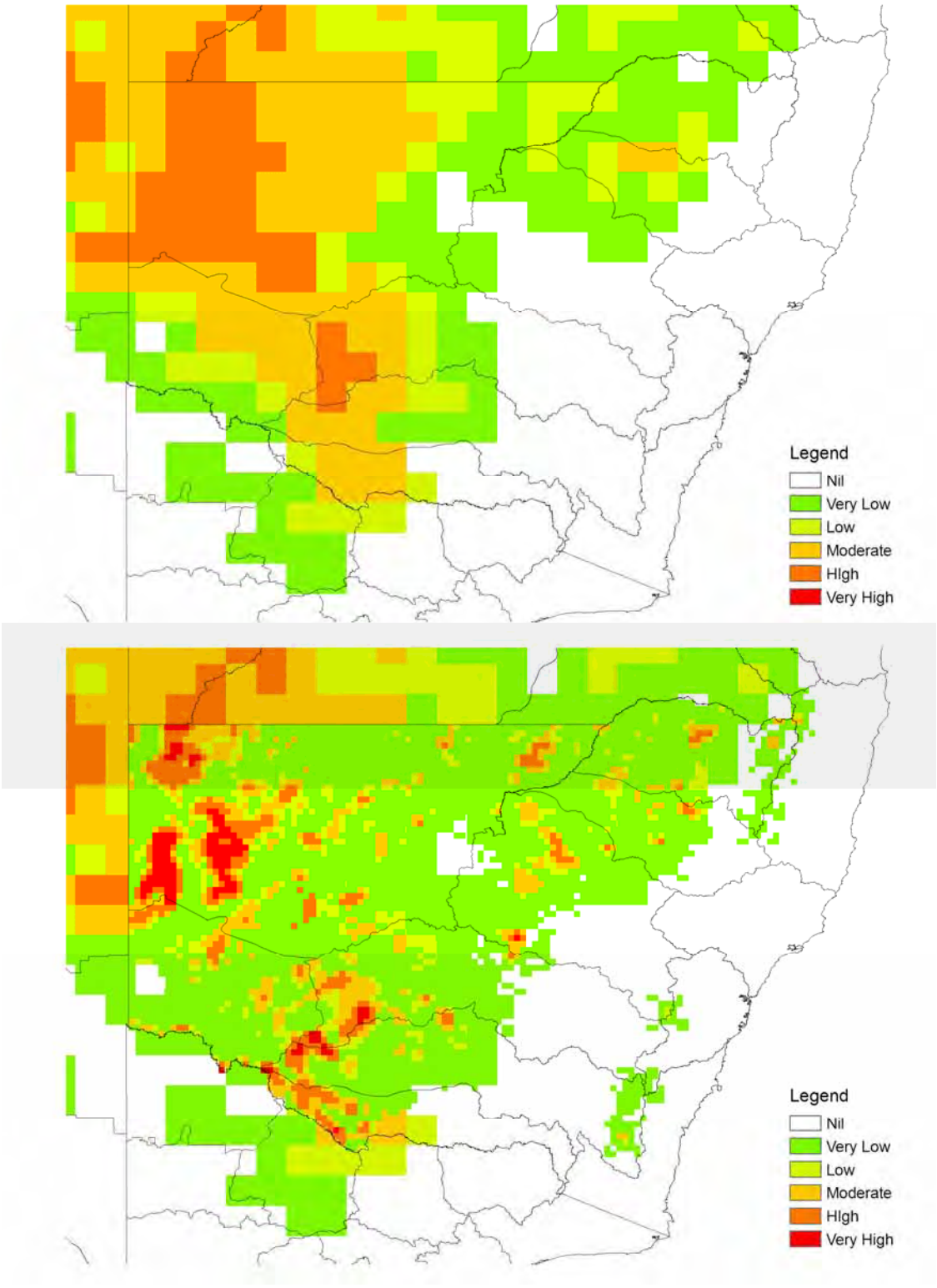


Figure 14. CEMSYS outputs for NSW for 2007–08 at 50 and 10-km resolution

4.2 PROPOSED IMPROVEMENTS

The study has identified a number of possible limitations to the CEMSYS modelling that should be improved. These include:

1. Incorporation of the updated soil particle-size analysis for all representative soil types used in CEMSYS. These model runs were done with five fully dispersed soils representing the Australian continent, a vast simplicity. Through the MERI C4oC 2008–09 funding a further 19 soils will become available and there is a need to incorporate them into the model. Note that the particle-size analysis is a 256-class analysis of samples that are pre-treated in minimally and fully dispersed states.

2. Use of a consistent NDVI record. Over the years that CEMSYS has been run, various NDVI data sources have been employed. Each of these is slightly different (e.g. AVHRR, SeaWiFs, and MODIS). In 2008–09, CSIRO made available the MODIS NDVI data (MOD13Q1) 16-day interval product for the period 2000 to the current date. So that all years can be compared, we propose to use this consistent product at the 50-km CEMSYS resolution for the 2000 to 2011 period should the implementation plan be funded. This extended data record would give a better indication of the performance of CEMSYS because it could be compared to the DSI for this period and allow us to gain a better understanding of the ranges of wind erosion intensity under climatic extremes.

3. The use of NDVI to calculate the cover fraction has been shown to be unreliable because NDVI is a greenness index and fails to adequately address the bleached or dead cover that is present. The currently funded TERN/AusCover project is most likely to deliver a MODIS 500-m resolution fractional cover product that has a bare ground component. If this is product is delivered, it is proposed to use this rather than the MODIS NDVI product outlined in point 2 above.

4. A major anomaly is the failure to identify erosion in known wind erosion regions such as the Mallee of north-western Victoria and southern NSW and the farming areas in Western Australia and South Australia. If the improvements in points 1 and 2 above do not address this issue, then the operational scale of the model might need to be considered for some areas, that is, from 10-km to 1-km resolution. This would be a major undertaking as it means we would need to address the atmospheric resolution and the soil data resolution.

5. Once the improved input data are available, a significant part of the project would be to test the new model against DSI and DustWatch Node data to see if the model has improved.

6. Delivery of a 10-km product for Australia. This would require several domains to be run through the model. The 10-km domains would be:
   a) NSW / Victoria / Tasmania
   b) Southern Queensland
   c) Northern Queensland
   d) Northern Territory
   e) South Australia

f) Southern Western Australia
g) Northern Western Australia

The proposed task is not a simple one and will take considerable computing time to complete. The twelve monthly maps at 50-km resolution are less complex and take about one month to complete. It will take about one month to produce a single monthly continental map for the seven 10-km domains using the current computing facilities at USQ. With the installation of a new high performance computing facility at USQ, this time should be significantly reduced once this facility becomes operational. This computational increase is related to needing to recalculate atmospheric and soil conditions within each 10-km pixel to account for localised effects (i.e. soil moisture and wind field variations). There are also research issues about the best methods to combine the seven domains into one map.

4.3 PROPOSED PRODUCTS

If this implementation plan is funded for four years then the proposed products would be:

- Monthly and dust-year maps at 50-km resolution for the period 2000 to 2011, and
- Monthly and dust-year maps at 10-km resolution for at least three years.

Figure 15 shows a combination of the two products: 50-km resolution for all states except NSW at 10-km resolution.

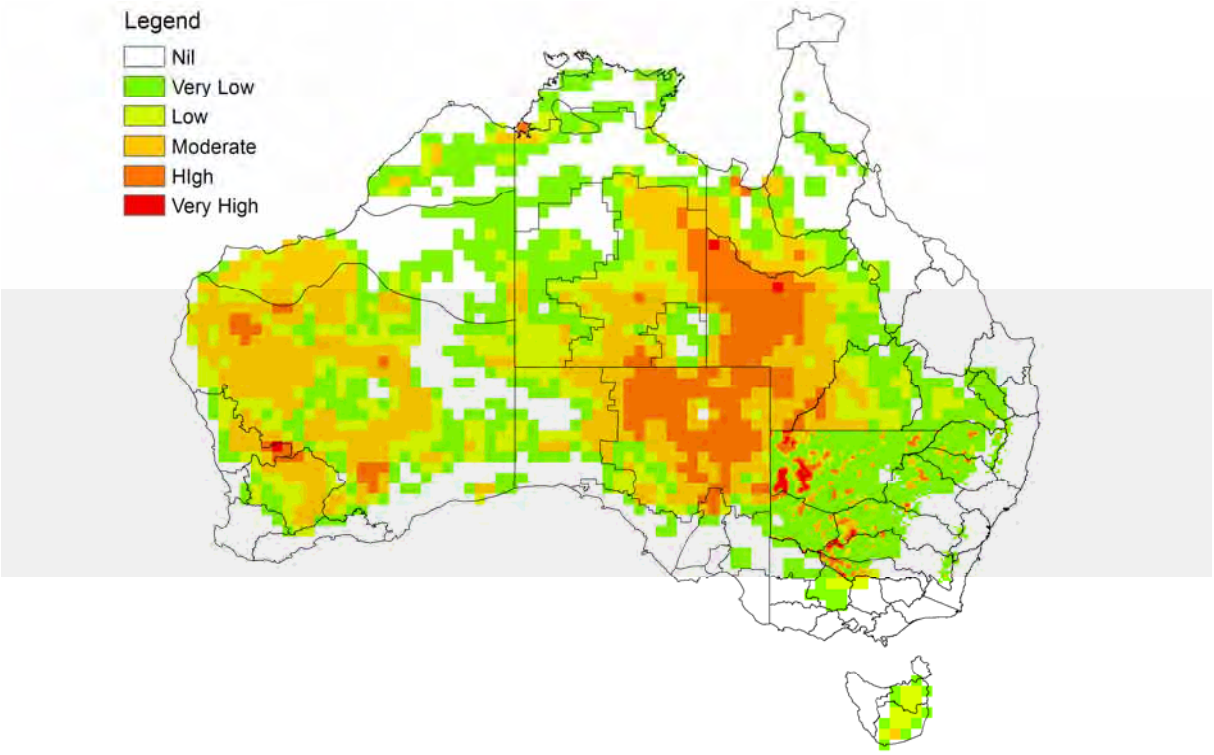


Figure 15. CEMSYS 2007–08 map of Australia at 50-km resolution, with 10-km resolution within NSW

4.4 COSTING

CEMSYS is currently run at USQ under the direction of Dr Harry Butler. Dr Butler is on the teaching staff and has limited ability to undertake this modelling full time unless a replacement staff member is employed to take on his teaching work. USQ has agreed in principal to letting Dr Butler undertake the modelling if funding for his salary and computer operational costs can be provided for four years. In-kind support in the form of computing facilities and administrative support can be offered. An estimate of $130,000 p.a. has been suggested by USQ.

The project will be managed by Dr Leys at DECCW and will involve two other DECCW staff who will provide GIS and statistical analysis support to complete the project. Their time can be offered as in-kind support and a modest travel budget for meetings and field validation of model outputs and computer consumables component is requested at $20,000 p.a.

Total cost for the four-year project would be $600,000.

5. Conclusions

Both objectives of this project have been successfully completed; that is, the development of a) monthly and annual maps and statistics of wind erosion at 50-km resolution for two years, and b) an implementation plan for the provision of a longer time series of low-resolution maps and three years of higher resolution maps for all of Australia.

Monthly and dust-year maps and statistics of wind erosion as measured by horizontal sand flux (TQ mg/m/s) from the CEMSYS model for the period July 2006 to June 2007 were produced to describe the intensity of wind erosion for Australia, the states and NRM regions.

The model results indicated monthly and yearly variations. The erosion seasons, defined as when the high and very high classes of erosion exceed 5% of the nation, commenced in October 2006 and finished in March 2007 and recommenced in August 2007 and remained high through to June 2008 with the exception of May 2008.The NRM regions with very high and high erosion during this period were

- in Queensland: Desert Channels, South West, Border Rivers Maranoa–Balonne, and Condamine
- in NSW: Western, Border Rivers–Gwydir, Namoi, Lachlan, Murrumbidgee, Murray and Lower Murray–Darling regions
- in South Australia: the Arid Lands and Northern and Yorke regions
- in the Northern Territory: the Pastoral and Non-Pastoral regions, and
- in Western Australian: the Rangeland regions of the Goldfields Nullarbor and Gascoyne Murchison, Northern Agricultural and the Avon region.

NRM regions with erosion levels of concern (high and very classes) tend to be focused in arid and semi-arid rangelands and the agricultural (farming) land in parts of South Australia and Western Australia. The non-agricultural lands of western South Australia, northern Northern Territory and eastern Western Australia all have low erosion levels.

At the state scale, South Australia had the highest percentage of area in the high and very high class with 14 to 20% respectively in 2006–07 and 2007–08. Queensland was the second highest state with 13 to 14%, followed by NSW with 15 to 13% and the Northern Territory with 3 to 5%.

Nationally 2007–08 had greater percentage of eroding areas with 11% compared to 9% in 2006–07.

There is a lack of data to test the CEMSYS output against at the 50- and 10-km scales. Specifically data that details the intensity of erosion (sand flux) at a site is required. Roadside survey (RoS) data is the best data available but there are difficulties with the scale differences (RoS 1-ha scale) vs. the 50 and 10-km modelling scales. Despite these scale differences the RoS data was used to establish the erosion class thresholds. As more RoS data becomes available from future surveys and other states it will offer a new test data source. Until then the only other data available is visibility reduction data used in the Dust Storm Index (DSI).

DSI measures the dust intensity and not the sand flux at a station that is downwind of the actual erosion area so the comparison of CEMSYS with DSI data is not straight forward. When the CEMSYS dust-year map was compared with the dust-year DSI map for 2007–08

there was generally good agreement. However, the CEMSYS data offers greater spatial resolution, especially in the rangelands where there are fewer Bureau of Meteorology stations to record the visibility data that the DSI uses. The DSI still has the advantage of a longer time series from 1960 to the present.

This study highlights some of the problems with scaling and indicates that comparison of products derived at different scales is very problematic. Finer scale products have the advantage of being able to more accurately represent landscape features such as rivers or hills, have a greater chance of reporting a greater range of values due to the heterogeneous nature of landscapes and provide greater numbers of pixels for statistical analysis.

There are major advantages for providing a longer time scale (2000 to current) and increasing the resolution of the modelling from 50 to 10 km. Such products could be used by the Australian government, states and NRM bodies for resource condition reporting. The same products would also assist in prioritising Caring for our Country investments.

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Appendix 1: NRM regions and sub regions

SORTED BY REGION NUMBER

Region Number in Figure 1	Region Name	State
1	Torres Strait	Queensland
2	Cape York	Queensland
3	NT - Top End	Northern Territory
4	NT - Melville Island	Northern Territory
5	NT - Darwin	Northern Territory
6	NT - Katherine-Douglas	Northern Territory
7	Rangelands - Kimberley	Western Australia
8	NT - Savannah	Northern Territory
9	NT - Victoria River	Northern Territory
10	Northern Gulf	Queensland
11	Wet Tropics	Queensland
12	Southern Gulf	Queensland
13	NT - Arid Centre - Pastoral	Northern Territory
14	NT - Arid Centre - Non Pastoral	Northern Territory
15	Rangelands - Gascoyne Murchison	Western Australia
16	Burdekin	Queensland
17	Desert Channels	Queensland
18	Mackay Whitsunday	Queensland
19	Rangelands - Goldfields Nullarbor	Western Australia
20	Fitzroy	Queensland
21	NT - Arid Centre Simpson	Northern Territory
22	Burnett Mary	Queensland
23	South West Queensland	Queensland
24	Border Rivers Maranoa - Balonne	Queensland
25	South East Queensland	Queensland
26	South Australian Arid Lands	South Australia
27	Alinytjara Wilurara	South Australia
28	Condamine	Queensland
29	Northern Agricultural	Western Australia
30	Northern Rivers	New South Wales
31	Border Rivers-Gwydir	New South Wales
32	Western	New South Wales
33	Namoi	New South Wales
34	Avon	Western Australia
35	Central West	New South Wales
36	Swan	Western Australia
37	Eyre Peninsula	South Australia
38	Hunter-Central Rivers	New South Wales
39	Northern and Yorke	South Australia
40	Lower Murray Darling	New South Wales
41	South West	Western Australia
42	Lachlan	New South Wales

43	South Australian Murray Darling Basin	South Australia
44	South Coast	Western Australia
45	Hawkesbury-Nepean	New South Wales
46	Murrumbidgee	New South Wales
47	Mallee	Victoria
48	Southern Rivers	New South Wales
49	Adelaide and Mount Lofty Ranges	South Australia
50	Murray	New South Wales
51	North Central	Victoria
52	Kangaroo Island	South Australia
53	South East	South Australia
54	Wimmera	Victoria
55	Goulburn Broken	Victoria
56	North East	Victoria
57	East Gippsland	Victoria
58	Glenelg Hopkins	Victoria
59	West Gippsland	Victoria
60	Port Phillip and Westernport	Victoria
61	Corangamite	Victoria
62	Tas - Flinders	Tasmania
63	Tas - North West	Tasmania
64	Tas - North	Tasmania
65	Tas - South East	Tasmania

SORTED BY REGION NAME

Region Number in Figure 1	Region Name	State
49	Adelaide and Mount Lofty Ranges	South Australia
27	Alinytjara Wilurara	South Australia
34	Avon	Western Australia
31	Border Rivers-Gwydir	New South Wales
24	Border Rivers Maranoa - Balonne	Queensland
16	Burdekin	Queensland
22	Burnett Mary	Queensland
2	Cape York	Queensland
35	Central West	New South Wales
28	Condamine	Queensland
61	Corangamite	Victoria
17	Desert Channels	Queensland
57	East Gippsland	Victoria
37	Eyre Peninsula	South Australia
20	Fitzroy	Queensland
58	Glenelg Hopkins	Victoria
55	Goulburn Broken	Victoria
45	Hawkesbury-Nepean	New South Wales
38	Hunter-Central Rivers	New South Wales
52	Kangaroo Island	South Australia
42	Lachlan	New South Wales

40	Lower Murray Darling	New South Wales
18	Mackay Whitsunday	Queensland
47	Mallee	Victoria
50	Murray	New South Wales
46	Murrumbidgee	New South Wales
33	Namoi	New South Wales
62	Tas - Flinders	Tasmania
64	Tas - North	Tasmania
51	North Central	Victoria
56	North East	Victoria
63	Tas - North West	Tasmania
29	Northern Agricultural	Western Australia
39	Northern and Yorke	South Australia
10	Northern Gulf	Queensland
30	Northern Rivers	New South Wales
5	NT - Darwin	Northern Territory
3	NT - Top End	Northern Territory
6	NT - Katherine-Douglas	Northern Territory
8	NT - Savannah	Northern Territory
13	NT - Arid Centre - Pastoral	Northern Territory
14	NT - Arid Centre - Non Pastoral	Northern Territory
21	NT - Arid Centre Simpson	Northern Territory
4	NT - Melville Island	Northern Territory
9	NT - Victoria River	Northern Territory
60	Port Phillip and Westernport	Victoria
7	Rangelands - Kimberley	Western Australia
15	Rangelands - Gascoyne Murchison	Western Australia
19	Rangelands - Goldfields Nullarbor	Western Australia
65	Tas - South East	Tasmania
26	South Australian Arid Lands	South Australia
43	South Australian Murray Darling Basin	South Australia
44	South Coast	Western Australia
53	South East	South Australia
25	South East Queensland	Queensland
41	South West	Western Australia
23	South West Queensland	Queensland
12	Southern Gulf	Queensland
48	Southern Rivers	New South Wales
36	Swan	Western Australia
1	Torres Strait	Queensland
59	West Gippsland	Victoria
32	Western	New South Wales
11	Wet Tropics	Queensland
54	Wimmera	Victoria

Appendix 2. Monthly statistics for each NRM region, state and the continent

DateStamp	Number of Pixel	Area [%] very low erosion	Area [%] low erosion	Area [%] moderate erosion	Area [%] high erosion	Area [%] very high erosion
Torres Strait (r01)						
July 2006	13	100	0	0	0	0
August 2006	13	100	0	0	0	0
September 2006	13	100	0	0	0	0
October 2006	13	100	0	0	0	0
November 2006	13	100	0	0	0	0
December 2006	13	100	0	0	0	0
January 2007	13	100	0	0	0	0
February 2007	13	100	0	0	0	0
March 2007	13	100	0	0	0	0
April 2007	13	100	0	0	0	0
May 2007	13	100	0	0	0	0
June 2007	13	100	0	0	0	0
July 2007	13	100	0	0	0	0
August 2007	13	100	0	0	0	0
September 2007	13	100	0	0	0	0
October 2007	13	100	0	0	0	0
November 2007	13	100	0	0	0	0
December 2007	13	100	0	0	0	0
January 2008	13	100	0	0	0	0
February 2008	13	100	0	0	0	0
March 2008	13	100	0	0	0	0
April 2008	13	100	0	0	0	0
May 2008	13	100	0	0	0	0
June 2008	13	100	0	0	0	0

NRM Region, ID and Date	Num. of Pixel	Area [%] very low erosion	Area [%] low erosion	Area [%] moderate erosion	Area [%] high erosion	Area [%] very high erosion
Cape York (r02)						
July 2006	46	100	0	0	0	0
August 2006	46	100	0	0	0	0
September 2006	46	98	2	0	0	0
October 2006	46	100	0	0	0	0
November 2006	46	98	0	2	0	0
December 2006	46	98	2	0	0	0
January 2007	46	98	2	0	0	0
February 2007	46	98	2	0	0	0
March 2007	46	100	0	0	0	0
April 2007	46	100	0	0	0	0
May 2007	46	100	0	0	0	0
June 2007	46	100	0	0	0	0
July 2007	46	100	0	0	0	0
August 2007	46	98	2	0	0	0
September 2007	46	98	2	0	0	0
October 2007	46	98	2	0	0	0
November 2007	46	98	2	0	0	0
December 2007	46	98	2	0	0	0
January 2008	46	96	4	0	0	0
February 2008	46	100	0	0	0	0
March 2008	46	100	0	0	0	0
April 2008	46	100	0	0	0	0
May 2008	46	100	0	0	0	0
June 2008	46	100	0	0	0	0
NT - Top End (r03)						
July 2006	52	96	4	0	0	0
August 2006	52	90	8	2	0	0
September 2006	52	88	4	4	4	0
October 2006	52	92	8	0	0	0
November 2006	52	88	8	4	0	0
December 2006	52	90	2	8	0	0
January 2007	52	100	0	0	0	0
February 2007	52	98	2	0	0	0
March 2007	52	96	2	2	0	0
April 2007	52	100	0	0	0	0
May 2007	52	100	0	0	0	0
June 2007	52	92	8	0	0	0
July 2007	52	100	0	0	0	0
August 2007	52	88	4	8	0	0
September 2007	52	85	8	6	2	0
October 2007	52	81	10	10	0	0
November 2007	52	88	10	2	0	0
December 2007	52	92	6	2	0	0
January 2008	52	90	6	4	0	0
February 2008	52	98	0	2	0	0
March 2008	52	88	6	4	2	0
April 2008	52	94	4	2	0	0
May 2008	52	100	0	0	0	0
June 2008	52	87	8	6	0	0

NRM Region, ID and Date	Num. of Pixel	Area [%] very low erosion	Area [%] low erosion	Area [%] moderate erosion	Area [%] high erosion	Area [%] very high erosion
NT - Melville Island (r04)						
July 2006	3	100	0	0	0	0
August 2006	3	100	0	0	0	0
September 2006	3	100	0	0	0	0
October 2006	3	100	0	0	0	0
November 2006	3	100	0	0	0	0
December 2006	3	100	0	0	0	0
January 2007	3	100	0	0	0	0
February 2007	3	100	0	0	0	0
March 2007	3	100	0	0	0	0
April 2007	3	100	0	0	0	0
May 2007	3	100	0	0	0	0
June 2007	3	100	0	0	0	0
July 2007	3	100	0	0	0	0
August 2007	3	100	0	0	0	0
September 2007	3	100	0	0	0	0
October 2007	3	100	0	0	0	0
November 2007	3	100	0	0	0	0
December 2007	3	100	0	0	0	0
January 2008	3	100	0	0	0	0
February 2008	3	100	0	0	0	0
March 2008	3	100	0	0	0	0
April 2008	3	100	0	0	0	0
May 2008	3	100	0	0	0	0
June 2008	3	100	0	0	0	0
NT - Darwin (r05)						
July 2006	2	100	0	0	0	0
August 2006	2	100	0	0	0	0
September 2006	2	100	0	0	0	0
October 2006	2	100	0	0	0	0
November 2006	2	100	0	0	0	0
December 2006	2	100	0	0	0	0
January 2007	2	100	0	0	0	0
February 2007	2	100	0	0	0	0
March 2007	2	100	0	0	0	0
April 2007	2	100	0	0	0	0
May 2007	2	100	0	0	0	0
June 2007	2	100	0	0	0	0
July 2007	2	100	0	0	0	0
August 2007	2	100	0	0	0	0
September 2007	2	0	100	0	0	0
October 2007	2	100	0	0	0	0
November 2007	2	100	0	0	0	0
December 2007	2	100	0	0	0	0
January 2008	2	100	0	0	0	0
February 2008	2	100	0	0	0	0
March 2008	2	100	0	0	0	0
April 2008	2	100	0	0	0	0
May 2008	2	100	0	0	0	0
June 2008	2	100	0	0	0	0

NRM Region, ID and Date	Num. of Pixel	Area [%] very low erosion	Area [%] low erosion	Area [%] moderate erosion	Area [%] high erosion	Area [%] very high erosion
NT - Katherine-Douglas (r06)						
July 2006	7	86	14	0	0	0
August 2006	7	86	14	0	0	0
September 2006	7	86	14	0	0	0
October 2006	7	100	0	0	0	0
November 2006	7	57	14	29	0	0
December 2006	7	71	0	29	0	0
January 2007	7	100	0	0	0	0
February 2007	7	86	14	0	0	0
March 2007	7	100	0	0	0	0
April 2007	7	100	0	0	0	0
May 2007	7	100	0	0	0	0
June 2007	7	29	71	0	0	0
July 2007	7	100	0	0	0	0
August 2007	7	100	0	0	0	0
September 2007	7	29	57	14	0	0
October 2007	7	43	43	14	0	0
November 2007	7	43	14	29	14	0
December 2007	7	86	0	14	0	0
January 2008	7	100	0	0	0	0
February 2008	7	100	0	0	0	0
March 2008	7	100	0	0	0	0
April 2008	7	86	14	0	0	0
May 2008	7	86	14	0	0	0
June 2008	7	100	0	0	0	0
Rangelands - Kimberley (r07)						
July 2006	104	97	2	1	0	0
August 2006	104	96	0	4	0	0
September 2006	104	95	3	2	0	0
October 2006	104	96	2	2	0	0
November 2006	104	92	5	3	0	0
December 2006	104	94	6	0	0	0
January 2007	104	95	2	3	0	0
February 2007	104	97	1	2	0	0
March 2007	104	99	1	0	0	0
April 2007	104	99	0	1	0	0
May 2007	104	98	1	1	0	0
June 2007	104	97	0	3	0	0
July 2007	104	90	4	5	1	0
August 2007	104	72	13	13	1	0
September 2007	104	89	5	6	0	0
October 2007	104	83	12	6	0	0
November 2007	104	85	4	12	0	0
December 2007	104	83	5	11	2	0
January 2008	104	91	4	4	1	0
February 2008	104	95	2	3	0	0
March 2008	104	95	1	1	3	0
April 2008	104	97	2	1	0	0
May 2008	104	95	4	0	1	0
June 2008	104	69	16	13	0	1

NRM Region, ID and Date	Num. of Pixel	Area [%] very low erosion	Area [%] low erosion	Area [%] moderate erosion	Area [%] high erosion	Area [%] very high erosion
NT - Savannah (r08)						
July 2006	106	100	0	0	0	0
August 2006	106	98	2	0	0	0
September 2006	106	92	6	3	0	0
October 2006	106	99	1	0	0	0
November 2006	106	89	5	7	0	0
December 2006	106	79	13	8	0	0
January 2007	106	99	1	0	0	0
February 2007	106	99	1	0	0	0
March 2007	106	99	1	0	0	0
April 2007	106	97	1	2	0	0
May 2007	106	97	3	0	0	0
June 2007	106	92	4	5	0	0
July 2007	106	97	3	0	0	0
August 2007	106	88	8	4	1	0
September 2007	106	90	4	6	1	0
October 2007	106	71	11	15	3	0
November 2007	106	79	8	8	4	0
December 2007	106	90	7	4	0	0
January 2008	106	92	5	3	0	0
February 2008	106	97	1	2	0	0
March 2008	106	96	2	2	0	0
April 2008	106	93	6	1	0	0
May 2008	106	98	1	1	0	0
June 2008	106	66	12	16	6	0
NT - Victoria river (r09)						
July 2006	1	100	0	0	0	0
August 2006	1	0	0	100	0	0
September 2006	1	0	0	100	0	0
October 2006	1	100	0	0	0	0
November 2006	1	0	100	0	0	0
December 2006	1	0	0	100	0	0
January 2007	1	0	0	100	0	0
February 2007	1	100	0	0	0	0
March 2007	1	100	0	0	0	0
April 2007	1	100	0	0	0	0
May 2007	1	100	0	0	0	0
June 2007	1	0	100	0	0	0
July 2007	1	0	0	0	100	0
August 2007	1	0	0	0	100	0
September 2007	1	0	0	100	0	0
October 2007	1	0	0	100	0	0
November 2007	1	0	0	100	0	0
December 2007	1	0	0	100	0	0
January 2008	1	0	0	0	100	0
February 2008	1	0	0	100	0	0
March 2008	1	0	0	0	100	0
April 2008	1	100	0	0	0	0
May 2008	1	0	0	100	0	0
June 2008	1	0	0	0	0	100

NRM Region, ID and Date	Num. of Pixel	Area [%] very low erosion	Area [%] low erosion	Area [%] moderate erosion	Area [%] high erosion	Area [%] very high erosion
Northern Gulf (r10)						
July 2006	66	100	0	0	0	0
August 2006	66	98	2	0	0	0
September 2006	66	95	3	2	0	0
October 2006	66	97	2	2	0	0
November 2006	66	76	11	14	0	0
December 2006	66	89	8	3	0	0
January 2007	66	92	3	5	0	0
February 2007	66	95	3	2	0	0
March 2007	66	100	0	0	0	0
April 2007	66	100	0	0	0	0
May 2007	66	100	0	0	0	0
June 2007	66	86	12	2	0	0
July 2007	66	91	5	3	2	0
August 2007	66	83	8	6	3	0
September 2007	66	83	5	11	2	0
October 2007	66	70	8	12	11	0
November 2007	66	80	2	12	6	0
December 2007	66	80	9	9	2	0
January 2008	66	97	2	2	0	0
February 2008	66	100	0	0	0	0
March 2008	66	100	0	0	0	0
April 2008	66	100	0	0	0	0
May 2008	66	95	2	3	0	0
June 2008	66	89	3	5	3	0
Wet Tropics (r11)						
July 2006	9	100	0	0	0	0
August 2006	9	100	0	0	0	0
September 2006	9	100	0	0	0	0
October 2006	9	100	0	0	0	0
November 2006	9	100	0	0	0	0
December 2006	9	100	0	0	0	0
January 2007	9	100	0	0	0	0
February 2007	9	100	0	0	0	0
March 2007	9	100	0	0	0	0
April 2007	9	100	0	0	0	0
May 2007	9	100	0	0	0	0
June 2007	9	100	0	0	0	0
July 2007	9	100	0	0	0	0
August 2007	9	100	0	0	0	0
September 2007	9	100	0	0	0	0
October 2007	9	100	0	0	0	0
November 2007	9	100	0	0	0	0
December 2007	9	100	0	0	0	0
January 2008	9	100	0	0	0	0
February 2008	9	100	0	0	0	0
March 2008	9	100	0	0	0	0
April 2008	9	100	0	0	0	0
May 2008	9	100	0	0	0	0
June 2008	9	100	0	0	0	0

NRM Region, ID and Date	Num. of Pixel	Area [%] very low erosion	Area [%] low erosion	Area [%] moderate erosion	Area [%] high erosion	Area [%] very high erosion
Southern Gulf (r12)						
July 2006	72	90	3	7	0	0
August 2006	72	89	1	6	4	0
September 2006	72	76	4	13	7	0
October 2006	72	83	6	11	0	0
November 2006	72	24	11	28	36	1
December 2006	72	35	13	38	14	1
January 2007	72	89	7	4	0	0
February 2007	72	96	4	0	0	0
March 2007	72	72	19	8	0	0
April 2007	72	85	3	11	1	0
May 2007	72	60	14	24	3	0
June 2007	72	29	19	39	13	0
July 2007	72	76	8	10	6	0
August 2007	72	64	14	11	11	0
September 2007	72	57	14	24	4	1
October 2007	72	13	15	31	39	3
November 2007	72	22	17	25	33	3
December 2007	72	57	14	26	3	0
January 2008	72	75	13	11	1	0
February 2008	72	99	0	1	0	0
March 2008	72	88	6	6	1	0
April 2008	72	74	13	13	1	0
May 2008	72	60	10	26	4	0
June 2008	72	26	8	32	33	0
NT - Arid Centre - Pastoral (r13)						
July 2006	155	94	5	1	0	0
August 2006	155	74	15	10	0	0
September 2006	155	62	16	22	0	0
October 2006	155	36	12	49	3	0
November 2006	155	27	25	39	10	0
December 2006	155	2	7	65	26	0
January 2007	155	65	4	22	9	0
February 2007	155	65	10	24	1	0
March 2007	155	45	12	32	10	1
April 2007	155	100	0	0	0	0
May 2007	155	83	14	4	0	0
June 2007	155	83	12	6	0	0
July 2007	155	88	7	5	0	0
August 2007	155	43	21	28	8	0
September 2007	155	27	29	36	8	0
October 2007	155	13	21	41	26	0
November 2007	155	8	18	48	25	1
December 2007	155	19	25	42	14	0
January 2008	155	38	20	30	12	0
February 2008	155	28	21	36	15	0
March 2008	155	49	27	22	2	0
April 2008	155	23	32	33	11	1
May 2008	155	65	12	17	6	0
June 2008	155	7	14	43	24	12

NRM Region, ID and Date	Num. of Pixel	Area [%] very low erosion	Area [%] low erosion	Area [%] moderate erosion	Area [%] high erosion	Area [%] very high erosion
NT - Arid Centre - Non Pastoral (r14)						
July 2006	110	91	6	3	0	0
August 2006	110	87	9	4	0	0
September 2006	110	79	13	8	0	0
October 2006	110	56	11	30	3	0
November 2006	110	59	14	25	2	0
December 2006	110	40	15	29	15	0
January 2007	110	57	11	24	8	0
February 2007	110	79	13	7	1	0
March 2007	110	42	12	32	15	0
April 2007	110	100	0	0	0	0
May 2007	110	96	4	0	0	0
June 2007	110	98	2	0	0	0
July 2007	110	100	0	0	0	0
August 2007	110	93	5	2	0	0
September 2007	110	80	17	3	0	0
October 2007	110	60	13	27	0	0
November 2007	110	61	11	28	0	0
December 2007	110	75	16	8	0	0
January 2008	110	87	7	5	0	0
February 2008	110	71	3	26	0	0
March 2008	110	95	5	0	0	0
April 2008	110	77	19	4	0	0
May 2008	110	100	0	0	0	0
June 2008	110	51	18	31	0	0
Rangelands - Gascoyne Murchison (r15)						
July 2006	193	97	2	1	0	0
August 2006	193	100	0	0	0	0
September 2006	193	99	1	0	0	0
October 2006	193	90	6	4	0	0
November 2006	193	88	9	3	0	0
December 2006	193	62	15	21	2	0
January 2007	193	63	17	20	1	0
February 2007	193	93	5	2	0	0
March 2007	193	48	10	27	14	1
April 2007	193	100	0	0	0	0
May 2007	193	83	6	10	1	0
June 2007	193	80	4	7	9	0
July 2007	193	90	5	5	1	0
August 2007	193	67	8	10	15	0
September 2007	193	76	7	16	1	0
October 2007	193	53	17	20	10	0
November 2007	193	59	8	17	16	0
December 2007	193	85	11	4	0	0
January 2008	193	84	7	8	0	0
February 2008	193	81	6	12	0	0
March 2008	193	97	2	1	0	0
April 2008	193	94	5	1	0	0
May 2008	193	92	4	5	0	0
June 2008	193	46	11	25	12	6

NRM Region, ID and Date	Num. of Pixel	Area [%] very low erosion	Area [%] low erosion	Area [%] moderate erosion	Area [%] high erosion	Area [%] very high erosion
Burdekin (r16)						
July 2006	52	100	0	0	0	0
August 2006	52	100	0	0	0	0
September 2006	52	98	2	0	0	0
October 2006	52	100	0	0	0	0
November 2006	52	81	2	15	2	0
December 2006	52	87	6	8	0	0
January 2007	52	94	4	2	0	0
February 2007	52	100	0	0	0	0
March 2007	52	98	2	0	0	0
April 2007	52	88	8	4	0	0
May 2007	52	88	8	4	0	0
June 2007	52	98	2	0	0	0
July 2007	52	100	0	0	0	0
August 2007	52	100	0	0	0	0
September 2007	52	98	2	0	0	0
October 2007	52	96	2	2	0	0
November 2007	52	100	0	0	0	0
December 2007	52	100	0	0	0	0
January 2008	52	100	0	0	0	0
February 2008	52	100	0	0	0	0
March 2008	52	100	0	0	0	0
April 2008	52	100	0	0	0	0
May 2008	52	100	0	0	0	0
June 2008	52	100	0	0	0	0
Desert Channels (r17)						
July 2006	181	62	15	23	0	0
August 2006	181	61	21	18	1	0
September 2006	181	28	15	49	7	0
October 2006	181	15	12	33	40	0
November 2006	181	0	1	3	56	40
December 2006	181	0	1	7	74	18
January 2007	181	12	7	18	57	7
February 2007	181	47	13	27	13	0
March 2007	181	7	15	39	26	13
April 2007	181	55	10	29	6	0
May 2007	181	14	21	59	7	0
June 2007	181	28	12	57	3	0
July 2007	181	63	19	18	1	0
August 2007	181	27	13	35	25	1
September 2007	181	8	3	26	62	1
October 2007	181	2	1	12	77	8
November 2007	181	7	6	14	62	12
December 2007	181	22	4	17	52	4
January 2008	181	35	4	20	41	0
February 2008	181	34	7	22	37	0
March 2008	181	38	7	31	24	0
April 2008	181	25	7	25	41	1
May 2008	181	13	14	62	11	0
June 2008	181	23	11	27	37	2

NRM Region, ID and Date	Num. of Pixel	Area [%] very low erosion	Area [%] low erosion	Area [%] moderate erosion	Area [%] high erosion	Area [%] very high erosion
Mackay Whitsunday (r18)						
July 2006	8	100	0	0	0	0
August 2006	8	100	0	0	0	0
September 2006	8	100	0	0	0	0
October 2006	8	100	0	0	0	0
November 2006	8	100	0	0	0	0
December 2006	8	100	0	0	0	0
January 2007	8	100	0	0	0	0
February 2007	8	100	0	0	0	0
March 2007	8	100	0	0	0	0
April 2007	8	100	0	0	0	0
May 2007	8	100	0	0	0	0
June 2007	8	100	0	0	0	0
July 2007	8	100	0	0	0	0
August 2007	8	100	0	0	0	0
September 2007	8	100	0	0	0	0
October 2007	8	100	0	0	0	0
November 2007	8	100	0	0	0	0
December 2007	8	100	0	0	0	0
January 2008	8	100	0	0	0	0
February 2008	8	100	0	0	0	0
March 2008	8	100	0	0	0	0
April 2008	8	100	0	0	0	0
May 2008	8	100	0	0	0	0
June 2008	8	100	0	0	0	0
Rangelands - Goldfields Nullarbor (r19)						
July 2006	522	85	7	7	1	0
August 2006	522	94	6	1	0	0
September 2006	522	74	9	14	3	0
October 2006	522	60	11	22	7	0
November 2006	522	52	16	25	7	0
December 2006	522	34	9	31	21	4
January 2007	522	45	11	26	16	1
February 2007	522	57	13	24	7	0
March 2007	522	39	9	24	22	5
April 2007	522	85	6	8	1	0
May 2007	522	81	7	11	1	0
June 2007	522	71	11	14	5	0
July 2007	526	86	8	6	0	0
August 2007	526	64	11	18	6	0
September 2007	526	63	17	18	2	0
October 2007	526	31	10	33	24	1
November 2007	526	36	13	29	21	2
December 2007	526	40	16	27	16	0
January 2008	526	34	12	30	23	1
February 2008	526	39	12	33	15	1
March 2008	526	63	13	20	3	0
April 2008	526	85	10	5	0	0
May 2008	526	96	3	1	0	0
June 2008	526	67	11	17	6	0

NRM Region, ID and Date	Num. of Pixel	Area [%] very low erosion	Area [%] low erosion	Area [%] moderate erosion	Area [%] high erosion	Area [%] very high erosion
Fitzroy (r20)						
July 2006	57	100	0	0	0	0
August 2006	57	100	0	0	0	0
September 2006	57	100	0	0	0	0
October 2006	57	100	0	0	0	0
November 2006	57	96	0	4	0	0
December 2006	57	100	0	0	0	0
January 2007	57	100	0	0	0	0
February 2007	57	100	0	0	0	0
March 2007	57	100	0	0	0	0
April 2007	57	100	0	0	0	0
May 2007	57	100	0	0	0	0
June 2007	57	100	0	0	0	0
July 2007	57	100	0	0	0	0
August 2007	57	100	0	0	0	0
September 2007	57	100	0	0	0	0
October 2007	57	100	0	0	0	0
November 2007	57	100	0	0	0	0
December 2007	57	100	0	0	0	0
January 2008	57	100	0	0	0	0
February 2008	57	100	0	0	0	0
March 2008	57	100	0	0	0	0
April 2008	57	100	0	0	0	0
May 2008	57	100	0	0	0	0
June 2008	57	100	0	0	0	0
NT - Arid Centre Simpson (r21)						
July 2006	27	100	0	0	0	0
August 2006	27	100	0	0	0	0
September 2006	27	63	33	4	0	0
October 2006	27	48	19	33	0	0
November 2006	27	56	26	19	0	0
December 2006	27	30	22	41	7	0
January 2007	27	56	19	22	4	0
February 2007	27	93	7	0	0	0
March 2007	27	30	19	41	11	0
April 2007	27	100	0	0	0	0
May 2007	27	85	15	0	0	0
June 2007	27	100	0	0	0	0
July 2007	27	100	0	0	0	0
August 2007	27	93	4	4	0	0
September 2007	27	78	11	7	4	0
October 2007	27	74	11	11	4	0
November 2007	27	37	33	22	7	0
December 2007	27	56	19	22	4	0
January 2008	27	56	22	15	7	0
February 2008	27	37	26	26	11	0
March 2008	27	85	4	11	0	0
April 2008	27	78	11	11	0	0
May 2008	27	96	4	0	0	0
June 2008	27	74	19	7	0	0

NRM Region, ID and Date	Num. of Pixel	Area [%] very low erosion	Area [%] low erosion	Area [%] moderate erosion	Area [%] high erosion	Area [%] very high erosion
Burnett Mary (r22)						
July 2006	25	100	0	0	0	0
August 2006	25	100	0	0	0	0
September 2006	25	92	8	0	0	0
October 2006	25	96	4	0	0	0
November 2006	25	80	4	8	8	0
December 2006	25	92	4	4	0	0
January 2007	25	92	4	4	0	0
February 2007	25	96	4	0	0	0
March 2007	25	92	4	4	0	0
April 2007	25	92	4	4	0	0
May 2007	25	92	4	4	0	0
June 2007	25	92	0	8	0	0
July 2007	25	100	0	0	0	0
August 2007	25	100	0	0	0	0
September 2007	25	100	0	0	0	0
October 2007	25	100	0	0	0	0
November 2007	25	92	4	4	0	0
December 2007	25	100	0	0	0	0
January 2008	25	100	0	0	0	0
February 2008	25	100	0	0	0	0
March 2008	25	100	0	0	0	0
April 2008	25	100	0	0	0	0
May 2008	25	100	0	0	0	0
June 2008	25	100	0	0	0	0
South West Queensland (r23)						
July 2006	70	83	11	4	1	0
August 2006	70	94	4	1	0	0
September 2006	70	76	10	13	1	0
October 2006	70	46	10	29	16	0
November 2006	70	4	0	1	31	63
December 2006	70	4	1	16	76	3
January 2007	70	9	4	41	43	3
February 2007	70	60	24	13	3	0
March 2007	70	9	10	60	13	9
April 2007	70	21	27	40	11	0
May 2007	70	17	23	59	1	0
June 2007	70	39	16	39	7	0
July 2007	70	99	1	0	0	0
August 2007	70	61	29	10	0	0
September 2007	70	14	7	67	11	0
October 2007	70	4	0	37	59	0
November 2007	70	43	16	33	9	0
December 2007	70	60	7	20	13	0
January 2008	70	73	10	9	9	0
February 2008	70	81	6	6	7	0
March 2008	70	90	3	7	0	0
April 2008	70	50	16	21	13	0
May 2008	70	57	26	17	0	0
June 2008	70	89	3	9	0	0

NRM Region, ID and Date	Num. of Pixel	Area [%] very low erosion	Area [%] low erosion	Area [%] moderate erosion	Area [%] high erosion	Area [%] very high erosion
Border rivers Maranoa - Balonne (r24)						
July 2006	37	100	0	0	0	0
August 2006	37	100	0	0	0	0
September 2006	37	89	8	3	0	0
October 2006	37	84	11	5	0	0
November 2006	37	5	3	38	46	8
December 2006	37	35	27	32	5	0
January 2007	37	54	16	27	3	0
February 2007	37	78	11	8	3	0
March 2007	37	62	11	24	3	0
April 2007	37	76	5	19	0	0
May 2007	37	84	14	3	0	0
June 2007	37	57	16	11	14	3
July 2007	37	86	14	0	0	0
August 2007	37	86	14	0	0	0
September 2007	37	57	11	32	0	0
October 2007	37	35	27	32	5	0
November 2007	37	81	14	5	0	0
December 2007	37	100	0	0	0	0
January 2008	37	100	0	0	0	0
February 2008	37	100	0	0	0	0
March 2008	37	97	3	0	0	0
April 2008	37	89	11	0	0	0
May 2008	37	95	5	0	0	0
June 2008	37	100	0	0	0	0
South East Queensland (r25)						
July 2006	8	100	0	0	0	0
August 2006	8	100	0	0	0	0
September 2006	8	100	0	0	0	0
October 2006	8	100	0	0	0	0
November 2006	8	38	13	25	25	0
December 2006	8	100	0	0	0	0
January 2007	8	100	0	0	0	0
February 2007	8	100	0	0	0	0
March 2007	8	100	0	0	0	0
April 2007	8	100	0	0	0	0
May 2007	8	75	25	0	0	0
June 2007	8	50	0	25	25	0
July 2007	8	88	13	0	0	0
August 2007	8	100	0	0	0	0
September 2007	8	100	0	0	0	0
October 2007	8	100	0	0	0	0
November 2007	8	100	0	0	0	0
December 2007	8	100	0	0	0	0
January 2008	8	100	0	0	0	0
February 2008	8	100	0	0	0	0
March 2008	8	100	0	0	0	0
April 2008	8	100	0	0	0	0
May 2008	8	100	0	0	0	0
June 2008	8	100	0	0	0	0

NRM Region, ID and Date	Num. of Pixel	Area [%] very low erosion	Area [%] low erosion	Area [%] moderate erosion	Area [%] high erosion	Area [%] very high erosion
South Australian Arid Lands (r26)						
July 2006	192	60	11	27	2	0
August 2006	192	78	9	13	0	0
September 2006	192	66	6	23	5	0
October 2006	192	41	9	24	24	2
November 2006	192	16	6	20	53	5
December 2006	192	15	5	19	51	11
January 2007	192	17	5	20	46	13
February 2007	192	28	7	45	20	0
March 2007	192	15	8	15	38	24
April 2007	192	33	17	32	18	0
May 2007	192	44	11	31	14	0
June 2007	192	60	11	28	2	0
July 2007	192	36	23	38	3	0
August 2007	192	27	15	52	6	0
September 2007	192	7	6	27	57	3
October 2007	192	4	5	24	52	15
November 2007	192	10	5	24	53	7
December 2007	192	12	8	27	44	8
January 2008	192	5	5	23	47	19
February 2008	192	13	7	24	47	9
March 2008	192	20	14	41	26	0
April 2008	192	19	9	43	29	0
May 2008	192	31	16	49	5	0
June 2008	192	39	13	46	2	0
Alinytjara Wilurara (r27)						
July 2006	104	89	8	3	0	0
August 2006	104	100	0	0	0	0
September 2006	104	100	0	0	0	0
October 2006	104	79	14	7	0	0
November 2006	104	63	7	26	4	0
December 2006	104	49	8	25	18	0
January 2007	104	53	12	22	13	0
February 2007	104	66	17	16	0	0
March 2007	104	64	14	18	3	0
April 2007	104	93	2	5	0	0
May 2007	104	100	0	0	0	0
June 2007	104	100	0	0	0	0
July 2007	104	89	11	0	0	0
August 2007	104	66	10	24	0	0
September 2007	104	62	12	26	1	0
October 2007	104	40	11	33	16	0
November 2007	104	47	13	27	13	0
December 2007	104	60	13	23	5	0
January 2008	104	52	13	23	12	0
February 2008	104	53	12	33	3	0
March 2008	104	75	15	10	0	0
April 2008	104	87	12	2	0	0
May 2008	104	95	5	0	0	0
June 2008	104	100	0	0	0	0

NRM Region, ID and Date	Num. of Pixel	Area [%] very low erosion	Area [%] low erosion	Area [%] moderate erosion	Area [%] high erosion	Area [%] very high erosion
Condamine (r28)						
July 2006	10	100	0	0	0	0
August 2006	10	100	0	0	0	0
September 2006	10	20	70	10	0	0
October 2006	10	30	60	10	0	0
November 2006	10	0	0	0	100	0
December 2006	10	10	30	60	0	0
January 2007	10	40	20	40	0	0
February 2007	10	70	20	10	0	0
March 2007	10	40	40	20	0	0
April 2007	10	20	60	20	0	0
May 2007	10	20	70	10	0	0
June 2007	10	0	0	40	60	0
July 2007	10	90	10	0	0	0
August 2007	10	100	0	0	0	0
September 2007	10	100	0	0	0	0
October 2007	10	80	10	10	0	0
November 2007	10	70	10	20	0	0
December 2007	10	100	0	0	0	0
January 2008	10	100	0	0	0	0
February 2008	10	100	0	0	0	0
March 2008	10	100	0	0	0	0
April 2008	10	100	0	0	0	0
May 2008	10	60	40	0	0	0
June 2008	10	100	0	0	0	0
Northern Agricultural (r29)						
July 2006	30	100	0	0	0	0
August 2006	30	100	0	0	0	0
September 2006	30	100	0	0	0	0
October 2006	30	100	0	0	0	0
November 2006	30	90	3	0	7	0
December 2006	30	90	0	3	3	3
January 2007	30	90	0	3	0	7
February 2007	30	87	3	3	3	3
March 2007	30	87	3	3	0	7
April 2007	30	90	3	3	3	0
May 2007	30	97	3	0	0	0
June 2007	30	90	3	0	7	0
July 2007	30	83	3	10	3	0
August 2007	30	97	0	3	0	0
September 2007	30	90	3	3	3	0
October 2007	30	50	17	20	10	3
November 2007	30	47	10	30	10	3
December 2007	30	27	0	33	20	20
January 2008	30	20	7	33	20	20
February 2008	30	17	7	27	37	13
March 2008	30	40	10	23	23	3
April 2008	30	87	7	7	0	0
May 2008	30	97	0	3	0	0
June 2008	30	87	3	7	3	0

NRM Region, ID and Date	Num. of Pixel	Area [%] very low erosion	Area [%] low erosion	Area [%] moderate erosion	Area [%] high erosion	Area [%] very high erosion
Northern rivers (r30)						
July 2006	20	100	0	0	0	0
August 2006	20	100	0	0	0	0
September 2006	20	100	0	0	0	0
October 2006	20	100	0	0	0	0
November 2006	20	85	5	5	5	0
December 2006	20	85	10	5	0	0
January 2007	20	100	0	0	0	0
February 2007	20	100	0	0	0	0
March 2007	20	100	0	0	0	0
April 2007	20	100	0	0	0	0
May 2007	20	100	0	0	0	0
June 2007	20	100	0	0	0	0
July 2007	20	100	0	0	0	0
August 2007	20	100	0	0	0	0
September 2007	20	100	0	0	0	0
October 2007	20	100	0	0	0	0
November 2007	20	100	0	0	0	0
December 2007	20	100	0	0	0	0
January 2008	20	100	0	0	0	0
February 2008	20	100	0	0	0	0
March 2008	20	100	0	0	0	0
April 2008	20	100	0	0	0	0
May 2008	20	100	0	0	0	0
June 2008	20	100	0	0	0	0
Border rivers-Gwydir (r31)						
July 2006	21	100	0	0	0	0
August 2006	21	100	0	0	0	0
September 2006	21	100	0	0	0	0
October 2006	21	86	14	0	0	0
November 2006	21	10	0	24	52	14
December 2006	21	43	14	33	10	0
January 2007	21	38	14	48	0	0
February 2007	21	90	10	0	0	0
March 2007	21	57	14	29	0	0
April 2007	21	67	24	10	0	0
May 2007	21	90	10	0	0	0
June 2007	21	81	10	10	0	0
July 2007	21	100	0	0	0	0
August 2007	21	100	0	0	0	0
September 2007	21	90	5	5	0	0
October 2007	21	29	14	52	5	0
November 2007	21	67	29	5	0	0
December 2007	21	100	0	0	0	0
January 2008	21	100	0	0	0	0
February 2008	21	100	0	0	0	0
March 2008	21	100	0	0	0	0
April 2008	21	57	29	14	0	0
May 2008	21	62	29	10	0	0
June 2008	21	100	0	0	0	0

NRM Region, ID and Date	Num. of Pixel	Area [%] very low erosion	Area [%] low erosion	Area [%] moderate erosion	Area [%] high erosion	Area [%] very high erosion
Western (r32)						
July 2006	85	88	7	5	0	0
August 2006	85	96	1	2	0	0
September 2006	85	69	15	14	1	0
October 2006	85	24	9	49	18	0
November 2006	85	0	1	8	33	58
December 2006	85	2	5	18	45	31
January 2007	85	0	6	19	40	35
February 2007	85	19	12	22	47	0
March 2007	85	1	4	21	31	44
April 2007	85	9	11	22	56	1
May 2007	85	29	16	33	21	0
June 2007	85	12	5	39	45	0
July 2007	85	100	0	0	0	0
August 2007	85	86	14	0	0	0
September 2007	85	7	8	25	60	0
October 2007	85	2	5	18	74	1
November 2007	85	13	8	32	46	1
December 2007	85	21	5	20	54	0
January 2008	85	28	4	19	41	8
February 2008	85	38	9	18	35	0
March 2008	85	51	5	36	8	0
April 2008	85	24	7	38	32	0
May 2008	85	39	18	40	4	0
June 2008	85	54	13	33	0	0
Namoi (r33)						
July 2006	15	100	0	0	0	0
August 2006	15	100	0	0	0	0
September 2006	15	100	0	0	0	0
October 2006	15	80	13	7	0	0
November 2006	15	13	7	27	40	13
December 2006	15	20	27	40	13	0
January 2007	15	33	20	40	7	0
February 2007	15	93	0	7	0	0
March 2007	15	27	40	27	7	0
April 2007	15	60	13	27	0	0
May 2007	15	93	0	7	0	0
June 2007	15	60	7	20	13	0
July 2007	15	100	0	0	0	0
August 2007	15	100	0	0	0	0
September 2007	15	73	7	20	0	0
October 2007	15	53	7	13	27	0
November 2007	15	60	13	27	0	0
December 2007	15	87	0	13	0	0
January 2008	15	87	13	0	0	0
February 2008	15	100	0	0	0	0
March 2008	15	87	0	13	0	0
April 2008	15	60	7	20	13	0
May 2008	15	73	13	13	0	0
June 2008	15	93	7	0	0	0

NRM Region, ID and Date	Num. of Pixel	Area [%] very low erosion	Area [%] low erosion	Area [%] moderate erosion	Area [%] high erosion	Area [%] very high erosion
Avon (r34)						
July 2006	45	96	4	0	0	0
August 2006	45	100	0	0	0	0
September 2006	45	100	0	0	0	0
October 2006	45	93	4	2	0	0
November 2006	45	67	9	11	13	0
December 2006	45	60	7	16	16	2
January 2007	45	47	13	16	22	2
February 2007	45	44	13	13	24	4
March 2007	45	51	7	18	22	2
April 2007	45	62	7	20	11	0
May 2007	45	89	7	4	0	0
June 2007	45	82	2	16	0	0
July 2007	45	91	7	2	0	0
August 2007	45	98	2	0	0	0
September 2007	45	82	2	16	0	0
October 2007	45	51	9	24	16	0
November 2007	45	53	9	24	13	0
December 2007	45	4	2	27	51	16
January 2008	45	2	0	18	29	51
February 2008	45	4	4	31	53	7
March 2008	45	11	7	36	47	0
April 2008	45	91	7	2	0	0
May 2008	45	89	11	0	0	0
June 2008	45	76	11	13	0	0
Central West (r35)						
July 2006	33	100	0	0	0	0
August 2006	33	100	0	0	0	0
September 2006	33	100	0	0	0	0
October 2006	33	94	3	3	0	0
November 2006	33	24	21	33	18	3
December 2006	33	64	21	9	6	0
January 2007	33	58	27	12	3	0
February 2007	33	100	0	0	0	0
March 2007	33	88	6	6	0	0
April 2007	33	94	0	6	0	0
May 2007	33	94	6	0	0	0
June 2007	33	82	9	9	0	0
July 2007	33	100	0	0	0	0
August 2007	33	100	0	0	0	0
September 2007	33	73	9	15	3	0
October 2007	33	39	18	30	12	0
November 2007	33	76	15	9	0	0
December 2007	33	100	0	0	0	0
January 2008	33	100	0	0	0	0
February 2008	33	100	0	0	0	0
March 2008	33	100	0	0	0	0
April 2008	33	94	6	0	0	0
May 2008	33	100	0	0	0	0
June 2008	33	100	0	0	0	0

NRM Region, ID and Date	Num. of Pixel	Area [%] very low erosion	Area [%] low erosion	Area [%] moderate erosion	Area [%] high erosion	Area [%] very high erosion
Swan (r36)						
July 2006	7	100	0	0	0	0
August 2006	7	100	0	0	0	0
September 2006	7	100	0	0	0	0
October 2006	7	100	0	0	0	0
November 2006	7	100	0	0	0	0
December 2006	7	100	0	0	0	0
January 2007	7	100	0	0	0	0
February 2007	7	100	0	0	0	0
March 2007	7	100	0	0	0	0
April 2007	7	100	0	0	0	0
May 2007	7	100	0	0	0	0
June 2007	7	100	0	0	0	0
July 2007	7	100	0	0	0	0
August 2007	7	100	0	0	0	0
September 2007	7	100	0	0	0	0
October 2007	7	100	0	0	0	0
November 2007	7	100	0	0	0	0
December 2007	7	100	0	0	0	0
January 2008	7	71	29	0	0	0
February 2008	7	71	29	0	0	0
March 2008	7	100	0	0	0	0
April 2008	7	100	0	0	0	0
May 2008	7	100	0	0	0	0
June 2008	7	100	0	0	0	0
Eyre Peninsula (r37)						
July 2006	29	100	0	0	0	0
August 2006	29	100	0	0	0	0
September 2006	29	100	0	0	0	0
October 2006	29	100	0	0	0	0
November 2006	29	100	0	0	0	0
December 2006	29	100	0	0	0	0
January 2007	29	100	0	0	0	0
February 2007	29	100	0	0	0	0
March 2007	29	100	0	0	0	0
April 2007	29	100	0	0	0	0
May 2007	29	100	0	0	0	0
June 2007	29	100	0	0	0	0
July 2007	29	100	0	0	0	0
August 2007	29	100	0	0	0	0
September 2007	29	97	0	3	0	0
October 2007	29	90	7	0	3	0
November 2007	29	97	0	3	0	0
December 2007	29	97	0	3	0	0
January 2008	29	79	10	10	0	0
February 2008	29	93	3	3	0	0
March 2008	29	90	7	3	0	0
April 2008	29	97	0	3	0	0
May 2008	29	97	0	3	0	0
June 2008	29	100	0	0	0	0

NRM Region, ID and Date	Num. of Pixel	Area [%] very low erosion	Area [%] low erosion	Area [%] moderate erosion	Area [%] high erosion	Area [%] very high erosion
Hunter-Central rivers (r38)						
July 2006	13	100	0	0	0	0
August 2006	13	100	0	0	0	0
September 2006	13	100	0	0	0	0
October 2006	13	100	0	0	0	0
November 2006	13	100	0	0	0	0
December 2006	13	100	0	0	0	0
January 2007	13	100	0	0	0	0
February 2007	13	100	0	0	0	0
March 2007	13	100	0	0	0	0
April 2007	13	100	0	0	0	0
May 2007	13	100	0	0	0	0
June 2007	13	100	0	0	0	0
July 2007	13	100	0	0	0	0
August 2007	13	100	0	0	0	0
September 2007	13	100	0	0	0	0
October 2007	13	100	0	0	0	0
November 2007	13	100	0	0	0	0
December 2007	13	100	0	0	0	0
January 2008	13	100	0	0	0	0
February 2008	13	100	0	0	0	0
March 2008	13	100	0	0	0	0
April 2008	13	100	0	0	0	0
May 2008	13	100	0	0	0	0
June 2008	13	100	0	0	0	0
Northern and Yorke (r39)						
July 2006	21	86	5	10	0	0
August 2006	21	100	0	0	0	0
September 2006	21	86	5	10	0	0
October 2006	21	81	5	14	0	0
November 2006	21	67	5	19	10	0
December 2006	21	67	5	19	10	0
January 2007	21	71	5	24	0	0
February 2007	21	71	14	14	0	0
March 2007	21	71	0	19	10	0
April 2007	21	90	0	10	0	0
May 2007	21	90	0	10	0	0
June 2007	21	90	0	10	0	0
July 2007	21	86	5	10	0	0
August 2007	21	71	10	19	0	0
September 2007	21	67	5	10	19	0
October 2007	21	67	0	5	24	5
November 2007	21	67	0	10	19	5
December 2007	21	67	5	19	10	0
January 2008	21	62	5	5	24	5
February 2008	21	67	0	14	14	5
March 2008	21	67	5	24	5	0
April 2008	21	71	0	19	10	0
May 2008	21	71	5	19	5	0
June 2008	21	71	5	19	5	0

NRM Region, ID and Date	Num. of Pixel	Area [%] very low erosion	Area [%] low erosion	Area [%] moderate erosion	Area [%] high erosion	Area [%] very high erosion
Lower Murray Darling (r40)						
July 2006	24	100	0	0	0	0
August 2006	24	100	0	0	0	0
September 2006	24	100	0	0	0	0
October 2006	24	100	0	0	0	0
November 2006	24	13	21	29	38	0
December 2006	24	29	17	21	33	0
January 2007	24	25	17	38	21	0
February 2007	24	46	13	42	0	0
March 2007	24	25	25	21	29	0
April 2007	24	54	17	29	0	0
May 2007	24	71	8	21	0	0
June 2007	24	46	21	25	8	0
July 2007	24	100	0	0	0	0
August 2007	24	96	4	0	0	0
September 2007	24	13	13	42	33	0
October 2007	24	17	17	33	33	0
November 2007	24	17	13	46	25	0
December 2007	24	25	21	46	8	0
January 2008	24	8	13	33	46	0
February 2008	24	21	17	29	33	0
March 2008	24	46	17	38	0	0
April 2008	24	50	13	38	0	0
May 2008	24	67	17	17	0	0
June 2008	24	54	29	17	0	0
South West (r41)						
July 2006	21	100	0	0	0	0
August 2006	21	100	0	0	0	0
September 2006	21	100	0	0	0	0
October 2006	21	100	0	0	0	0
November 2006	21	100	0	0	0	0
December 2006	21	100	0	0	0	0
January 2007	21	100	0	0	0	0
February 2007	21	100	0	0	0	0
March 2007	21	100	0	0	0	0
April 2007	21	100	0	0	0	0
May 2007	21	100	0	0	0	0
June 2007	21	100	0	0	0	0
July 2007	21	100	0	0	0	0
August 2007	21	100	0	0	0	0
September 2007	21	100	0	0	0	0
October 2007	21	100	0	0	0	0
November 2007	21	100	0	0	0	0
December 2007	21	86	14	0	0	0
January 2008	21	81	5	10	5	0
February 2008	21	86	14	0	0	0
March 2008	21	100	0	0	0	0
April 2008	21	100	0	0	0	0
May 2008	21	100	0	0	0	0
June 2008	21	100	0	0	0	0

NRM Region, ID and Date	Num. of Pixel	Area [%] very low erosion	Area [%] low erosion	Area [%] moderate erosion	Area [%] high erosion	Area [%] very high erosion
Lachlan (r42)						
July 2006	35	100	0	0	0	0
August 2006	35	100	0	0	0	0
September 2006	35	100	0	0	0	0
October 2006	35	94	0	6	0	0
November 2006	35	31	3	43	23	0
December 2006	35	29	6	46	20	0
January 2007	35	31	14	40	14	0
February 2007	35	74	11	11	3	0
March 2007	35	34	17	31	17	0
April 2007	35	74	11	14	0	0
May 2007	35	91	6	3	0	0
June 2007	35	77	9	11	3	0
July 2007	35	100	0	0	0	0
August 2007	35	89	3	9	0	0
September 2007	35	54	6	14	20	6
October 2007	35	43	11	20	20	6
November 2007	35	66	3	6	26	0
December 2007	35	63	6	6	26	0
January 2008	35	66	0	9	14	11
February 2008	35	69	6	9	17	0
March 2008	35	77	6	14	3	0
April 2008	35	71	9	14	6	0
May 2008	35	83	11	6	0	0
June 2008	35	80	3	17	0	0
South Australian Murray Darling Basin (r43)						
July 2006	24	100	0	0	0	0
August 2006	24	100	0	0	0	0
September 2006	24	100	0	0	0	0
October 2006	24	100	0	0	0	0
November 2006	24	54	29	17	0	0
December 2006	24	71	29	0	0	0
January 2007	24	67	25	8	0	0
February 2007	24	96	4	0	0	0
March 2007	24	67	29	4	0	0
April 2007	24	96	4	0	0	0
May 2007	24	96	4	0	0	0
June 2007	24	100	0	0	0	0
July 2007	24	100	0	0	0	0
August 2007	24	100	0	0	0	0
September 2007	24	96	4	0	0	0
October 2007	24	100	0	0	0	0
November 2007	24	100	0	0	0	0
December 2007	24	100	0	0	0	0
January 2008	24	79	17	4	0	0
February 2008	24	100	0	0	0	0
March 2008	24	100	0	0	0	0
April 2008	24	100	0	0	0	0
May 2008	24	100	0	0	0	0
June 2008	24	100	0	0	0	0

NRM Region, ID and Date	Num. of Pixel	Area [%] very low erosion	Area [%] low erosion	Area [%] moderate erosion	Area [%] high erosion	Area [%] very high erosion
South Coast (r44)						
July 2006	23	100	0	0	0	0
August 2006	23	100	0	0	0	0
September 2006	23	100	0	0	0	0
October 2006	23	100	0	0	0	0
November 2006	23	91	4	4	0	0
December 2006	23	87	4	9	0	0
January 2007	23	74	9	9	9	0
February 2007	23	83	9	4	4	0
March 2007	23	65	13	13	9	0
April 2007	23	91	4	4	0	0
May 2007	23	100	0	0	0	0
June 2007	23	100	0	0	0	0
July 2007	23	100	0	0	0	0
August 2007	23	100	0	0	0	0
September 2007	23	100	0	0	0	0
October 2007	23	100	0	0	0	0
November 2007	23	100	0	0	0	0
December 2007	23	96	0	4	0	0
January 2008	23	96	0	0	4	0
February 2008	23	96	0	4	0	0
March 2008	23	91	9	0	0	0
April 2008	23	100	0	0	0	0
May 2008	23	100	0	0	0	0
June 2008	23	100	0	0	0	0
Hawkesbury-Nepean (r45)						
July 2006	9	100	0	0	0	0
August 2006	9	100	0	0	0	0
September 2006	9	100	0	0	0	0
October 2006	9	100	0	0	0	0
November 2006	9	89	11	0	0	0
December 2006	9	100	0	0	0	0
January 2007	9	89	0	11	0	0
February 2007	9	100	0	0	0	0
March 2007	9	100	0	0	0	0
April 2007	9	100	0	0	0	0
May 2007	9	100	0	0	0	0
June 2007	9	100	0	0	0	0
July 2007	9	100	0	0	0	0
August 2007	9	100	0	0	0	0
September 2007	9	100	0	0	0	0
October 2007	9	100	0	0	0	0
November 2007	9	100	0	0	0	0
December 2007	9	100	0	0	0	0
January 2008	9	100	0	0	0	0
February 2008	9	100	0	0	0	0
March 2008	9	100	0	0	0	0
April 2008	9	100	0	0	0	0
May 2008	9	100	0	0	0	0
June 2008	9	100	0	0	0	0

NRM Region, ID and Date	Num. of Pixel	Area [%] very low erosion	Area [%] low erosion	Area [%] moderate erosion	Area [%] high erosion	Area [%] very high erosion
Murrumbidgee (r46)						
July 2006	26	96	0	4	0	0
August 2006	26	100	0	0	0	0
September 2006	26	100	0	0	0	0
October 2006	26	100	0	0	0	0
November 2006	26	54	12	27	8	0
December 2006	26	50	4	38	8	0
January 2007	26	50	15	31	4	0
February 2007	26	81	12	8	0	0
March 2007	26	54	12	31	4	0
April 2007	26	100	0	0	0	0
May 2007	26	85	8	8	0	0
June 2007	26	81	8	12	0	0
July 2007	26	100	0	0	0	0
August 2007	26	100	0	0	0	0
September 2007	26	73	0	19	8	0
October 2007	26	54	12	15	19	0
November 2007	26	69	4	15	12	0
December 2007	26	69	12	8	12	0
January 2008	26	73	4	4	15	4
February 2008	26	81	4	8	8	0
March 2008	26	85	4	12	0	0
April 2008	26	88	0	12	0	0
May 2008	26	100	0	0	0	0
June 2008	26	81	8	12	0	0
Mallee (r47)						
July 2006	16	100	0	0	0	0
August 2006	16	100	0	0	0	0
September 2006	16	100	0	0	0	0
October 2006	16	100	0	0	0	0
November 2006	16	75	13	13	0	0
December 2006	16	88	0	13	0	0
January 2007	16	81	19	0	0	0
February 2007	16	100	0	0	0	0
March 2007	16	88	13	0	0	0
April 2007	16	100	0	0	0	0
May 2007	16	100	0	0	0	0
June 2007	16	100	0	0	0	0
July 2007	16	100	0	0	0	0
August 2007	16	100	0	0	0	0
September 2007	16	81	19	0	0	0
October 2007	16	100	0	0	0	0
November 2007	16	94	6	0	0	0
December 2007	16	94	6	0	0	0
January 2008	16	44	25	31	0	0
February 2008	16	75	25	0	0	0
March 2008	16	100	0	0	0	0
April 2008	16	100	0	0	0	0
May 2008	16	100	0	0	0	0
June 2008	16	100	0	0	0	0

NRM Region, ID and Date	Num. of Pixel	Area [%] very low erosion	Area [%] low erosion	Area [%] moderate erosion	Area [%] high erosion	Area [%] very high erosion
Southern rivers (r48)						
July 2006	12	92	8	0	0	0
August 2006	12	100	0	0	0	0
September 2006	12	100	0	0	0	0
October 2006	12	100	0	0	0	0
November 2006	12	100	0	0	0	0
December 2006	12	92	0	8	0	0
January 2007	12	83	17	0	0	0
February 2007	12	100	0	0	0	0
March 2007	12	100	0	0	0	0
April 2007	12	100	0	0	0	0
May 2007	12	100	0	0	0	0
June 2007	12	100	0	0	0	0
July 2007	12	100	0	0	0	0
August 2007	12	100	0	0	0	0
September 2007	12	100	0	0	0	0
October 2007	12	100	0	0	0	0
November 2007	12	100	0	0	0	0
December 2007	12	100	0	0	0	0
January 2008	12	100	0	0	0	0
February 2008	12	100	0	0	0	0
March 2008	12	100	0	0	0	0
April 2008	12	100	0	0	0	0
May 2008	12	100	0	0	0	0
June 2008	12	100	0	0	0	0
Adelaide and Mount Lofty ranges (r49)						
July 2006	3	100	0	0	0	0
August 2006	3	100	0	0	0	0
September 2006	3	100	0	0	0	0
October 2006	3	100	0	0	0	0
November 2006	3	100	0	0	0	0
December 2006	3	100	0	0	0	0
January 2007	3	100	0	0	0	0
February 2007	3	100	0	0	0	0
March 2007	3	100	0	0	0	0
April 2007	3	100	0	0	0	0
May 2007	3	100	0	0	0	0
June 2007	3	100	0	0	0	0
July 2007	3	100	0	0	0	0
August 2007	3	100	0	0	0	0
September 2007	3	100	0	0	0	0
October 2007	3	100	0	0	0	0
November 2007	3	100	0	0	0	0
December 2007	3	100	0	0	0	0
January 2008	3	100	0	0	0	0
February 2008	3	100	0	0	0	0
March 2008	3	100	0	0	0	0
April 2008	3	100	0	0	0	0
May 2008	3	100	0	0	0	0
June 2008	3	100	0	0	0	0

NRM Region, ID and Date	Num. of Pixel	Area [%] very low erosion	Area [%] low erosion	Area [%] moderate erosion	Area [%] high erosion	Area [%] very high erosion
Murray (r50)						
July 2006	16	100	0	0	0	0
August 2006	16	100	0	0	0	0
September 2006	16	100	0	0	0	0
October 2006	16	100	0	0	0	0
November 2006	16	44	19	6	31	0
December 2006	16	50	13	6	25	6
January 2007	16	50	13	13	25	0
February 2007	16	63	6	13	19	0
March 2007	16	50	13	13	25	0
April 2007	16	81	13	6	0	0
May 2007	16	69	0	25	6	0
June 2007	16	63	0	25	13	0
July 2007	16	100	0	0	0	0
August 2007	16	100	0	0	0	0
September 2007	16	69	19	13	0	0
October 2007	16	50	13	13	25	0
November 2007	16	50	6	19	19	6
December 2007	16	50	6	19	13	13
January 2008	16	50	0	13	25	13
February 2008	16	50	13	25	13	0
March 2008	16	56	13	19	13	0
April 2008	16	75	13	13	0	0
May 2008	16	100	0	0	0	0
June 2008	16	75	13	13	0	0
North Central (r51)						
July 2006	12	100	0	0	0	0
August 2006	12	100	0	0	0	0
September 2006	12	100	0	0	0	0
October 2006	12	100	0	0	0	0
November 2006	12	42	17	33	8	0
December 2006	12	50	8	33	8	0
January 2007	12	50	8	33	8	0
February 2007	12	58	8	25	8	0
March 2007	12	50	8	33	8	0
April 2007	12	92	8	0	0	0
May 2007	12	92	0	8	0	0
June 2007	12	83	8	8	0	0
July 2007	12	100	0	0	0	0
August 2007	12	100	0	0	0	0
September 2007	12	100	0	0	0	0
October 2007	12	83	8	8	0	0
November 2007	12	75	8	8	8	0
December 2007	12	25	42	25	8	0
January 2008	12	0	17	75	0	8
February 2008	12	8	33	50	8	0
March 2008	12	17	75	8	0	0
April 2008	12	75	17	8	0	0
May 2008	12	100	0	0	0	0
June 2008	12	92	8	0	0	0

NRM Region, ID and Date	Num. of Pixel	Area [%] very low erosion	Area [%] low erosion	Area [%] moderate erosion	Area [%] high erosion	Area [%] very high erosion
Kangaroo Island (r52)						
July 2006	4	100	0	0	0	0
August 2006	4	100	0	0	0	0
September 2006	4	100	0	0	0	0
October 2006	4	100	0	0	0	0
November 2006	4	100	0	0	0	0
December 2006	4	100	0	0	0	0
January 2007	4	100	0	0	0	0
February 2007	4	100	0	0	0	0
March 2007	4	100	0	0	0	0
April 2007	4	100	0	0	0	0
May 2007	4	100	0	0	0	0
June 2007	4	100	0	0	0	0
July 2007	4	100	0	0	0	0
August 2007	4	100	0	0	0	0
September 2007	4	100	0	0	0	0
October 2007	4	100	0	0	0	0
November 2007	4	100	0	0	0	0
December 2007	4	100	0	0	0	0
January 2008	4	100	0	0	0	0
February 2008	4	100	0	0	0	0
March 2008	4	100	0	0	0	0
April 2008	4	100	0	0	0	0
May 2008	4	100	0	0	0	0
June 2008	4	100	0	0	0	0
South East (r53)						
July 2006	14	100	0	0	0	0
August 2006	14	100	0	0	0	0
September 2006	14	100	0	0	0	0
October 2006	14	100	0	0	0	0
November 2006	14	100	0	0	0	0
December 2006	14	100	0	0	0	0
January 2007	14	100	0	0	0	0
February 2007	14	100	0	0	0	0
March 2007	14	100	0	0	0	0
April 2007	14	100	0	0	0	0
May 2007	14	100	0	0	0	0
June 2007	14	100	0	0	0	0
July 2007	14	100	0	0	0	0
August 2007	14	100	0	0	0	0
September 2007	14	100	0	0	0	0
October 2007	14	100	0	0	0	0
November 2007	14	100	0	0	0	0
December 2007	14	100	0	0	0	0
January 2008	14	100	0	0	0	0
February 2008	14	100	0	0	0	0
March 2008	14	100	0	0	0	0
April 2008	14	100	0	0	0	0
May 2008	14	100	0	0	0	0
June 2008	14	100	0	0	0	0

NRM Region, ID and Date	Num. of Pixel	Area [%] very low erosion	Area [%] low erosion	Area [%] moderate erosion	Area [%] high erosion	Area [%] very high erosion
Wimmera (r54)						
July 2006	9	100	0	0	0	0
August 2006	9	100	0	0	0	0
September 2006	9	100	0	0	0	0
October 2006	9	100	0	0	0	0
November 2006	9	78	22	0	0	0
December 2006	9	100	0	0	0	0
January 2007	9	100	0	0	0	0
February 2007	9	100	0	0	0	0
March 2007	9	100	0	0	0	0
April 2007	9	100	0	0	0	0
May 2007	9	100	0	0	0	0
June 2007	9	100	0	0	0	0
July 2007	9	100	0	0	0	0
August 2007	9	100	0	0	0	0
September 2007	9	100	0	0	0	0
October 2007	9	100	0	0	0	0
November 2007	9	100	0	0	0	0
December 2007	9	100	0	0	0	0
January 2008	9	89	11	0	0	0
February 2008	9	100	0	0	0	0
March 2008	9	100	0	0	0	0
April 2008	9	100	0	0	0	0
May 2008	9	100	0	0	0	0
June 2008	9	100	0	0	0	0
Goulburn Broken (r55)						
July 2006	8	100	0	0	0	0
August 2006	8	100	0	0	0	0
September 2006	8	100	0	0	0	0
October 2006	8	100	0	0	0	0
November 2006	8	88	13	0	0	0
December 2006	8	75	25	0	0	0
January 2007	8	88	0	13	0	0
February 2007	8	88	13	0	0	0
March 2007	8	75	13	13	0	0
April 2007	8	100	0	0	0	0
May 2007	8	100	0	0	0	0
June 2007	8	100	0	0	0	0
July 2007	8	100	0	0	0	0
August 2007	8	100	0	0	0	0
September 2007	8	100	0	0	0	0
October 2007	8	88	13	0	0	0
November 2007	8	88	0	13	0	0
December 2007	8	88	0	13	0	0
January 2008	8	75	13	13	0	0
February 2008	8	88	13	0	0	0
March 2008	8	100	0	0	0	0
April 2008	8	100	0	0	0	0
May 2008	8	100	0	0	0	0
June 2008	8	100	0	0	0	0

NRM Region, ID and Date	Num. of Pixel	Area [%] very low erosion	Area [%] low erosion	Area [%] moderate erosion	Area [%] high erosion	Area [%] very high erosion
North East (r56)						
July 2006	8	100	0	0	0	0
August 2006	8	100	0	0	0	0
September 2006	8	100	0	0	0	0
October 2006	8	100	0	0	0	0
November 2006	8	100	0	0	0	0
December 2006	8	100	0	0	0	0
January 2007	8	100	0	0	0	0
February 2007	8	100	0	0	0	0
March 2007	8	100	0	0	0	0
April 2007	8	100	0	0	0	0
May 2007	8	100	0	0	0	0
June 2007	8	100	0	0	0	0
July 2007	8	100	0	0	0	0
August 2007	8	100	0	0	0	0
September 2007	8	100	0	0	0	0
October 2007	8	100	0	0	0	0
November 2007	8	100	0	0	0	0
December 2007	8	100	0	0	0	0
January 2008	8	100	0	0	0	0
February 2008	8	100	0	0	0	0
March 2008	8	100	0	0	0	0
April 2008	8	100	0	0	0	0
May 2008	8	100	0	0	0	0
June 2008	8	100	0	0	0	0
East Gippsland (r57)						
July 2006	11	100	0	0	0	0
August 2006	11	100	0	0	0	0
September 2006	11	100	0	0	0	0
October 2006	11	100	0	0	0	0
November 2006	11	100	0	0	0	0
December 2006	11	100	0	0	0	0
January 2007	11	100	0	0	0	0
February 2007	11	100	0	0	0	0
March 2007	11	100	0	0	0	0
April 2007	11	100	0	0	0	0
May 2007	11	100	0	0	0	0
June 2007	11	100	0	0	0	0
July 2007	11	100	0	0	0	0
August 2007	11	100	0	0	0	0
September 2007	11	100	0	0	0	0
October 2007	11	100	0	0	0	0
November 2007	11	100	0	0	0	0
December 2007	11	100	0	0	0	0
January 2008	11	100	0	0	0	0
February 2008	11	100	0	0	0	0
March 2008	11	100	0	0	0	0
April 2008	11	100	0	0	0	0
May 2008	11	100	0	0	0	0
June 2008	11	100	0	0	0	0

NRM Region, ID and Date	Num. of Pixel	Area [%] very low erosion	Area [%] low erosion	Area [%] moderate erosion	Area [%] high erosion	Area [%] very high erosion
Glenelg Hopkins (r58)						
July 2006	11	100	0	0	0	0
August 2006	11	100	0	0	0	0
September 2006	11	100	0	0	0	0
October 2006	11	100	0	0	0	0
November 2006	11	100	0	0	0	0
December 2006	11	100	0	0	0	0
January 2007	11	100	0	0	0	0
February 2007	11	100	0	0	0	0
March 2007	11	100	0	0	0	0
April 2007	11	100	0	0	0	0
May 2007	11	100	0	0	0	0
June 2007	11	100	0	0	0	0
July 2007	11	100	0	0	0	0
August 2007	11	100	0	0	0	0
September 2007	11	100	0	0	0	0
October 2007	11	100	0	0	0	0
November 2007	11	100	0	0	0	0
December 2007	11	100	0	0	0	0
January 2008	11	100	0	0	0	0
February 2008	11	100	0	0	0	0
March 2008	11	100	0	0	0	0
April 2008	11	100	0	0	0	0
May 2008	11	100	0	0	0	0
June 2008	11	100	0	0	0	0
West Gippsland (r59)						
July 2006	5	100	0	0	0	0
August 2006	5	100	0	0	0	0
September 2006	5	100	0	0	0	0
October 2006	5	100	0	0	0	0
November 2006	5	100	0	0	0	0
December 2006	5	100	0	0	0	0
January 2007	5	100	0	0	0	0
February 2007	5	100	0	0	0	0
March 2007	5	100	0	0	0	0
April 2007	5	100	0	0	0	0
May 2007	5	100	0	0	0	0
June 2007	5	100	0	0	0	0
July 2007	5	100	0	0	0	0
August 2007	5	100	0	0	0	0
September 2007	5	100	0	0	0	0
October 2007	5	100	0	0	0	0
November 2007	5	100	0	0	0	0
December 2007	5	100	0	0	0	0
January 2008	5	100	0	0	0	0
February 2008	5	100	0	0	0	0
March 2008	5	100	0	0	0	0
April 2008	5	100	0	0	0	0
May 2008	5	100	0	0	0	0
June 2008	5	100	0	0	0	0

NRM Region, ID and Date	Num. of Pixel	Area [%] very low erosion	Area [%] low erosion	Area [%] moderate erosion	Area [%] high erosion	Area [%] very high erosion
Port Phillip and Westernport (r60)						
July 2006	6	100	0	0	0	0
August 2006	6	100	0	0	0	0
September 2006	6	100	0	0	0	0
October 2006	6	100	0	0	0	0
November 2006	6	100	0	0	0	0
December 2006	6	100	0	0	0	0
January 2007	6	83	17	0	0	0
February 2007	6	100	0	0	0	0
March 2007	6	100	0	0	0	0
April 2007	6	100	0	0	0	0
May 2007	6	100	0	0	0	0
June 2007	6	100	0	0	0	0
July 2007	6	100	0	0	0	0
August 2007	6	100	0	0	0	0
September 2007	6	100	0	0	0	0
October 2007	6	100	0	0	0	0
November 2007	6	100	0	0	0	0
December 2007	6	100	0	0	0	0
January 2008	6	100	0	0	0	0
February 2008	6	100	0	0	0	0
March 2008	6	100	0	0	0	0
April 2008	6	100	0	0	0	0
May 2008	6	100	0	0	0	0
June 2008	6	100	0	0	0	0
Corangamite (r61)						
July 2006	5	100	0	0	0	0
August 2006	5	100	0	0	0	0
September 2006	5	100	0	0	0	0
October 2006	5	100	0	0	0	0
November 2006	5	100	0	0	0	0
December 2006	5	100	0	0	0	0
January 2007	5	100	0	0	0	0
February 2007	5	100	0	0	0	0
March 2007	5	100	0	0	0	0
April 2007	5	100	0	0	0	0
May 2007	5	100	0	0	0	0
June 2007	5	100	0	0	0	0
July 2007	5	100	0	0	0	0
August 2007	5	100	0	0	0	0
September 2007	5	100	0	0	0	0
October 2007	5	100	0	0	0	0
November 2007	5	100	0	0	0	0
December 2007	5	100	0	0	0	0
January 2008	5	100	0	0	0	0
February 2008	5	100	0	0	0	0
March 2008	5	100	0	0	0	0
April 2008	5	100	0	0	0	0
May 2008	5	100	0	0	0	0
June 2008	5	100	0	0	0	0

NRM Region, ID and Date	Num. of Pixel	Area [%] very low erosion	Area [%] low erosion	Area [%] moderate erosion	Area [%] high erosion	Area [%] very high erosion
Tas - Flinders (r62)						
July 2006	2	100	0	0	0	0
August 2006	2	100	0	0	0	0
September 2006	2	100	0	0	0	0
October 2006	2	100	0	0	0	0
November 2006	2	100	0	0	0	0
December 2006	2	100	0	0	0	0
January 2007	2	100	0	0	0	0
February 2007	2	100	0	0	0	0
March 2007	2	100	0	0	0	0
April 2007	2	100	0	0	0	0
May 2007	2	100	0	0	0	0
June 2007	2	100	0	0	0	0
July 2007	2	100	0	0	0	0
August 2007	2	100	0	0	0	0
September 2007	2	100	0	0	0	0
October 2007	2	100	0	0	0	0
November 2007	2	100	0	0	0	0
December 2007	2	100	0	0	0	0
January 2008	2	100	0	0	0	0
February 2008	2	100	0	0	0	0
March 2008	2	100	0	0	0	0
April 2008	2	100	0	0	0	0
May 2008	2	100	0	0	0	0
June 2008	2	100	0	0	0	0
Tas - North West (r63)						
July 2006	6	100	0	0	0	0
August 2006	6	100	0	0	0	0
September 2006	6	100	0	0	0	0
October 2006	6	100	0	0	0	0
November 2006	6	100	0	0	0	0
December 2006	6	100	0	0	0	0
January 2007	6	100	0	0	0	0
February 2007	6	100	0	0	0	0
March 2007	6	100	0	0	0	0
April 2007	6	100	0	0	0	0
May 2007	6	100	0	0	0	0
June 2007	6	100	0	0	0	0
July 2007	12	100	0	0	0	0
August 2007	12	100	0	0	0	0
September 2007	12	100	0	0	0	0
October 2007	12	100	0	0	0	0
November 2007	12	100	0	0	0	0
December 2007	12	92	8	0	0	0
January 2008	12	100	0	0	0	0
February 2008	12	100	0	0	0	0
March 2008	12	100	0	0	0	0
April 2008	12	100	0	0	0	0
May 2008	12	100	0	0	0	0
June 2008	12	100	0	0	0	0

NRM Region, ID and Date	Num. of Pixel	Area [%] very low erosion	Area [%] low erosion	Area [%] moderate erosion	Area [%] high erosion	Area [%] very high erosion
Tas - North (r64)						
July 2006	4	100	0	0	0	0
August 2006	4	100	0	0	0	0
September 2006	4	100	0	0	0	0
October 2006	4	100	0	0	0	0
November 2006	4	100	0	0	0	0
December 2006	4	100	0	0	0	0
January 2007	4	100	0	0	0	0
February 2007	4	100	0	0	0	0
March 2007	4	100	0	0	0	0
April 2007	4	100	0	0	0	0
May 2007	4	100	0	0	0	0
June 2007	4	100	0	0	0	0
July 2007	9	100	0	0	0	0
August 2007	9	100	0	0	0	0
September 2007	9	78	11	11	0	0
October 2007	9	89	11	0	0	0
November 2007	9	100	0	0	0	0
December 2007	9	22	22	44	11	0
January 2008	9	22	0	33	44	0
February 2008	9	22	11	11	56	0
March 2008	9	33	11	56	0	0
April 2008	9	56	11	33	0	0
May 2008	9	100	0	0	0	0
June 2008	9	100	0	0	0	0
Tas - South (r65)						
July 2006	27	No data	No data	No data	No data	No data
August 2006	27	No data	No data	No data	No data	No data
September 2006	27	No data	No data	No data	No data	No data
October 2006	27	No data	No data	No data	No data	No data
November 2006	27	No data	No data	No data	No data	No data
December 2006	27	No data	No data	No data	No data	No data
January 2007	27	No data	No data	No data	No data	No data
February 2007	27	No data	No data	No data	No data	No data
March 2007	27	No data	No data	No data	No data	No data
April 2007	27	No data	No data	No data	No data	No data
May 2007	27	No data	No data	No data	No data	No data
June 2007	27	No data	No data	No data	No data	No data
July 2007	27	93	0	7	0	0
August 2007	27	93	0	7	0	0
September 2007	27	93	11	7	0	0
October 2007	27	89	4	7	0	0
November 2007	27	100	0	0	0	0
December 2007	27	89	0	11	0	0
January 2008	27	85	4	7	4	0
February 2008	27	70	4	15	7	4
March 2008	27	78	11	7	4	0
April 2008	27	89	7	4	0	0
May 2008	27	81	7	7	4	0

NRM Region, ID and Date	Num. of Pixel	Area [%] very low erosion	Area [%] low erosion	Area [%] moderate erosion	Area [%] high erosion	Area [%] very high erosion
June 2008	74	0	15	7	4	74

NRM Region, ID and Date	Number of Pixel	Area [%] very low erosion	Area [%] low erosion	Area [%] moderate erosion	Area [%] high erosion	Area [%] very high erosion
Australia (nat)						
July 2006	2863	89	5	5	0	0
August 2006	2863	92	5	3	0	0
September 2006	2863	82	7	10	2	0
October 2006	2863	71	7	15	7	0
November 2006	2863	54	9	16	15	6
December 2006	2863	48	8	20	20	4
January 2007	2863	58	8	17	14	3
February 2007	2863	72	8	14	6	0
March 2007	2863	55	8	19	13	5
April 2007	2863	82	5	9	4	0
May 2007	2863	78	8	12	2	0
June 2007	2863	75	7	14	4	0
July 2007	2891	87	6	6	1	0
August 2007	2891	72	9	14	5	0
September 2007	2891	62	9	17	12	0
October 2007	2891	47	9	20	22	2
November 2007	2891	52	9	19	18	2
December 2007	2891	59	9	16	14	1
January 2008	2891	60	7	15	14	3
February 2008	2891	62	7	17	13	1
March 2008	2891	73	8	14	5	0
April 2008	2891	74	9	11	7	0
May 2008	2891	81	6	12	2	0
June 2008	2891	66	9	17	7	1
New South Wales (s01)						
July 2006	309	96	2	2	0	0
August 2006	309	99	0	1	0	0
September 2006	309	92	4	4	0	0
October 2006	309	76	5	15	5	0
November 2006	309	31	7	19	25	18
December 2006	309	40	9	21	21	9
January 2007	309	39	12	23	17	10
February 2007	309	66	7	12	14	0
March 2007	309	45	10	18	15	12
April 2007	309	63	8	13	16	0
May 2007	309	73	8	13	6	0
June 2007	309	60	6	19	15	0
July 2007	309	100	0	0	0	0
August 2007	309	94	5	1	0	0
September 2007	309	54	6	17	22	1
October 2007	309	40	9	19	31	1
November 2007	309	54	8	18	19	1
December 2007	309	62	5	12	20	1
January 2008	309	64	3	10	19	5
February 2008	309	69	6	10	16	0
March 2008	309	75	4	17	3	0
April 2008	309	64	7	18	10	0
May 2008	309	75	10	14	1	0
June 2008	309	78	8	14	0	0

NRM Region, ID and Date	Number of Pixel	Area [%] very low erosion	Area [%] low erosion	Area [%] moderate erosion	Area [%] high erosion	Area [%] very high erosion
Victoria (s02)						
July 2006	91	100	0	0	0	0
August 2006	91	100	0	0	0	0
September 2006	91	100	0	0	0	0
October 2006	91	100	0	0	0	0
November 2006	91	85	8	7	1	0
December 2006	91	89	3	7	1	0
January 2007	91	88	5	5	1	0
February 2007	91	93	2	3	1	0
March 2007	91	89	4	5	1	0
April 2007	91	99	1	0	0	0
May 2007	91	99	0	1	0	0
June 2007	91	98	1	1	0	0
July 2007	91	100	0	0	0	0
August 2007	91	100	0	0	0	0
September 2007	91	97	3	0	0	0
October 2007	91	97	2	1	0	0
November 2007	91	95	2	2	1	0
December 2007	91	88	7	4	1	0
January 2008	91	74	9	16	0	1
February 2008	91	82	10	7	1	0
March 2008	91	89	10	1	0	0
April 2008	91	97	2	1	0	0
May 2008	91	100	0	0	0	0
June 2008	91	99	1	0	0	0
Queensland (s03)						
July 2006	653	87	6	8	0	0
August 2006	653	87	7	6	1	0
September 2006	653	72	8	17	3	0
October 2006	653	67	7	14	13	0
November 2006	653	41	3	10	28	19
December 2006	653	47	5	11	30	6
January 2007	653	59	5	13	21	2
February 2007	653	78	8	9	4	0
March 2007	653	58	9	20	9	4
April 2007	653	74	8	15	3	0
May 2007	653	59	13	26	2	0
June 2007	653	59	9	26	5	0
July 2007	653	85	8	6	1	0
August 2007	653	69	10	13	8	0
September 2007	653	56	4	20	19	0
October 2007	653	45	5	14	33	3
November 2007	653	56	7	12	22	4
December 2007	653	67	5	11	16	1
January 2008	653	76	4	8	12	0
February 2008	653	80	3	7	11	0
March 2008	653	80	3	10	7	0
April 2008	653	70	6	11	13	0
May 2008	653	65	9	22	4	0
June 2008	653	68	5	12	14	1

NRM Region, ID and Date	Number of Pixel	Area [%] very low erosion	Area [%] low erosion	Area [%] moderate erosion	Area [%] high erosion	Area [%] very high erosion
South Australia (s04)						
July 2006	391	77	8	15	1	0
August 2006	391	89	5	6	0	0
September 2006	391	82	3	12	2	0
October 2006	391	64	9	15	12	1
November 2006	391	45	7	19	27	3
December 2006	391	41	6	17	30	5
January 2007	391	43	7	17	26	6
February 2007	391	54	9	27	10	0
March 2007	391	45	9	14	20	12
April 2007	391	65	9	17	9	0
May 2007	391	72	6	16	7	0
June 2007	391	80	5	14	1	0
July 2007	391	65	14	19	2	0
August 2007	391	54	10	33	3	0
September 2007	391	42	7	21	29	1
October 2007	391	34	6	21	31	8
November 2007	391	40	6	20	31	4
December 2007	391	44	8	21	24	4
January 2008	391	36	8	19	28	10
February 2008	391	42	7	21	25	5
March 2008	391	51	12	24	13	0
April 2008	391	55	8	23	15	0
May 2008	391	63	9	25	3	0
June 2008	391	69	6	24	1	0
Western Australia (s05)						
July 2006	945	90	5	4	0	0
August 2006	945	96	3	1	0	0
September 2006	945	85	5	8	2	0
October 2006	945	75	8	13	4	0
November 2006	945	68	12	16	5	0
December 2006	945	53	9	23	13	3
January 2007	945	58	10	20	11	1
February 2007	945	71	9	14	5	0
March 2007	945	52	8	20	17	3
April 2007	945	90	4	6	1	0
May 2007	945	85	6	8	1	0
June 2007	945	79	7	10	5	0
July 2007	949	88	6	5	0	0
August 2007	949	70	10	14	6	0
September 2007	949	73	11	15	1	0
October 2007	949	47	11	25	17	1
November 2007	949	50	10	23	16	1
December 2007	949	55	12	20	12	2
January 2008	949	52	9	21	15	4
February 2008	949	54	9	24	12	1
March 2008	949	72	9	14	5	0
April 2008	949	89	7	3	0	0
May 2008	949	95	3	2	0	0
June 2008	949	65	11	17	6	1

NRM Region, ID and Date	Number of Pixel	Area [%] very low erosion	Area [%] low erosion	Area [%] moderate erosion	Area [%] high erosion	Area [%] very high erosion
Tasmania (s06)						
July 2006	12	100	0	0	0	0
August 2006	12	100	0	0	0	0
September 2006	12	100	0	0	0	0
October 2006	12	100	0	0	0	0
November 2006	12	100	0	0	0	0
December 2006	12	100	0	0	0	0
January 2007	12	100	0	0	0	0
February 2007	12	100	0	0	0	0
March 2007	12	100	0	0	0	0
April 2007	12	100	0	0	0	0
May 2007	12	100	0	0	0	0
June 2007	12	100	0	0	0	0
July 2007	36	94	0	6	0	0
August 2007	36	94	0	6	0	0
September 2007	36	83	11	6	0	0
October 2007	36	89	8	3	0	0
November 2007	36	100	0	0	0	0
December 2007	36	72	8	17	3	0
January 2008	36	72	3	14	11	0
February 2008	36	61	6	14	17	3
March 2008	36	67	11	19	3	0
April 2008	36	83	8	8	0	0
May 2008	36	86	6	6	3	0
June 2008	36	83	0	8	6	3
Northern Territory (s07)						
July 2006	462	95	4	1	0	0
August 2006	462	86	9	5	0	0
September 2006	462	76	12	11	0	0
October 2006	462	64	9	26	2	0
November 2006	462	58	15	23	4	0
December 2006	462	42	11	34	13	0
January 2007	462	75	5	15	5	0
February 2007	462	82	8	10	0	0
March 2007	462	63	8	21	7	0
April 2007	462	99	0	0	0	0
May 2007	462	92	7	1	0	0
June 2007	462	90	7	3	0	0
July 2007	462	95	3	2	0	0
August 2007	462	74	11	12	3	0
September 2007	462	64	18	16	3	0
October 2007	462	50	15	26	10	0
November 2007	462	49	14	27	10	0
December 2007	462	61	16	19	5	0
January 2008	462	71	11	13	5	0
February 2008	462	64	9	21	6	0
March 2008	462	79	11	9	1	0
April 2008	462	65	18	13	4	0
May 2008	462	87	5	6	2	0
June 2008	462	46	14	26	9	4

Appendix 3. Annual statistics for each NRM region, state and the continent for 2006–07 and 2007–08

NRM Region (ID)	Number of Pixel	Area [%] very low erosion	Area [%] low erosion	Area [%] moderate erosion	Area [%] high erosion	Area [%] very high erosion
Torres Strait (a01)						
DustYear 06-07	13	0	0	0	0	0
DustYear 07-08	13	0	0	0	0	0
Cape York (a02)						
DustYear 06-07	46	99	1	0	0	0
DustYear 07-08	46	99	1	0	0	0
NT - Top End (a03)						
DustYear 06-07	52	94	4	2	0	0
DustYear 07-08	52	91	5	4	0	0
NT - Melville Island (a04)						
DustYear 06-07	3	100	0	0	0	0
DustYear 07-08	3	100	0	0	0	0
NT - Darwin (a05)						
DustYear 06-07	2	100	0	0	0	0
DustYear 07-08	2	92	8	0	0	0
NT - Katherine-Douglas (a06)						
DustYear 06-07	7	83	12	5	0	0
DustYear 07-08	7	81	12	6	1	0
Rangelands - Kimberley (a07)						
DustYear 06-07	104	96	2	2	0	0
DustYear 07-08	104	87	6	6	1	0
NT - Savannah (a08)						
DustYear 06-07	106	95	3	2	0	0
DustYear 07-08	106	88	6	5	1	0
NT - Victoria river (a09)						
DustYear 06-07	1	50	17	33	0	0
DustYear 07-08	1	8	0	50	33	8
Northern Gulf (a10)						
DustYear 06-07	66	94	4	3	0	0
DustYear 07-08	66	89	4	5	2	0
Wet Tropics (a11)						
DustYear 06-07	9	100	0	0	0	0
DustYear 07-08	9	100	0	0	0	0

NRM Region (ID)	Number of Pixel	Area [%] very low erosion	Area [%] low erosion	Area [%] moderate erosion	Area [%] high erosion	Area [%] very high erosion
Southern Gulf (a12)						
DustYear 06-07	72	69	9	16	7	0
DustYear 07-08	72	59	11	18	11	1
NT - Arid Centre - Pastoral (a13)						
DustYear 06-07	155	61	11	23	5	0
DustYear 07-08	155	34	21	32	13	1
NT - Arid Centre - Non Pastoral (a14)						
DustYear 06-07	110	74	9	14	4	0
DustYear 07-08	110	79	10	11	0	0
Rangelands - Gascoyne Murchison (a15)						
DustYear 06-07	193	84	6	8	2	0
DustYear 07-08	193	77	8	10	5	1
Burdekin (a16)						
DustYear 06-07	52	94	3	3	0	0
DustYear 07-08	52	100	0	0	0	0
Desert Channels (a17)						
DustYear 06-07	181	27	12	30	24	7
DustYear 07-08	181	25	8	26	39	2
Mackay Whitsunday (a18)						
DustYear 06-07	8	100	0	0	0	0
DustYear 07-08	8	100	0	0	0	0
Rangelands - Goldfields Nullarbor (a19)						
DustYear 06-07	522	65	10	17	8	1
DustYear 07-08	526	59	11	20	10	0
Fitzroy (a20)						
DustYear 06-07	57	100	0	0	0	0
DustYear 07-08	57	100	0	0	0	0
NT - Arid Centre Simpson (a21)						
DustYear 06-07	27	72	13	13	2	0
DustYear 07-08	27	72	14	11	3	0
Burnett Mary (a22)						
DustYear 06-07	25	93	3	3	1	0
DustYear 07-08	25	99	0	0	0	0

NRM Region (ID)	Number of Pixel	Area [%] very low erosion	Area [%] low erosion	Area [%] moderate erosion	Area [%] high erosion	Area [%] very high erosion
South West Queensland (a23)						
DustYear 06-07	70	39	12	26	17	7
DustYear 07-08	70	60	10	20	10	0
Border rivers Maranoa - Balonne (a24)						
DustYear 06-07	37	69	10	14	6	1
DustYear 07-08	37	86	8	6	0	0
South East Queensland (a25)						
DustYear 06-07	8	89	3	4	4	0
DustYear 07-08	8	99	1	0	0	0
South Australian Arid Lands (a26)						
DustYear 06-07	192	39	9	25	23	5
DustYear 07-08	192	19	11	35	31	5
Alinytjara Wilurara (a27)						
DustYear 06-07	104	80	7	10	3	0
DustYear 07-08	104	69	11	17	4	0
Condamine (a28)						
DustYear 06-07	10	38	31	18	13	0
DustYear 07-08	10	92	6	3	0	0
Northern Agricultural (a29)						
DustYear 06-07	30	93	2	1	2	2
DustYear 07-08	30	62	6	17	11	5
Northern rivers (a30)						
DustYear 06-07	20	98	1	1	0	0
DustYear 07-08	20	100	0	0	0	0
Border rivers-Gwydir (a31)						
DustYear 06-07	21	72	9	13	5	1
DustYear 07-08	21	84	9	7	0	0
Western (a32)						
DustYear 06-07	85	29	8	21	28	14
DustYear 07-08	85	39	8	23	30	1
Namoi (a33)						
DustYear 06-07	15	65	11	17	7	1
DustYear 07-08	15	81	6	10	3	0

NRM Region (ID)	Number of Pixel	Area [%] very low erosion	Area [%] low erosion	Area [%] moderate erosion	Area [%] high erosion	Area [%] very high erosion
Avon (a34)						
DustYear 06-07	45	74	6	10	9	1
DustYear 07-08	45	54	6	16	17	6
Central West (a35)						
DustYear 06-07	33	83	8	7	2	0
DustYear 07-08	33	90	4	5	1	0
Swan (a36)						
DustYear 06-07	7	100	0	0	0	0
DustYear 07-08	7	95	5	0	0	0
Eyre Peninsula (a37)						
DustYear 06-07	29	100	0	0	0	0
DustYear 07-08	29	95	2	3	0	0
Hunter-Central rivers (a38)						
DustYear 06-07	13	100	0	0	0	0
DustYear 07-08	13	100	0	0	0	0
Northern and Yorke (a39)						
DustYear 06-07	21	81	4	13	3	0
DustYear 07-08	21	70	4	14	11	2
Lower Murray Darling (a40)						
DustYear 06-07	24	59	12	19	11	0
DustYear 07-08	24	43	15	28	15	0
South West (a41)						
DustYear 06-07	21	100	0	0	0	0
DustYear 07-08	21	96	3	1	0	0
Lachlan (a42)						
DustYear 06-07	35	70	6	17	7	0
DustYear 07-08	35	72	5	10	11	2
South Australian Murray Darling Basin (a43)						
DustYear 06-07	24	87	10	2	0	0
DustYear 07-08	24	98	2	0	0	0
South Coast (a44)						
DustYear 06-07	23	91	4	4	2	0
DustYear 07-08	23	98	1	1	0	0

NRM Region (ID)	Number of Pixel	Area [%] very low erosion	Area [%] low erosion	Area [%] moderate erosion	Area [%] high erosion	Area [%] very high erosion
Hawkesbury-Nepean (a45)						
DustYear 06-07	9	98	1	1	0	0
DustYear 07-08	9	100	0	0	0	0
Murrumbidgee (a46)						
DustYear 06-07	26	79	6	13	2	0
DustYear 07-08	26	81	4	9	6	0
Mallee (a47)						
DustYear 06-07	16	94	4	2	0	0
DustYear 07-08	16	91	7	3	0	0
Southern rivers (a48)						
DustYear 06-07	12	97	2	1	0	0
DustYear 07-08	12	100	0	0	0	0
Adelaide and Mount Lofty ranges (a49)						
DustYear 06-07	3	100	0	0	0	0
DustYear 07-08	3	100	0	0	0	0
Murray (a50)						
DustYear 06-07	16	73	6	9	12	1
DustYear 07-08	16	69	8	12	9	3
North Central (a51)						
DustYear 06-07	12	76	5	14	3	0
DustYear 07-08	12	65	17	15	2	1
Kangaroo Island (a52)						
DustYear 06-07	4	100	0	0	0	0
DustYear 07-08	4	100	0	0	0	0
South East (a53)						
DustYear 06-07	14	100	0	0	0	0
DustYear 07-08	14	100	0	0	0	0
Wimmera (a54)						
DustYear 06-07	9	98	2	0	0	0
DustYear 07-08	9	99	1	0	0	0
Goulburn Broken (a55)						
DustYear 06-07	8	93	5	2	0	0
DustYear 07-08	8	94	3	3	0	0

NRM Region (ID)	Number of Pixel	Area [%] very low erosion	Area [%] low erosion	Area [%] moderate erosion	Area [%] high erosion	Area [%] very high erosion
North East (a56)						
DustYear 06-07	8	100	0	0	0	0
DustYear 07-08	8	100	0	0	0	0
East Gippsland (a57)						
DustYear 06-07	11	100	0	0	0	0
DustYear 07-08	11	100	0	0	0	0
Glenelg Hopkins (a58)						
DustYear 06-07	11	100	0	0	0	0
DustYear 07-08	11	100	0	0	0	0
West Gippsland (a59)						
DustYear 06-07	5	100	0	0	0	0
DustYear 07-08	5	100	0	0	0	0
Port Phillip and Westernport (a60)						
DustYear 06-07	6	99	1	0	0	0
DustYear 07-08	6	100	0	0	0	0
Corangamite (a61)						
DustYear 06-07	5	100	0	0	0	0
DustYear 07-08	5	100	0	0	0	0
Tas - Flinders (a62)						
DustYear 06-07	3	100	0	0	0	0
DustYear 07-08	3	100	0	0	0	0
Tas - North West (a63)						
DustYear 06-07	6	100	0	0	0	0
DustYear 07-08	12	99	1	0	0	0
Tas - North (a64)						
DustYear 06-07	4	100	0	0	0	0
DustYear 07-08	9	69	6	16	9	0
Tas - South (a65)						
DustYear 06-07	No data	No data	No data	No data	No data	No data
DustYear 07-08	27	86	4	8	2	1

NRM Region (ID)	Number of Pixel	Area [%] very low erosion	Area [%] low erosion	Area [%] moderate erosion	Area [%] high erosion	Area [%] very high erosion
Australia (ana)						
DustYear 06-07	2869	71	7	13	7	2
DustYear 07-08	2899	66	8	15	10	1
New South Wales (as1)						
DustYear 06-07	309	65	7	13	11	4
DustYear 07-08	309	69	6	13	12	1
Victoria (as2)						
DustYear 06-07	91	95	2	2	0	0
DustYear 07-08	91	93	4	3	0	0
Queensland (as3)						
DustYear 06-07	653	66	7	15	10	3
DustYear 07-08	653	68	6	12	13	1
South Australia (as4)						
DustYear 06-07	391	63	7	16	12	2
DustYear 07-08	391	50	8	23	17	3
Western Australia (as5)						
DustYear 06-07	945	75	7	12	5	1
DustYear 07-08	949	68	9	15	8	1
Tasmania (as6)						
DustYear 06-07	12	100	0	0	0	0
DustYear 07-08	36	82	5	9	4	1
Northern Territory (as7)						
DustYear 06-07	462	77	8	13	3	0
DustYear 07-08	462	67	12	16	5	0