



Australian Government

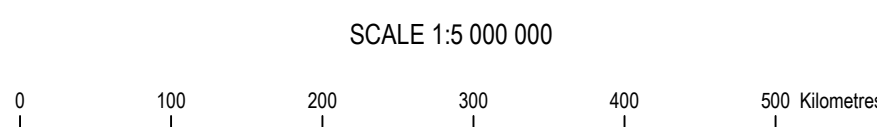
Geoscience Australia

Australian Bureau of Agricultural and
Resource Economics and Sciences

LAND COVER MAP OF AUSTRALIA

from 2000 to 2008

1ST EDITION, 2011



LAMBERT CONFORMAL CONIC PROJECTION
Central Meridian: 134°E Standard Parallels: 16°S, 36°S
Geocentric Datum of Australia

About the Land Cover Map

The Land Cover Map of Australia is the first nationally consistent and thematically comprehensive land cover reference for Australia. It provides a baseline for reporting on change and trends in vegetation cover and extent. Information about land cover dynamics is required for emergency management, environmental reporting and natural resource management purposes.

Land cover is the observed biophysical cover on the Earth's surface, including trees, shrubs, grasses, soils, exposed rocks and water bodies, as well as anthropogenic elements such as plantations, crops and built environments. Remote sensing data recorded over a period of time allow the observation of land cover dynamics. Different land cover types display distinct responses resulting from seasonal, climatic and anthropogenic drivers. Classifying these responses provides a robust and repeatable method for characterising land cover types. A key aspect of land cover is vegetation greenness, which is directly related to the amount of photosynthesis occurring and can be measured as an index, such as the Enhanced Vegetation Index (EVI) (Huete et al. 2002).

The Land Cover Map of Australia presents a synopsis of land cover information for every 250 x 250 metre area of the country from April 2000 to April 2008. The classification scheme used to describe land cover categories in the Land Cover Map conforms to the 2007 International Standards Organisation (ISO) land cover standard (19144-2). The Land Cover Map shows Australian land covers clustered into 34 ISO classes. These classes reflect the structural character of vegetation, ranging from cultivated and managed land covers (crops and pastures) to natural land covers such as closed forest and open grasslands.

Development of the Land Cover Map

The source data for the Land Cover Map is a time series of EVI data from the Moderate Resolution Imaging Spectroradiometer (MODIS) on the Terra and Aqua satellites operated by NASA. The time series includes 186 snapshots of vegetation greenness for each 250 x 250 metre area across the continent over an eight year period. An example of the time series displayed by different land cover types is shown in **Figure 1**.

The EVI time series for each 250 x 250 metre area was characterised using 12 time series coefficients which describe the statistical, phenological and seasonal characteristics of the land cover. A clustering approach was applied to the 12 coefficients to define homogenous regions with similar greenness dynamics over time. Regions sharing similar time series coefficients were labelled using information derived from the 2005 Catchment Scale Land Use of Australia dataset and the Native Vegetation Information System dataset provided by the Australian Bureau of Agricultural and Resource Economics and Sciences (ABARES).

Initial results were presented to a workshop of Australian and State Government stakeholders in September 2009. Feedback from the workshop was used to revise the cluster labels. The labelling was further refined by comparison with the Fraction of Photosynthetically Active Radiation (FPAR) datasets from CSIRO Land and Water, and Foliate Projective Cover (FPC) datasets from the Queensland Statewide Landcover and Tree Study (SLATS) program. Terrain effects were addressed by using digital elevation data from the Shuttle Radar Topographic Mission (SRTM).

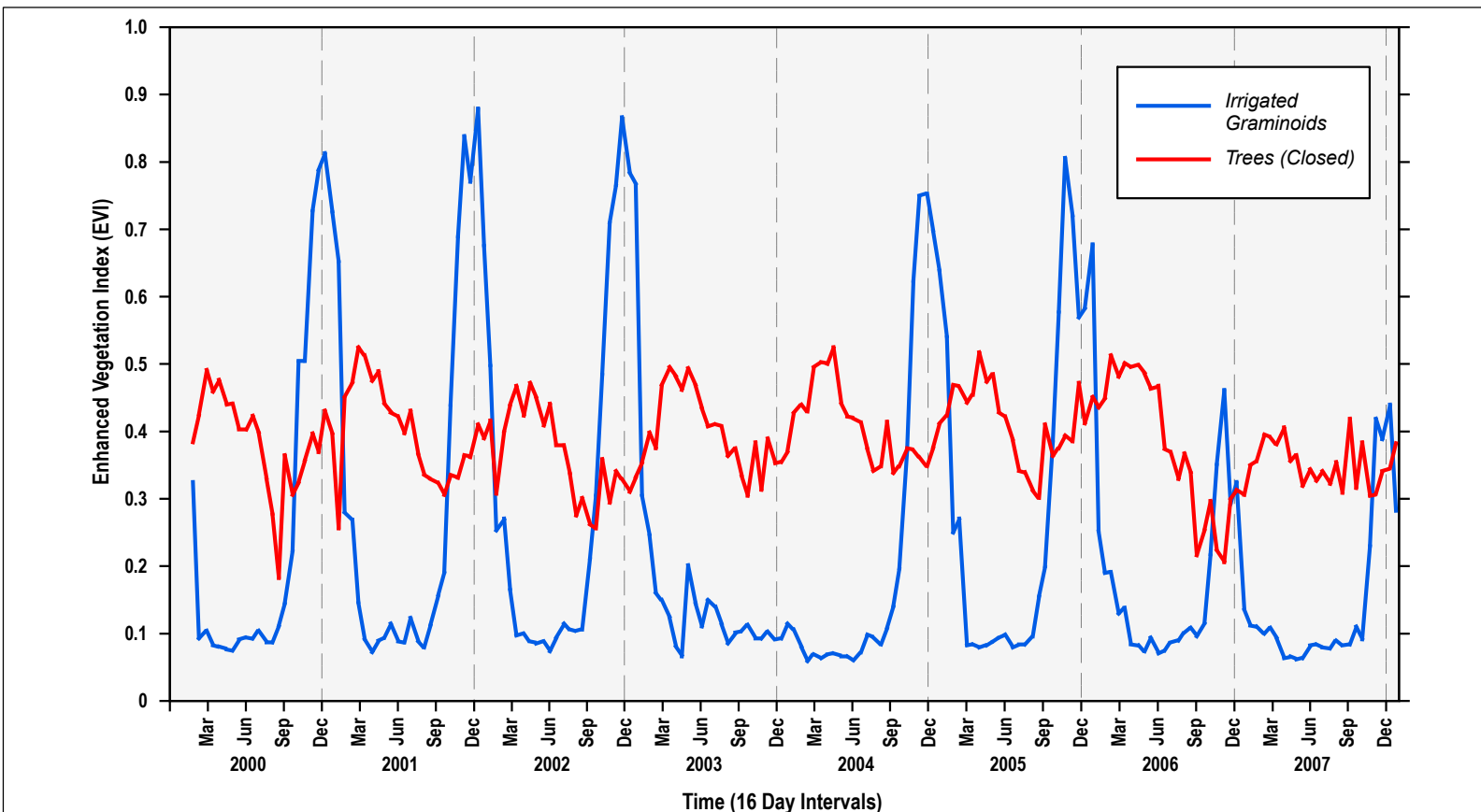


Figure 1 Two time series, each for a land cover type observed in a separate 250 x 250 metre area. The blue time series shows the vegetation index dynamics of an irrigated crop while the red time series shows the vegetation index dynamics for a closed forest. For the irrigated crop there are periods with very low greenness followed by very sharp rises as the crop starts to grow. The crop reaches its peak greenness during summer, dropping rapidly prior to harvest and removal of the dry vegetation. In contrast, the greenness of the closed forest fluctuates between summer lows and winter highs, but the vegetation index values don't fall below -0.20, reflecting the persistent presence of photosynthetically active leaves within the forest canopy.

Comparison with field data

State agencies provided data from more than 25 000 field sites to help to assess the accuracy of the Land Cover Map. Comparisons between the map and field data are complicated by differences in classifications, scales and timing, and because the field data were not captured with the Land Cover Map in mind. Furthermore, land cover types transition gradually from one type to another. To overcome this, a fuzzy logic system (Zhang and Foody, 1998) was used to compare the Land Cover Map with the field data on a sliding scale, as shown in **Table 1**.

The match between the field data and the Land Cover Map for each of the main cover types is shown in **Figure 2**. The match between the field data across all classes of the Land Cover Map was complete in 30% of cases, very similar in 35%, moderately similar in 10%, somewhat similar in 18% and a complete mismatch in 7% of cases. These results show a high degree of consistency between the Land Cover Map and extensive independent field-based datasets. A comprehensive comparison and a discussion of the constraints of comparing site-based field data with a 250 metre resolution land cover map are contained in the technical report.

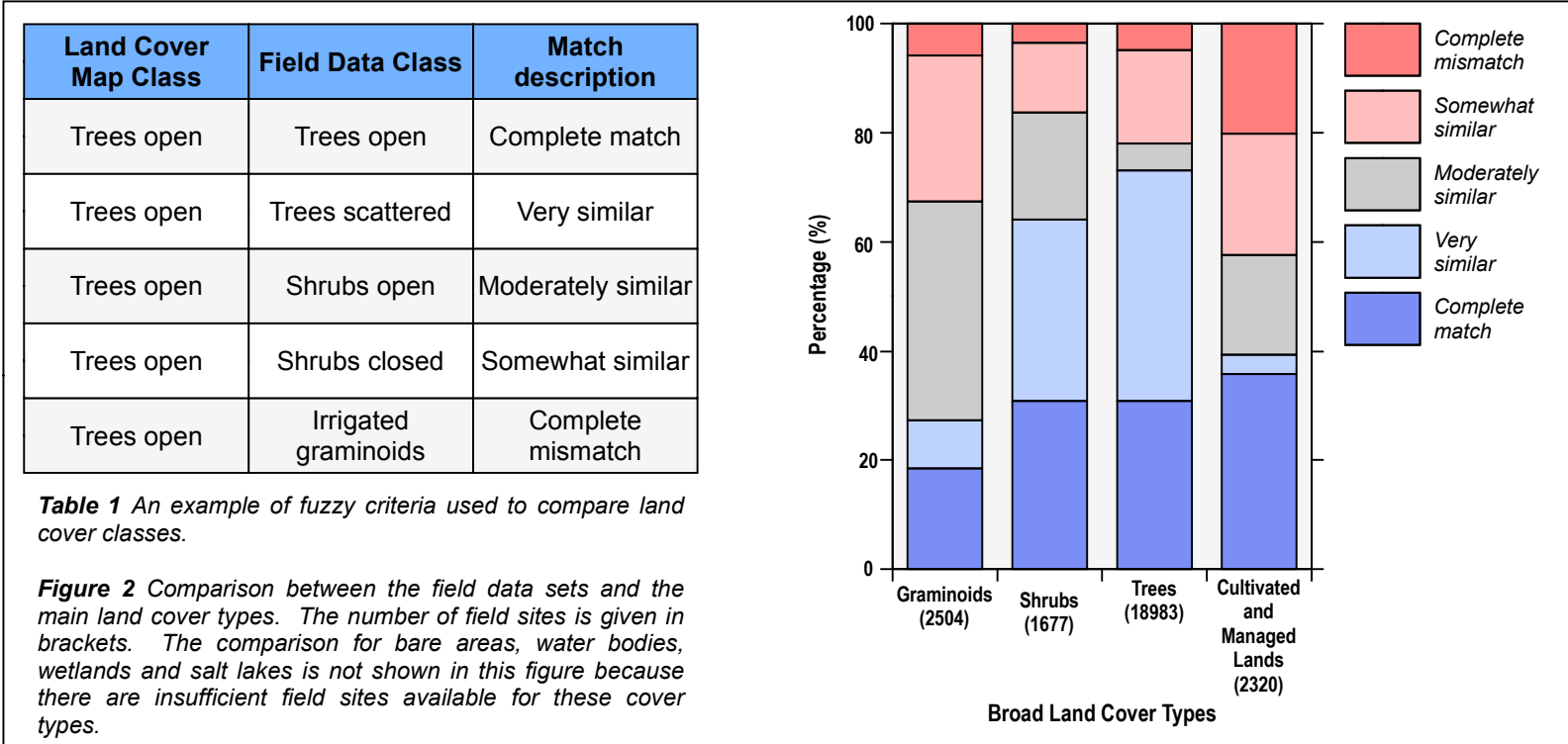


Table 1 An example of fuzzy criteria used to compare land cover classes.

Figure 2 Comparison between the field data sets and the Land Cover Map. The number of field sites is given in brackets. The comparison for bare areas, water bodies, wetlands and salt lakes is not shown in this figure because there are insufficient field sites available for these cover types.

Feedback and further information

The Land Cover Map forms part of the Dynamic Land Cover Dataset. This dataset, which includes a technical report that describes how this map was generated, is available from the Geoscience Australia website www.ga.gov.au/earth-observation/landcover. If you have information which could help to improve the accuracy of this map or would like information about future releases of the Dynamic Land Cover Dataset please email landcover@ga.gov.au.

References

Huete A., Didan K., Miura T., Rodriguez E.P., Gao X., and Ferreira L.G. (2002) 'Overview of the radiometric and biophysical performance of the MODIS vegetation indices', *Remote Sensing of Environment*, 83, 195-213.
Zhang J., and Foody G.M., (1998) 'A fuzzy classification of sub-urban land cover from remotely sensed imagery', *International Journal of Remote Sensing*, 19(14), 2722-2738.

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