National Forest and Sparse Woody Vegetation Data (Version 3.0) 2018

Custodian
Department of the Environment and Energy

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Abstract
Landsat satellite imagery is used to derive woody vegetation extent products that discriminate between forest, sparse woody and non-woody land cover across a time series from 1988 to 2018. A forest is defined as woody vegetation with a minimum 20 per cent canopy cover, potentially reaching 2 metres high and a minimum area of 0.2 hectares. Sparse woody is defined as woody vegetation with a canopy cover between 5-19 per cent.

The three-class classification (forest, sparse woody and non-woody) superseded the two class classification (forest and non-forest) from 2016. The new classification is produced using the same approach in terms of time series processing (conditional probability networks) as the two-class method, to detect woody vegetation cover. The three-class algorithm better encompasses the different types of woody vegetation across the Australian landscape.

It is not advisable to compare previous two-class forest and non-forest product with the latest three-class product for multi-year change. For land cover change studies, it is highly recommended to use three-class time series data from a single year of supply.

Forest and sparse woody vegetation data is derived from satellite imagery sourced from Landsat TM, ETM+ and OLI sensors for the following epochs:

1988, 1989, 1991, 1992, 1995, 1998, 2000, 2002, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016, 2017 and 2018.

Note that satellite sensor changes and calibration base changes can result in pixel shift in Landsat imagery between supply years for the same epoch at a given location.

For further technical information, please refer to Australia's National Inventory Report 2017:
http://www.environment.gov.au/system/files/resources/29eca947-af49-4ed1-8369-e68d74730cf9/files/national-inventory-report-2017-volume-2.pdf

For the 2018 supply, data is supplied for 35 tiles. Satellite image acquisition dates vary between northern and southern tiles, to ensure the best possible forest discrimination. From 2018, data is now available for five rangeland tiles in WA for the full time series. Data for remaining rangeland tiles (sf53 and sg53) is only available for 1989-2006.

Defined region
Australia

Date Range
3 January 1988 – 23 September 2018

Temporal distribution
1988, 1989, 1991, 1992, 1995, 1998, 2000, 2002, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016, 2017 and 2018.

Maintenance and update frequency
Each update of the National Inventory Report results in a new suite of products across the entire time series. Changes are also undertaken as part of a continuous improvement and verification program. Since 2004, woody cover and change products are updated annually.

Data Licence
Use of this data is subject to the terms and conditions listed on page 6 of this document.

Conditions of use
The data are designed for the purpose of providing a nationally consistent analysis of land cover change. Users should always consider the appropriateness of the data before using for other purposes.

Lineage
Woody vegetation cover across Australia is derived from Landsat imagery, at a 25-metre resolution from 1988 to 2018. The data goes through a process of thresholding, where the spectral indices of a given pixel are compared with reference indices that identify areas of forest across different soil types and climatic regions. Conditional probability network (CPN) analysis is used to strengthen confidence in the classification as each image is compared to the previous and subsequent images to resolve uncertainty.

The two-class algorithm in use prior to 2016 classified land cover into forest and non-forest. In 2016 a new three-class algorithm has been introduced to assess both the extent, and changes in extent, of sub-forest forms of woody vegetation using the Landsat TM, ETM+ and OLI data. This method builds on the previous two-class CPN classification technique, by incorporating an additional spatial measure to distinguish between sparse woody vegetation (5-19% canopy cover) and forest (≥ 20% canopy cover). See figure 1 for a comparison between the two classification methods.

During each national inventory cycle the entire product suite is revised as the time series expands and more images are available for previous and subsequent image comparisons. Therefore forest and sparse woody extent is continually changing, particularly in more recent years where there is less subsequent imagery available for comparisons.

It is highly recommend that the revised three-class data for the entire time series be used for land cover change studies as there are known changes to forest area between the two-class and three-class algorithms and changes related to sensor change. This does not necessarily indicate that forest has regrown or been cleared. Rather, it is related to the reclassification of areas that were classified as non-forest in the two-class system, but were near to the thresholding boundary and have now been captured using the three-class technique.

Table 1: Three-class woody vegetation classification pixel values

Pixel value	Description
0	Non-woody
1	Sparse woody vegetation
2	Woody vegetation (forest)

Figure 1: Woody vegetation extent. (A) shows forest (green) in the two-class classification. (B) shows forest (green) and sparse woody vegetation (orange) in the three-class classification (image source: CSIRO)
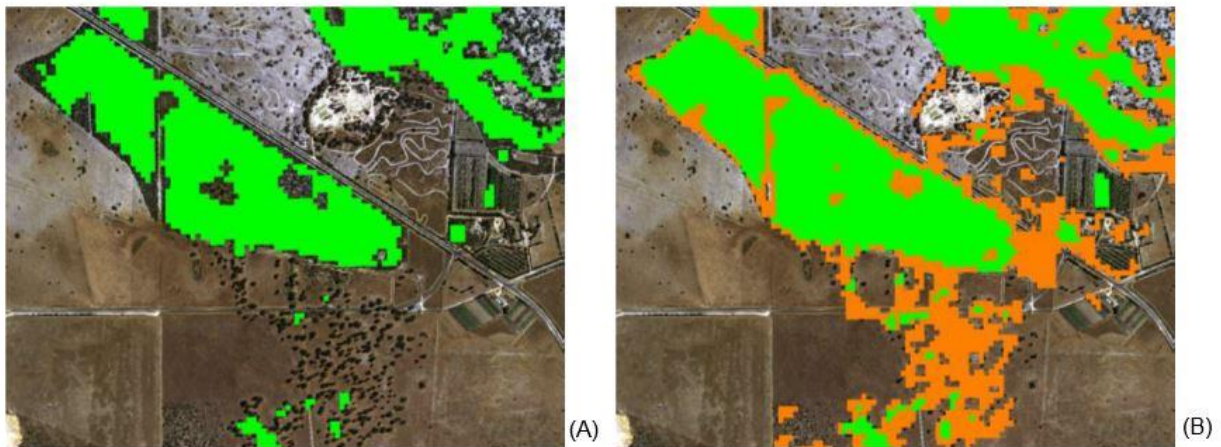
Cell Size
0.00025 degrees (~25m)

Coordinate System
Geographic; Datum: GDA 1994

Positional accuracy
The positional accuracy of these data is assumed to be around 10m based on an assessment of the underlying registration of base imagery.

Logical consistency
The method used for processing data was standardised across all areas. Systematic error between operators was checked and corrected.

Attribute Completeness
Woody vegetation extent is classified through the CPN analysis as present only where certainty levels are high, thus minimising false change over time. The statistical probability of woody vegetation being confidently attributed as present requires two subsequent epochs to be present in the analysis.

Completeness
Geographic completeness is defined by the available Landsat images for each epoch from 1988. Forest and sparse woody vegetation extent has been derived for all tiles across Australia, with 35 tiles (figure 2) available from 1988 to 2018. Data for remaining rangeland tiles (sf53 and sg53) is available for 1989-2006.

Data format and delivery
ESRI grids, provided on a tile basis (see figure 2)

Data is currently supplied by state in two time series:
>1988-2013
>2014-2018

Data for Queensland and WA is split into northern and southern tile folders. WA also has a rangeland tile folder.

By downloading the data you agree to the attached terms and conditions on page 6 of this document.

Dataset citation
Department of the Environment and Energy (2018). National forest and sparse woody vegetation data. Version 3.0. Commonwealth of Australia, Canberra.

Metadata contact
Geospatial Analysis Unit
National Inventory Systems & International Reporting Branch
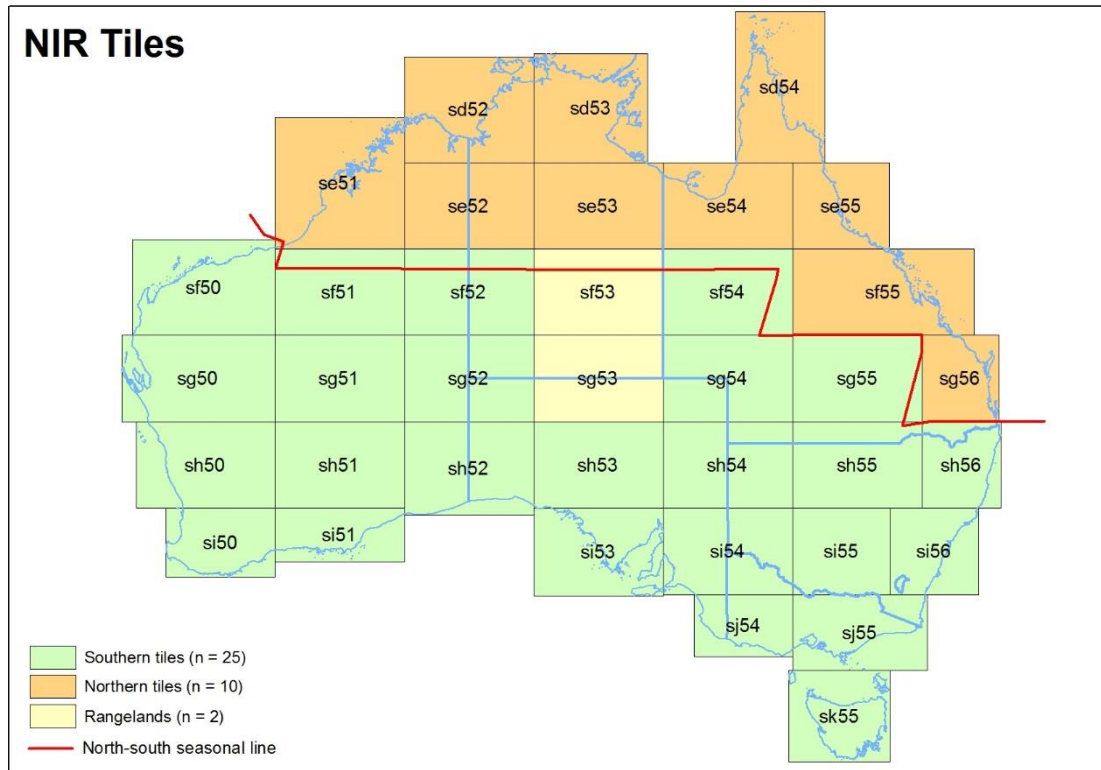Department of the Environment and Energy
GPO Box 787
CANBERRA ACT 2601
Phone: (02) 6274 1111
ncas-gis-rs@environment.gov.au

Figure 2: Woody extent data is currently available from 1988-2018 for northern and southern tiles. For rangeland tiles (yellow), data is only available on request, from 1989 to 2006.

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