# Publication details

#### Title:

## Land use of Australia 2010–11 To 2015–16, 250 M

#### Alternative title:

NLUM\_250m

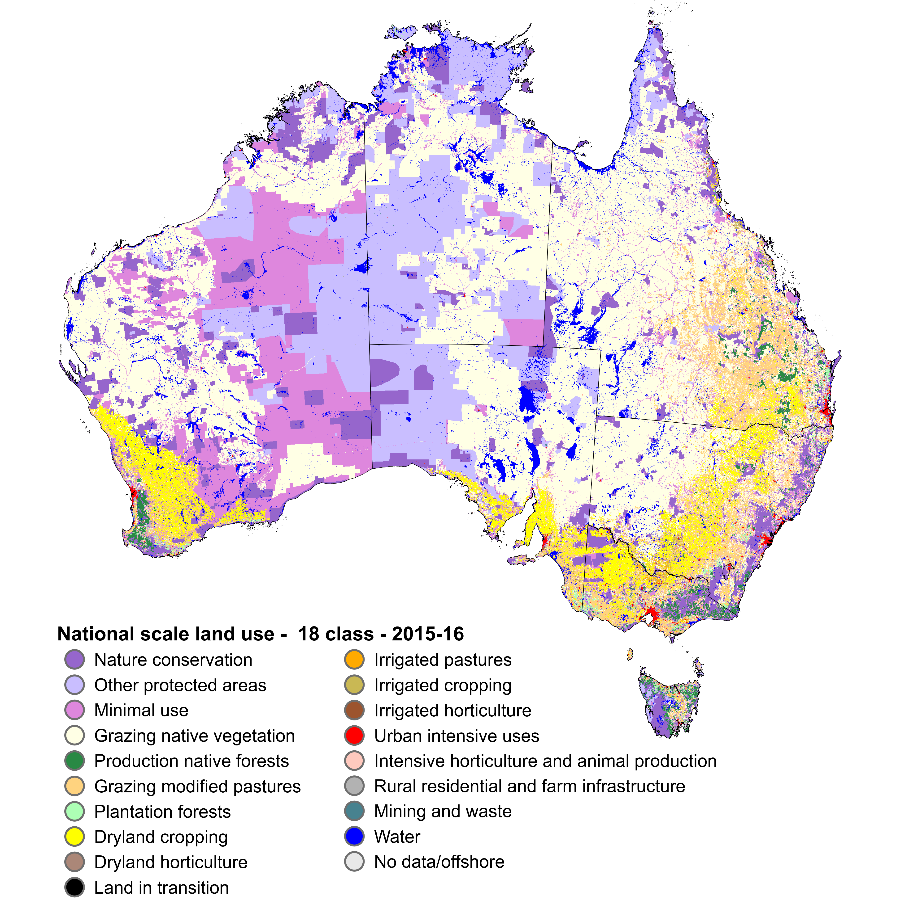
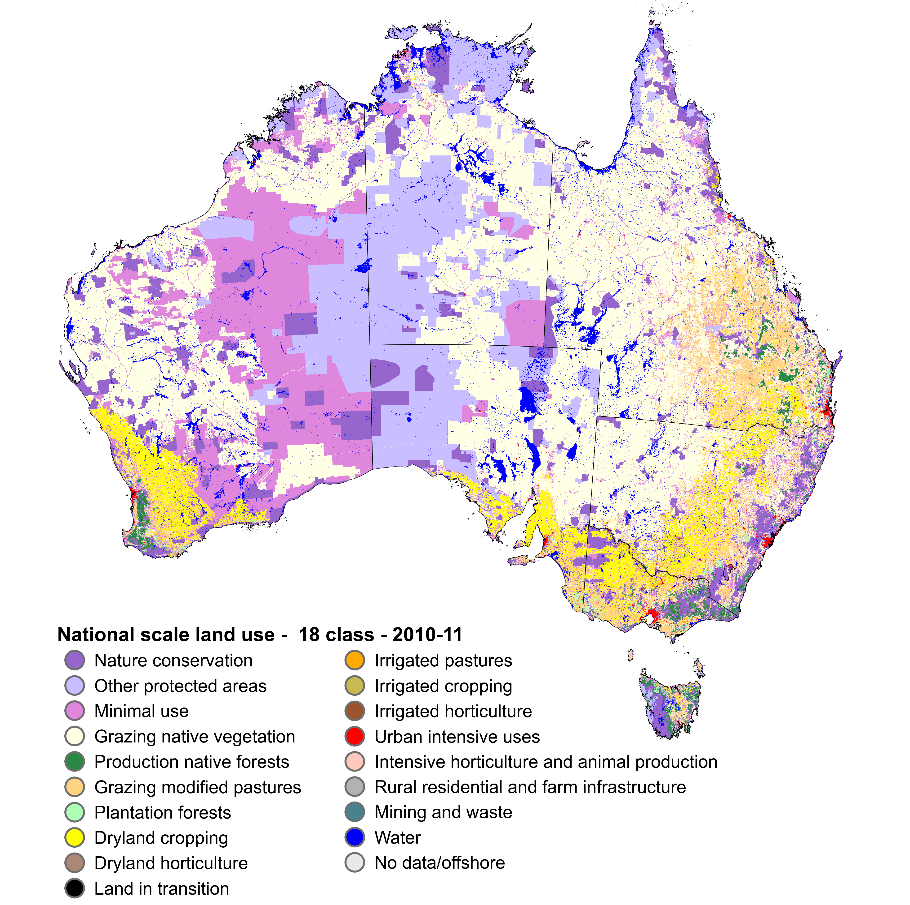
#### Date published:

22 June 2022

#### Date prepared:

5 May 2022

#### Preview:



#### Abstract:

The *Land use of Australia 2010–11 to 2015–16* is a data package of seamless continental rasters that present land use at national-scale for 2010–11, 2015–16 and the associated change between the two target periods. Non-agricultural land uses are mapped using 7 thematic layers, derived from existing datasets provided by state and territory jurisdictions and external agencies. These 7 layers are: protected areas, topographic features, land tenure, forest type, catchment-scale land use, urban boundaries, and stock routes. The agricultural land uses are based on the Australian Bureau of Statistics’ 2010–11 and 2015–16 agricultural census data; with spatial distributions modelled using Terra Moderate Resolution Imaging Spectroradiometer (MODIS) satellite imagery and training data, assisted by spatial constraint layers for cultivation, horticulture, and irrigation.

Land use is specified according to the Australian Land Use and Management (ALUM) Classification version 8. The same method is applied to both target periods using representative national datasets for each period, where available. All rasters are in GeoTIFF format with geographic coordinates in Geocentric Datum of Australian 1994 (GDA94) and a 0.002197 degree cell size.

The *Land use of Australia 2010–11 to 2015–16* data package is a product of the Australian Collaborative Land Use and Management Program.

# Descriptive information

#### Authors:

Australian Bureau of Agricultural and Resource Economics and Sciences (ABARES)

#### Acknowledgements:

This data package was produced by Australian Bureau of Agricultural and Resource Economics and Sciences (ABARES) within the Australian Government Department of Agriculture, Water and the Environment as part of the Australian Collaborative Land Use and Management Program (ACLUMP). ACLUMP, of which ABARES is a partner, is a consortium of Australian Government, and state and territory government partners that promotes the development of nationally consistent land use, land cover and land management practice information for Australia. More information on ACLUMP is available at [www.awe.gov.au/landuse](http://www.awe.gov.au/landuse).

Data were sourced from and used with permission of: the Australian Bureau of Statistics, Australian Government Department of Agriculture, Water and the Environment, Coleambally Irrigation Co-operative Limited, CSIRO, Department of Regional New South Wales, Department of Natural Resources and Environment Tasmania, Geosciences Australia, NASA, NSW Department of Planning, Industry and Environment, NT Department of Environment, Parks and Water Security, PSMA Australia Limited, Queensland Department of Environment and Science, Queensland Department of Resources, Victoria Department of Jobs, Precincts and Regions, SA Department of Environment, Water and Natural Resources, the United States Geological Survey, WA Department of Lands and Surveys and WA Department of Primary Industries and Regional Development.

# Constraints

## LEGAL CONSTRAINTS ASSOCIATED WITH THE MATERIAL

#### Limitation on the use of the material:

The Australian Government acting through the Department of Agriculture, Water and the Environment, represented by the Australian Bureau of Agricultural and Resource Economics and Sciences, has exercised due care and skill in preparing and compiling the information and data in this publication. Notwithstanding, the Department of Agriculture, Water and the Environment, ABARES, its employees and advisers disclaim all liability, including liability for negligence and for any loss, damage, injury, expense or cost incurred by any person as a result of accessing, using or relying on any of the information or data in this publication to the maximum extent permitted by law.

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This publication (and any material sourced from it) should be attributed as: ABARES 2022, [Land use of Australia 2010–11 to 2015–16, 250 m](https://doi.10.25814/7ygw-4d64), Australian Bureau of Agricultural and Resource Economics and Sciences, Canberra, June CC BY 4.0. [DOI: 10.25814/7ygw-4d64](https://doi.10.25814/7ygw-4d64).

# Additional information about this material

#### Purpose for which the material was obtained:

These land use datasets provide a national scale spatial representation of how the Australian landscape was used for the specified 12-month period. Land use can be for food production, forestry, nature conservation, water storage or urban development. These datasets provide the location, extent and the ability to explore change in land use between 2010–11 and 2015–16. They are inputs to a national land account as part of a national approach to environmental economic accounting. Previous datasets have a coarser resolution of 0.01 degree cell size.

The Land use of Australia data series is recognised as Foundation Spatial Data by the Australia New Zealand Land Information Council and as an Essential Statistical Asset for Australia by the Australian Bureau of Statistics. Common applications of the datasets are in strategic planning and continental modelling.

**How to use this data:**

1. These datasets have been made for change analysis. With the nature of archived datasets, change may reflect improved data quality. When interpreting land use change, users should consider the input data sources and their influence on the final land use assigned to a cell (pixel).
2. Agricultural areas will not necessarily tally to those reported by the Australian Bureau of Statistics. Agricultural census data is scaled to fit the spatial extent for agricultural uses within Statistical Areas Level 2. This area is determined by subtracting the area occupied by non-agricultural land uses.
3. Agricultural land uses are informed by continuous probability surfaces for each commodity allocated. The rarest commodity is allocated first to cells with the highest probability for that commodity until its area is satisfied. Then the next rarest commodity is allocated to the remaining cells with the highest probability for that commodity until its area is satisfied. This continues until all land uses are allocated. The result approximates a maximum likelihood map.
4. Irrigated agricultural land uses are informed by an irrigation potential index and reflect those areas mostly likely to have been irrigated in the target period up to the area of the scaled irrigation statistics.
5. ACLUMP releases regular updates to its [Catchment scale land use of Australia](https://www.agriculture.gov.au/abares/aclump/catchment-scale-land-use-of-australia-update-december-2020#:~:text=It%20is%20a%20seamless%20raster,50%20metres%20by%2050%20metres.) dataset. This provides more detailed land use mapping but as a compilation of various dates, between and often within jurisdictions, it is not recommended for reporting land use change nationally. The [Queensland Land Use Mapping Program](https://www.qld.gov.au/environment/land/management/mapping/statewide-monitoring/qlump) provides datasets for assessing land use change within its Natural Resource Management Regions.
6. The equal area projection (Australian Albers EPSG:3577) is provided for area calculations. The accuracy of the area estimates is affected by the cell size of the land use datasets and the input data sources used in their construction

#### Progress status of this material:

Final

#### Maintenance and update frequency:

Every five years

## KEYWORD(S)

#### ANZLIC search words:

AGRICULTURE

AGRICULTURE Crops

AGRICULTURE Livestock

AGRICULTURE Horticulture

AGRICULTURE Irrigation

BOUNDARIES

BOUNDARIES Administrative

BOUNDARIES Biophysical

BOUNDARIES Cultural

FLORA

FLORA Exotic

FLORA Native

FORESTS

FORESTS Agriforestry

FORESTS Natural

FORESTS Plantation

HERITAGE

HERITAGE World

HUMAN ENVIRONMENT

LAND

LAND Conservation

LAND Conservation Reserve

LAND Topography

LAND Use

VEGETATION

VEGETATION Structural

WATER

WATER Lakes

WATER Surface

WATER Wetlands

#### General keywords:

Land use

Australian Collaborative Land Use and Management Program (ACLUMP)

## TOPICS

#### ABARES topic categories:

Agriculture  
Land Use  
Environment and Natural Resource Management  
Models, Risk, Spatial Data and Datasets

#### ISO topic categories:

Farming  
Environment

Society

InlandWaters

## SPATIAL EXTENT(S)

#### Description of spatial extent:

Australian Land

#### Spatial bounding box included in:

North: -1047686.3053171562496573 m ; South: -4964936.3053171560168266 m

East: 2468707.7485073595307767 m ; West: -2189542.2514926404692233 m

Equivalent geographic coordinates:

North: -9.995 degrees; South: -44.004 degrees; East: 154.004 degrees; West: 112.505 degrees.

#### Spatial area included in:

Australian Mainland. Australia excluding external territories.

#### Projection:

The datasets are available in geographic EPSG:4283 and equal area EPSG:3577 projections.

#### Coordinate reference details in Well-Known Text for geographic projection EPSG:4283:

**GEOGCS**["GDA94",

**DATUM**["Geocentric\_Datum\_of\_Australia\_1994",

**SPHEROID**["GRS 1980",6378137,298.257222101,

AUTHORITY["EPSG","7019"]],

**TOWGS84**[0,0,0,0,0,0,0],

AUTHORITY["EPSG","6283"]],

**PRIMEM**["Greenwich",0,

AUTHORITY["EPSG","8901"]],

**UNIT**["degree",0.0174532925199433,

AUTHORITY["EPSG","9122"]],

AUTHORITY["EPSG","4283"]]

#### Coordinate reference details in Well-Known Text for equal area projection EPSG:3577:

**PROJCS**["GDA94 / Australian Albers",

**GEOGCS**["GDA94",

**DATUM**["Geocentric\_Datum\_of\_Australia\_1994",

**SPHEROID**["GRS 1980",6378137,298.257222101,

AUTHORITY["EPSG","7019"]],

**TOWGS84**[0,0,0,0,0,0,0],

AUTHORITY["EPSG","6283"]],PRIMEM["Greenwich",0,

AUTHORITY["EPSG","8901"]],

**UNIT**["degree",0.0174532925199433,

AUTHORITY["EPSG","9122"]],

AUTHORITY["EPSG","4283"]],

**PROJECTION**["Albers\_Conic\_Equal\_Area"],PARAMETER["standard\_parallel\_1",-18],

**PARAMETER**["standard\_parallel\_2",-36],

**PARAMETER**["latitude\_of\_center",0],

**PARAMETER**["longitude\_of\_center",132],

**PARAMETER**["false\_easting",0],PARAMETER["false\_northing",0],

**UNIT**["metre",1,

AUTHORITY["EPSG","9001"]],

**AXIS**["Easting",EAST],

**AXIS**["Northing",NORTH],

AUTHORITY["EPSG","3577"]]

## DATA PACKAGE CONTENTS

Table 1 Description of the Land use of Australia 2010–11 to 2015–16, 250 m data package

|  |  |
| --- | --- |
| File name | File description |
| NLUM\_ALUMV8\_250m\_20YY\_YY\_alb.zip | NLUM raster dataset with land uses described as primary, secondary, and tertiary classes of the ALUM classification version 8, plus the derived 18-class and agricultural industries summary classifications. One raster for each year. GeoTIFF, 16-bit integer. For attribute table description, see Table 2. |
| NLUM\_CHANGE\_250m\_2010\_11\_to\_2015\_16\_alb\_18class.zip | NLUM observed change raster dataset providing 2010–11 land use, 2015–16 land use and observed land use change at 18-class summary classification. GeoTIFF, 16-bit integer. For attribute table description, see Table 3. |
| NLUM\_INPUTS\_250m\_20YY\_YY\_geo.zip | NLUM raster dataset with the 7 input layers, agricultural commodities mapped and their irrigation status, and final land use class assigned according to ALUM v8. One raster for each year. GeoTIFF, 16-bit integer. For attribute table description, see Table 4. |
| **AgProbabilitySurfaces\_20YY\_YY\_geo.zip** | Folder containing 23 continuous probability rasters for each year, 1 for each agricultural commodity mapping unit. Used to construct the maximum likelihood map for agricultural land uses. Values 0 to 10,000. GeoTIFF, 16-bit integer. See Table A2.8 for list. |
| **Maps.zip** |  |
| * NLUM-PRIMV8\_20YY\_YY.png ; pdf | Map showing the NLUM dataset at ALUM primary classification; either 2010–11 or 2015–16. |
| * NLUM-SECV8\_20YY\_YY.png; pdf | Map showing the NLUM dataset at ALUM secondary classification; either 2010–11 or 2015–16. |
| * NLUM-CL18\_20YY\_YY.png; pdf | Map showing the NLUM dataset 18-class summary; either 2010–11 or 2015–16. |
| * NLUM-AGIND\_20YY\_YY.png; pdf | Map showing the NLUM dataset agricultural industries; either 2010–11 or 2015–16. |
| * NLUM-AGCOMMOD\_20YY\_YY.png; pdf | Map showing NLUM dataset classified by agricultural commodity; either 2010–11 or 2015–16. |
| * LUCH-CL18\_2010\_11\_to\_2015\_16.png; pdf | Map showing where observed land use change occurred between 2010-11 and 2015-16 at the 18-class summary classification level. |
| **Symbology.zip** | Folder containing files to visualise rasters in ESRI ArcMap. The .clr files are ESRI colour map files and the .lyr files are ESRI raster symbology files. |

Note: [projection] describes the projection of the raster. Rasters with the projection suffix ’alb‘ are in the coordinate system GDA94/Australian Albers (EPSG: 3577) with a 250 by 250 metres resolution. Rasters with a projection suffix ’geo‘ are in the coordinate system GDA94 (EPSG:4283) with a 0.02197 degree (degree equivalent of 250 metres) resolution. Each .tif raster dataset contains a .tif.aux.xml auxiliary file storing information including raster statistics, histogram, and attributes YY’ denotes the year; ‘\_11’ for 2010–11 and ‘\_16’ for 2015–16.

## DATA DICTIONARY

Table 2 Attributes of the NLUM raster datasets (NLUM\_ALUMV8\_250m\_20YY\_YY\_alb.tif)

| **Field name** | **Field description** | **Code values** |
| --- | --- | --- |
| Value | ALUM code as a three-digit integer. First digit is primary code, second digit is secondary code, and third digit is tertiary code. | Integer numeric value.  Range: 100 to 663 |
| Count | Count of the number of raster cells in each class of Value | Integer count |
| TERTV8 | ALUM tertiary code description as a string.  Examples: 1.1.1 Strict nature reserves 6.6.3 Estuary/coastal waters - intensive use | Text |
| SECV8N | ALUM secondary code | Integer numeric value |
| SECV8 | ALUM secondary code description as a string. See Table A1.2 for list. | Text |
| PRIMV8N | ALUM primary code | Integer numeric value |
| PRIMV8 | ALUM primary code description as a string. See Table A1.1 for list. | Text |
| CL18N | Code for simplified 18-class land use classification based on ALUM. | Integer numeric value |
| CL18 | Description of the simplified 18-class land use classification. See Table A1.3 for list. | Text |
| AGIND | Description of agricultural industries based on ALUM. See Table A1.4 for list. | Text |

Note: All ALUM codes refer to the Australian Land Use and Management Classification, version 8.

Table 3 Data dictionary for the attributes of the NLUM Change 2010-11 to 2015-16 dataset (NLUM\_CHANGE\_250m\_2010\_11\_to\_2015\_16\_alb\_18class.tif)

| ****Field name**** | ****Field description**** | ****Data type**** |
| --- | --- | --- |
| OID | A unique code automatically generated to start processing from index value zero. | Object ID |
| Value | Unique number given to each land use change combination. | Integer, range: 1 to 828 |
| Count | Count of the number of raster cells with a given value in VALUE. | Integer count |
| CL18N\_YY | Land use 18-class summary classification as an integer for the target period. ‘0’ is No data/offshore. | Integer, range: 0 to 18 |
| CL18\_YY | Land use 18-class code description as a string for each target period. See Table A1.3 for list. | String, width 254 |
| LUCH | Observed land use change code. | Integer, range: 0 to 2 |
| LUCH\_DESC | Description of observed land use change code. See Table A3.1 for list | String, width 254 |
| LUCHN11\_16 | Change in land use 18-class code from the year 2010–11 to 2015–16. | String, width 150 |
| LUCHD11\_16 | Change in land use 18-class description from the year 2010–11 to 2015–16. | String, width 150 |

## Table 4. Data dictionary for the attributes of the NLUM Inputs raster datasets (NLUM\_INPUTS\_250m\_20YY\_YY\_geo.tif)

| **Field name** | **Field description** | **Code values** |
| --- | --- | --- |
| Value | Unique number given to each combination of the values in the thematic input layers (protected areas, topographic features, tenure, forest type, catchment scale land use, urban boundaries stock routes and agricultural commodity mapping units) | Integer, range: 1 to 139,399 or 1 to 148,054 |
| LUV8N | ALUM code as a three-digit integer. First digit is primary code, second digit is secondary code, and third digit is tertiary code. | Integer numeric value.  Range: 100 to 663 |
| Count | Count of the number of raster cells in each class of Value | Integer count |
| TERTV8 | ALUM tertiary code description as a string.  Examples: 1.1.1 Strict nature reserves 6.6.3 Estuary/coastal waters - intensive use | Text |
| SECV8 | ALUM secondary code description as a string. See Table A1.2 for list. | Text |
| PRIMV8 | ALUM primary code description as a string. See Table A1.1 for list. | Text |
| CL18N | Simplified 18-class land use classification | Integer numeric value. Range: 0 to 18 |
| CL18 | Description of the simplified 18-class land use classification. See Table A1.3 for list. | Text |
| PA | Protected area code. | Integer numeric value. Range: 11 to 70 |
| PA\_DESC | Description of the protected area code consisting of IUCN classification and description. See Table A2.1 for descriptions and meanings. | Text |
| TOPO | Topographic feature code | Integer numeric value. Range: 0 to 144 |
| TOPO\_DESC | Description of the topographic feature code. See Table A2.2 for descriptions and meanings. | Text |
| TEN | Land tenure code | Integer numeric value. Range: 0 to 2302 |
| TEN\_DESC | Description of tenure code. See Table A2.3 for descriptions and meanings | Text |
| FOR | Forest type code | Integer numeric value. Range: 0 to 9 |
| FOR\_DESC | Description of forest type code. See Table A2.4 for descriptions and meanings. | Text |
| CLUM | Catchment scale land use code as a three-digit integer for the ALUM code. | Integer numeric value. Range: 111 to 663 |
| CLUM\_DESC | Description of catchment scale land use ALUM tertiary code and description as a string. | Text |
| CLUM\_CUR | The year of mapping (currency) of the CLUM dataset for the pixel. | Integer numeric value. Range 2003 to 2017 or 2018 |
| URBAN | Urban boundaries code | Integer numeric value. Range: 0 to 3 |
| URBAN\_DESC | Description of urban constraint code. See Table A2.5 for descriptions and meanings. | Text |
| SR | Stock routes and minimal use code | Integer numeric value. Range: 1 to 7 |
| SR\_DESC | Description of stock routes and minimal use code. See Table A2.6 for descriptions and meaning. | Text |
| IRGN | Irrigation status code for agricultural commodity mapping unit | Integer numeric value 0 or 1. |
| IRGN\_DESC | Description of irrigation status code | Text |
| AGMAPU | Agricultural commodity mapping unit code output from SPREAD II and mapping of grazing outside SPREAD II | Integer numeric value. Range: 0 to 25 |
| AGMAPU\_DESC | Description of agricultural commodity mapping unit codes. See Table A2.8 for descriptions. | Text |
| JURIS | Abbreviation of State or Territory jurisdiction | Text |

Note: All ALUM codes refer to the Australian Land Use and Management Classification, version 8. IUCN is the International Union for the Conservation of Nature.

## RESPONSIBILITY FOR THIS MATERIAL

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# Process used to generate this material

## Lineage Statement

#### Lineage:

To determine the non-agricultural land uses, 7 thematic layers were constructed as rasters with 0.002197 degree resolution and overlaid according to an expert rule-based spatial analysis. Input data was provided by state and territory agencies and external entities. The themes and their main sources were:

1. Protected areas layer - Collaborative Australian Protected Areas database (Department of Agriculture, Water and the Environment 2012ab, 2016ab, 2018ab) and World Heritage Areas (Department of Agriculture, Water and the Environment 2012c, 2020)
2. Topographic features layer – GEODATA TOPO 250K series 3 (Geoscience Australia 2006), Surface Hydrology Polygons (National) (Geoscience Australia 2015), Water Observation from Space (Geoscience Australia 2018) and ABS Census Urban Centres and Localities data (Australian Bureau of Statistics 2011, 2016)
3. Land tenure layer – Land tenure of Australia 2010-11 to 2015-16, 250 m (ABARES 2021)
4. Forest type layer – Forests of Australia (2013) v2.0 (ABARES 2016a) and Forests of Australia 2018 (ABARES 2018). Additionally, native forest areas with Multiple-use public forest tenure assessed as non-commercial or legally restricted from wood harvesting (Davey & Dunn 2014; Montreal Process Implementation Group for Australia and National Forest Inventory Steering Committee 2018) were excluded from allocation to Production native forests.
5. Catchment scale land use (CLUM) layer – a combination of available ACLUMP CLUM datasets most appropriate for each time period
6. Urban boundaries layer – ABS Urban Centres and Localities dataset (Australian Bureau of Statistics 2016)
7. Stock routes layer – PSMA Land Tenure February 2017, PSMA Land Tenure February 2012, Stock routes Queensland (Department of Natural Resources 2007), Conservation value of NSW travelling Stock Reserves (TSRs) (Department of Regional New South Wales 2017) and Stock routes in Western Australia (Department of Lands and Surveys 2019).

Tables A2.1–6 lists the attributes within each thematic layer excluding the CLUM layer attributes as these as described for ALUM v8 (ABARES 2016). The data sources and their currency used in the construction of these layers are provided in Table A4.1.

Data for the forest type layer was supplied as a 100 m resolution raster and was resampled to 0.002197 degree resolution (equivalent to 250 m). All other thematic inputs were rasterised to 0.002197 degree rasters in a two-step process replicating maximum combined area rasterisation. Polygons were rasterised to 0.0004394 degree (equivalent to 50 by 50 metres) rasters using cell point centre, then resampled by mode to 0.002197 degree resolution. This corresponded to a simple majority rasterization. For some thematic layers constructed from multiple datasets, datasets were combined as 0.0004394 degree rasters rather than vector files.

The extent of agricultural land use was based on the area of Australia excluding the non-agricultural land use. Agricultural land uses were allocated using the SPatial REallocation of Aggregated Data – version 2 (SPREAD II) algorithm (Knapp 2016). The spatial distribution of agricultural land uses on non-forested agricultural land were modelled using agricultural area estimates based on the 2010–11 and 2015–16 agricultural census data collected by the Australian Bureau of Statistics at the Australian Statistical Geography Standard (ASGS) Statistical Area Level 2 (SA2). Agricultural land uses were allocated using temporal normalised difference vegetation index (NDVI) profiles derived from Terra MODIS satellite imagery and ground referenced data. The NDVI profiles covered the growing period for each time period, from 1 April of the first year to 31 March of the second year. Nearly 32,000 ground reference points were collated from various ACLUMP partner state government agencies, Coleambally Irrigation Co-operative Limited and the United States Geological Survey. These data were collected for the period 2000–2017. SPREAD II was further constrained using spatial constraints for cultivation and horticulture. For construction of the cultivation constraint, a vegetation condition layer was generated using multiple state and national level datasets including the National Vegetation Information System, NSW native vegetation extent, WA current extent of native vegetation, Queensland remnant vegetation cover and CLUM. Non-native or modified vegetation areas were identified from these datasets with this layer informing the cultivation constraint. The horticulture spatial constraint was developed from ACLUMP catchment scale land use mapping.

In the first stage of running SPREAD II, native pasture and cultivation areas were separated using the cultivation spatial constraint. In the second stage, the horticulture spatial constraint was used to allocate horticulture and agronomic mapping units within the cultivation pixels obtained from the first run. Irrigation status of both agronomic and horticultural mapping units were implemented outside SPREAD II, assisted by an irrigation constraint developed from the catchment scale land use layer and a newly constructed irrigation potential index data created from Water Observations from Space (Geoscience Australia, 2018) and MODIS Land Surface Water Index (Fensholt and Sandholt 2003) datasets.

The SPREAD II outputs comprise agricultural commodity probability surfaces (floating point rasters converted to integers of Int16 data type) and categorical summary land use maps for agricultural commodities (integer grids).

Additional grazing land was allocated outside SPREAD II for pixels with forest crown cover less than 80% and without a non-agricultural land use. This additional area was allocated preferentially to pixels with lower forest crown cover and lower slope, as grazing was assumed to be more likely on flatter and less densely forested land. Forest crown cover data originated from the forest type thematic layer. Slope data originated from CSIRO Land and Water’s Slope relief 3” resolution dataset (Speight 2009) derived from the United States Geological Survey (USGS) Shuttle Radar Topography Mission (SRTM) (Farr et al. 2007).

All data processing outside SPREAD II used the Python spatial libraries Geospatial Data Abstraction Library (GDAL) (v2.4.1), Rasterio (v1.1.2) and GeoPandas (v0.6.2) within Anaconda Python Distribution. All processing was performed using the Geocentric Datum of Australian 1994 (GDA94) geographic coordinate system (EPSG: 4283). For reporting purposes, all data aligns to a 250 m rasterised version of the Statistical Area Level 2 (SA2) Australian Statistical Geography Standard shapefile (Australian Bureau of Statistics 2016a).

Figure 1 provides the process flow diagram for the construction of the individual land use rasters. This methodology builds on the work of Smart (2016), Smart et al (2006), Stewart et al (2001) and Walker and Mallawaarachchi (1998). Refer to Devadas et al (forthcoming) for further details particularly in their use for reporting land use change.

Figure 1. Process flow to generate the Land use of Australia rasters



#### Positional accuracy:

Horizontal: ±0.002197 (~ ±250 metres)

Vertical: not applicable

#### Attribute accuracy:

Attributes are compiled exercising due care and skill. However, attribute accuracy depends in part on the accuracy of input datasets and therefore cannot be guaranteed. The accuracy of the non-agricultural land use assignments is reasonably high whilst the accuracy of the agricultural land use allocations based on automated interpretation of NDVI images is variable. The probability rasters give an indication of the confidence in the agricultural land use allocations for those classes mapped within SPREAD II. The methods for mapping and classifying land use adhere to the standards outlined in 'Guidelines for land use mapping in Australia: principles, procedures and definitions, 4th edition (ABARES 2011) using ‘The Australian Land Use and Management Classification Version 8’ (ABARES 2016b).

#### Logical consistency:

Data was used from authoritative sources and are reliant on the logical consistency of input datasets. The logical consistency of the automated, rule-based land use assignments has been assessed independently by jurisdictions. This rule set is based on that used in previous Land use of Australia datasets. The rule set follows the principles of the ‘Australian Land Use and Management Classification Version 8’ (ABARES 2016b) considering level of intervention in the landscape and the reporting of prime use.

#### Completeness:

Datasets provide coverage for 100% of Australia excluding external territories. Classification and verification have been assessed by ACLUMP partners and major issues addressed in the final dataset.

# Information about the product description

## Parties responsible for description

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# Additional metadata

## References

ABARES 2011[, Guidelines for land use mapping in Australia: principles, procedures and definitions, A technical handbook supporting the Australian Collaborative Land Use and Management Program*,* 4th edition](http://data.daff.gov.au/data/warehouse/pe_abares99001806/GuidelinesLandUseMappingHighRes2011.pdf), Australian Bureau of Agricultural and Resource Economics and Sciences, Canberra.

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# Appendix 1 – Colour tables

Table A1.1 Primary land use classification symbology as RGB and hexadecimal colour values (ALUMV8\_Primary[.lyr, .clr])

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| VALUE | PRIMV8 | Red | Green | Blue | Hex | Colour |
| 1 | Conservation and natural environments | 202 | 122 | 245 | #CA7AF5 |  |
| 2 | Production from relatively natural environments | 255 | 255 | 190 | #FFFFBE |  |
| 3 | Production from dryland agriculture and plantations | 255 | 170 | 0 | #FFAA00 |  |
| 4 | Production from irrigated agriculture and plantations | 115 | 76 | 0 | #734C00 |  |
| 5 | Intensive uses | 255 | 0 | 0 | #FF0000 |  |
| 6 | Water | 0 | 0 | 255 | #0000FF |  |

Note: Codes refer to the Australian Land Use and Management (ALUM) Classification, version 8.

Table A1.2 Secondary land use classification symbology as RGB and hexadecimal colour values (ALUMV8\_Secondary[.lyr, .clr])

| VALUE | SECV8 | Red | Green | Blue | Hex | Colour |
| --- | --- | --- | --- | --- | --- | --- |
| 100; 110; 111; 112; 113; 114; 115; 116; 117 | 1.1 Nature conservation | 150 | 102 | 204 | #9666CC |  |
| 120; 121; 122; 123; 124; 125 | 1.2 Managed resource protection | 201 | 190 | 255 | #C9BEFF |  |
| 130; 131; 132; 133; 134 | 1.3 Other minimal use | 222 | 135 | 221 | #DE87DD |  |
| 200; 210 | 2.1 Grazing native vegetation | 255 | 255 | 229 | #FFFFE5 |  |
| 220; 221; 222 | 2.2 Production native forests | 41 | 137 | 68 | #298944 |  |
| 310; 311; 312; 313; 314 | 3.1 Plantation forests | 173 | 255 | 181 | #ADFFB5 |  |
| 300; 320; 321; 322; 323; 324; 325 | 3.2 Grazing modified pastures | 255 | 211 | 127 | #FFD37F |  |
| 330; 331; 332; 333; 334.; 335; 336; 337; 338 | 3.3 Cropping | 255 | 255 | 0 | #FFFF00 |  |
| 340; 341; 342; 343; 344; 345; 346; 347; 348; 349 | 3.4 Perennial horticulture | 171 | 135 | 120 | #AB8778 |  |
| 350; 351; 352; 353 | 3.5 Seasonal horticulture | 87 | 58 | 64 | #573A40 |  |
| 360; 361; 362; 363; 364; 365 | 3.6 Land in transition **a** | 0 | 0 | 0 | #000000 |  |
| 410; 411; 412; 413; 414 | 4.1 Irrigated plantation forests | 236 | 255 | 224 | #ECFFE0 |  |
| 400; 420; 421; 422; 423; 424 | 4.2 Grazing irrigated modified pastures | 255 | 170 | 0 | #FFAA00 |  |
| 430; 431; 432; 433; 434; 435; 436; 437; 438 | 4.3 Irrigated cropping | 201 | 184 | 84 | #C9B854 |  |
| 440; 441; 442; 443; 444; 445; 446; 447; 448; 449 | 4.4 Irrigated perennial horticulture | 156 | 84 | 46 | #9C542E |  |
| 450; 451; 452; 453; 454 | 4.5 Irrigated seasonal horticulture | 79 | 43 | 23 | #4F2B17 |  |
| 460; 461; 462; 463; 464; 465 | 4.6 Irrigated land in transition **a** | 52 | 52 | 52 | #343434 |  |
| 510; 511; 512; 513; 514; 515 | 5.1 Intensive horticulture | 255 | 201 | 190 | #FFC9BE |  |
| 520; 521; 522; 523; 524; 525; 526; 527; 528 | 5.2 Intensive animal production | 255 | 135 | 190 | #FF87BE |  |
| 530; 531; 532; 533; 534; 535; 536; 537; 538 | 5.3 Manufacturing and industrial | 115 | 76 | 0 | #734C00 |  |
| 540; 541 | 5.4.0, 5.4.1 Urban residential | 255 | 0 | 0 | #FF0000 |  |
| 542; 543; 544; 545 | 5.4.2, 5.4.3, 5.4.4, 5.4.5 Rural residential and farm infrastructure | 156 | 156 | 156 | #9C9C9C |  |
| 500; 550; 551; 552; 553; 554; 555 | 5.5 Services | 155 | 0 | 0 | #9B0000 |  |
| 560; 561; 562; 563; 564; 565; 566; 567 | 5.6 Utilities | 255 | 127 | 127 | #FF7F7F |  |
| 570; 571; 572; 573; 574; 575 | 5.7 Transport and communication | 168 | 0 | 0 | #A80000 |  |
| 580; 581; 582; 583; 584 | 5.8 Mining | 71 | 130 | 143 | #47828F |  |
| 590; 591; 592; 593; 594; 595 | 5.9 Waste treatment and disposal | 41 | 73 | 82 | #294952 |  |
| 610; 611; 612; 613; 614 | 6.1 Lake | 0 | 0 | 255 | #0000FF |  |
| 600; 620; 621; 622; 623 | 6.2 Reservoir/dam | 0 | 197 | 255 | #00C5FF |  |
| 630; 631; 632; 633 | 6.3 River | 0 | 112 | 255 | #0070FF |  |
| 640; 641; 642; 643 | 6.4 Channel/aqueduct | 0 | 77 | 168 | #004DA8 |  |
| 650; 651; 652; 653; 654 | 6.5 Marsh/wetland | 115 | 178 | 255 | #73B2FF |  |
| 660; 661; 662; 663 | 6.6 Estuary/coastal waters | 190 | 210 | 255 | #BED2FF |  |

**a** These classes are included for completeness but are not present in the datasets.

Note: Codes refer to the Australian Land Use and Management (ALUM) Classification, version 8.

Table A1.3 Simplified 18-class land use classification symbology as RGB and hexadecimal colour values (ALUMV8\_18Class[.lyr, .clr])

| VALUE | CL18 | Red | Green | Blue | Hex | Colour |
| --- | --- | --- | --- | --- | --- | --- |
| 100; 110; 111; 112; 113; 114; 115; 116; 117 | Nature conservation | 150 | 102 | 204 | #9666CC |  |
| 120; 121; 122; 123; 124; 125 | Managed resource protection | 201 | 190 | 255 | #C9BEFF |  |
| 130; 131; 132; 133; 134 | Other minimal use | 222 | 135 | 221 | #DE87DD |  |
| 200; 210 | Grazing native vegetation | 255 | 255 | 229 | #FFFFE5 |  |
| 220; 221; 222 | Production native forests | 41 | 137 | 68 | #298944 |  |
| 300; 320; 321; 322; 323; 324; 325 | Grazing modified pastures | 255 | 211 | 127 | #FFD37F |  |
| 310; 311; 312; 313; 314; 410; 411; 412; 413; 414 | Plantation forests | 173 | 255 | 181 | #ADFFB5 |  |
| 330; 331; 332; 333; 334; 335; 336; 337; 338 | Dryland cropping | 255 | 255 | 0 | #FFFF00 |  |
| 340; 341; 342; 343; 344; 345; 346; 347; 348; 349; 350; 351; 352; 353 | Dryland horticulture | 171 | 135 | 120 | #AB8778 |  |
| 360; 361; 362; 363; 364; 365; 460; 461; 462; 463; 464; 465 | Land in transition **a** | 0 | 0 | 0 | #000000 |  |
| 400; 420; 421; 422; 423; 424 | Irrigated pastures | 255 | 170 | 0 | #FFAA00 |  |
| 430; 431; 432; 433; 434; 435; 436; 437; 438 | Irrigated cropping | 201 | 184 | 84 | #C9B854 |  |
| 440; 441; 442; 443; 444; 445; 446; 447; 448; 449; 450; 451; 452; 453; 454 | Irrigated horticulture | 156 | 84 | 46 | #9C542E |  |
| 500; 530; 531; 532; 533; 534; 535; 536; 537; 538; 540; 541; 550; 551; 552; 553; 554; 555; 560; 561; 562; 563; 564; 565; 566; 567; 570; 571; 572; 573; 574; 575 | Urban intensive uses | 255 | 0 | 0 | #FF0000 |  |
| 510; 511; 512; 513; 514; 515; 520; 521; 522; 523; 524; 525; 526; 527; 528 | Intensive horticulture and animal production | 255 | 201 | 190 | #FFC9BE |  |
| 542; 543; 544; 545 | Rural residential and farm infrastructure | 178 | 178 | 178 | #B2B2B2 |  |
| 580; 581; 582; 583; 584; 590; 591; 592; 593; 594; 595 | Mining and waste | 71 | 130 | 143 | #47828F |  |
| 600; 610; 611; 612; 613; 614; 620; 621; 622; 623; 630; 631; 632; 633; 640; 641; 642; 643; 650; 651; 652; 653; 654; 660; 661; 662; 663 | Water | 0 | 0 | 255 | #0000FF |  |

**a** This class is included for completeness but is not present in the datasets.

Note: Codes refer to the Australian Land Use and Management (ALUM) Classification, version 8.

Table A1.4 Agricultural industries classification symbology as RGB and hexadecimal colour values (ALUMV8\_Agricultural\_industries[.lyr, .clr])

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| VALUE | AGIND | Red | Green | Blue | Hex | Colour |
| 210 | Grazing native vegetation | 217 | 214 | 207 | #D9D6CF |  |
| 300; 320; 321; 322; 323; 324; 325; 360; 361; 362; 363; 364; 365; 400; 420; 421; 422; 423; 424; 460; 461; 462; 463; 464; 465 | Grazing modified pastures | 205 | 213 | 70 | #CDD546 |  |
| 330; 331; 332; 333; 334; 335; 336; 337; 338; 430; 431; 432; 433; 434; 435; 436; 437; 438 | Cropping | 114 | 136 | 26 | #72881A |  |
| 340; 341; 342; 343; 344; 345; 346; 347; 348; 349; 350; 351; 352; 353; 440; 441; 442; 443; 444; 445; 446; 447; 448; 449; 450; 451; 452; 453; 454 | Horticulture | 230 | 0 | 0 | #E60000 |  |
| 510; 511; 512; 513; 514; 515; 520; 521; 522; 523; 524; 525; 526; 527; 528 | Intensive plant and animal industries | 115 | 223 | 255 | #73DFFF |  |
| 100; 110; 111; 112; 113; 114; 115; 116; 117; 120; 121; 122; 123; 124; 125; 130; 131; 132; 133; 134; 220; 221; 222, 310; 311; 312; 313; 314; 410; 411; 412; 413; 414; 500; 530; 531; 532; 533; 534; 535; 536; 537; 538; 540; 541; 550; 551; 552; 553; 554; 555; 560; 561; 562; 563; 564; 565; 566; 567; 570; 571; 572; 573; 574; 575; 542; 543; 544; 545; 580; 581; 582; 583; 584; 590; 591; 592; 593; 594; 595; 600; 610; 611; 612; 613; 614; 620; 621; 622; 623; 630; 631; 632; 633; 640; 641; 642; 643; 650; 651; 652; 653; 654; 660; 661; 662; 663 | Other uses | 255 | 255 | 255 | #FFFFFF |  |

Note: Codes refer to the Australian Land Use and Management (ALUM) Classification, version 8.

# Appendix 2 – Land use thematic input layers descriptions

Table A2.1 Values, description, and meanings of protected areas layers' attributes

| **PA** | **PA\_DESC** | **Meaning** |
| --- | --- | --- |
| 0 | Not a protected area | Not a protected area |
| 11 | Ia. Strict nature reserve | IUCN category Ia protected area: strict nature reserve; a protected area managed mainly for science |
| 12 | Ib. Wilderness area | IUCN category Ib protected area: wilderness area; a protected area managed mainly for wilderness protection |
| 20 | II. National park | IUCN category II protected area: national park; a protected area managed mainly for ecosystem conservation and recreation |
| 30 | III. Natural monument | IUCN category III protected area: natural monument; a protected area managed for conservation of specific natural features |
| 40 | IV. Habitat/species management area | IUCN category IV protected area: habitat/species management area; a protected area managed mainly for conservation through management intervention |
| 50 | V. Protected landscape/seascape | IUCN category V protected area: protected landscape/seascape; a protected area managed mainly for landscape/seascape conservation and recreation |
| 60 | VI. Managed resource protected areas | IUCN category VI protected area: managed resource protected area; a protected area managed mainly for the sustainable use of natural ecosystems |
| 70 | Other conserved area | Other conservation areas including protected areas without a prescribed IUCN management |

Note: IUCN is the International Union for the Conservation of Nature.

Table A2.2 Values, description and meanings of the topographic features layers' attributes

| **TOPO** | **TOPO\_DESC** | **Meaning** |
| --- | --- | --- |
| 0 | Not a topographic feature | Not classified as a topographic feature |
| 1 | Lake-perennial | A naturally occurring body of mainly static water surrounded by land; normally contains water for the whole year, except during unusually dry periods, in at least nine years out of ten |
| 2 | Lake-non-perennial | A naturally occurring body of mainly static water surrounded by land; contains water for several months of each year or only contains water intermittently |
| 3 | Watercourse-perennial | A natural channel along which water may flow from time to time; normally contains water for the whole year, except during unusually dry periods, in at least nine years out of ten |
| 4 | Watercourse-non-perennial | A natural channel along which water may flow from time to time; contains water for several months of each year or only contains water intermittently |
| 5 | Swamp | Land which is so saturated with water that it is not suitable for agricultural or pastoral use and presents a barrier to free passage |
| 6 | Marine swamp | That low lying part of the backshore area of tidal waters, usually immediately behind a saline coastal flat, which maintains a high salt water content, and is covered with characteristic thick grasses and reed growths |
| 7 | Saline coastal flat | That nearly level tract of land between mean high water and the line of the highest astronomical tide |
| 8 | Reservoir | A body of water collected and stored behind a constructed barrier for some specific use |
| 12 | Mine area | An excavation made by the removal of stone, gravel, clay or mineral from the ground for commercial or industrial purposes and tailings dumps from mining operations |
| 13 | Pond-aquaculture | Shallow beds, usually segmented by constructed walls, for the use of aquaculture |
| 14 | Pond-salt evaporator | A flat area, usually segmented, used for the commercial production of salt by evaporation |
| 15 | Pond-effluent | Shallow beds, usually segmented by constructed walls, for the treatment of sewage or other wastes |
| 19 | Estuary | The part of the mouth or lower course of a river in which its current meets the sea’s tides, and is subject to their effects |
| 20 | Farm dam | Water stored for on-site, immediate use on a farm |
| 21 | Flood irrigation storage | A body of water collected and stored behind constructed barriers, for the specific use of flooding pastures via internal irrigation systems |
| 22 | Desalination plant | A facility where the process of removing salt from sea water takes place |
| 23 | Fuel depot | Land and buildings used in the refinement or storage of petroleum products |
| 24 | Built-up-commercial | Business areas with low or zero population count |
| 25 | Built-up-education | Educational facilities such as primary/secondary schools and universities |
| 26 | Built-up-hospital | Hospital or medical facilities, including aged care facilities |
| 27 | Industrial | Land containing a number of businesses, and where possible, have a zero population count |
| 28 | Parkland | Parkland, natural reserves, and other minimal use protected or conserved areas; any public open space and sporting arena or facility whether enclosed or open to the public, including racecourses, golf courses, and stadiums |
| 30 | Urban residential | Areas whose predominant land use includes houses, duplexes, apartments, serviced/long stay apartments, townhouses, gated communities, complexes, caravan parks, retirement villages, military bases where people live, and prisons |
| 31 | Transport | Road or rail features |
| 34 | Quarries | Land from which stone, gravel, clay, slate, sand, soil and rock is being extracted |
| 35 | Rural residential | Rural allotments with no agricultural activity present |
| 36 | Built-up-airport | Defined area of a facility licensed, certified, or registered by the Civil Aviation Safety Authority intended to be used either wholly or in part for the arrival, departure and surface movement of aircraft and associated cargo |
| 37 | Tailings dams | Earth-fill embankment edam used to store by-products of mining operations after the ore has been extracted |
| 38 | Abandoned mines | Land formally used for extractive industry but no longer in use |
| 39 | Rehabilitated mines | Former mining sites undergoing remediation to return them near to their natural state or a state suitable for farming |
| 42 | Waste-transfer station | Depot that receives and temporarily stores waste before routing to further processing or disposal |
| 43 | Waste-landfill | Land for disposal of solid inert wastes |
| 44 | Prohibited areas | Military and other prohibited areas |

Note: Water Observations from Space (WOfS) data (Geoscience Australia 2018) for 2010-11 and 2015-16 was used to mark potential water pixels in the Topographic features layers. This applied to those pixels where the WOfS data observed water more frequently and with confidence. Pixels where water was detected, but no topographic feature was present in the layer were allocated a TOPO value of 100 and the TOPO\_DESC of ‘Water observed – no current topographic feature’. For topographic features where water was also detected according to WOfS their TOPO value was increased by 100 with the TOPO\_DESC for these attributes having ‘ – Water observed’ added.

Table A2.3 Values, description, and meanings of tenure layers' attributes

| ****TEN**** | ****TEN\_DESC**** | ****Meaning**** |
| --- | --- | --- |
| 0 | No data/offshore | Ocean or estuary with no tenure, or areas where the tenure is unresolved |
| 1001 | Freehold | Land title holder has the power to sell, lease, licence and mortgage the land. Minerals and petroleum remain property of the Crown. All dealings are subject to compliance to planning and environmental laws, including the protection of heritage and sacred sites. May include freehold land purchased by Aboriginal land trusts through the open market. |
| 1002 | Freehold - Indigenous | Land granted to an Aboriginal land trust as freehold. The power to sell, lease and licence the land varies with jurisdiction legislation. Minerals and petroleum rights and acquisition powers of the Crown varies between jurisdictions. |
| 2111 | Freeholding lease | Crown leasehold land where a lessee is in the process of transferring lease to freehold with instalments |
| 2121 | Pastoral perpetual lease | Crown leasehold land granted in perpetuity to an entity for primarily pastoral purposes |
| 2131 | Other perpetual lease | Crown leasehold land granted in perpetuity to an entity for non-pastoral or non-specified purposes |
| 2132 | Other perpetual lease - Indigenous | Crown leasehold land granted in perpetuity to an Indigenous land trust for non-pastoral or non-specified purposes |
| 2141 | Pastoral term lease | Crown leasehold land granted for a specified term of years to an entity for primarily pastoral purposes |
| 2142 | Pastoral term lease - Indigenous | Crown leasehold land granted for a specified term of years to an Indigenous land trust for primarily pastoral purposes |
| 2151 | Other term lease | Crown leasehold land granted to an entity for a specified term of years for non-pastoral or non-specified purposes |
| 2152 | Other term lease - Indigenous | Crown leasehold land granted to an Indigenous land trust for a specified term of years for non-pastoral or non-specified purposes |
| 2161 | Other lease | Crown leasehold land where the purpose is specified as other or undefined |
| 2162 | Other lease - Indigenous | Crown leasehold land where the purpose is specified as other or undefined and held by an Indigenous land trust |
| 2211 | Nature conservation reserve | Crown land set aside for conservation purposes. Includes heritage reserves where specified. |
| 2212 | Nature conservation reserve - Indigenous | Crown land vested or reserved to an Indigenous lands trust and set aside for conservation purposes. Includes heritage reserves where specified. |
| 2221 | Multiple-use public forest | Crown land set aside for multiple-use forest values such as wood harvesting, recreation, and environmental protection, includes state forests and timber reserves |
| 2231 | Other Crown purposes | Crown land set aside for all other purposes including, water, infrastructure, institutional, defence and other undefined reserves; or lands vested to, acquired, or purchased by the Crown or its authorised entities to deliver essential services |
| 2232 | Other Crown purposes - Indigenous | Crown land vested or reserved to an Indigenous land trust for the benefit of the Indigenous |
| 2301 | Other Crown land | Crown land unallocated to a purpose or purposes |
| 2302 | Other Crown land - Indigenous | Unallocated Crown land held by an Indigenous land trust |

Table A2.4 Values, description, and meanings of forest type layers' attributes

|  |  |  |
| --- | --- | --- |
| ****FOR**** | ****FOR\_DESC**** | ****Meaning**** |
| 0 | Non-forest or no data | Non-forest (crown cover less than 20%) or no data |
| 1 | Native woodland forest | Native woodland forest (crown cover between 20 and 50%) |
| 2 | Native open forest | Native open forest (crown cover greater than 50 to 80%) |
| 3 | Native closed forest | Native closed forest (crown cover greater than 80%) |
| 4 | Commercial plantation - hardwood | Commercial plantation - hardwood |
| 5 | Commercial plantation - softwood | Commercial plantation - softwood |
| 6 | Commercial plantation - mixed species | Commercial plantation - mixed species |
| 7 | Unknown forest | Unknown forest (crown cover greater or equal to 20%) |
| 8 | Native rainforest other than Tasmania | Native rainforest other than Tasmania |
| 9 | Native rainforest Tasmania | Native rainforest Tasmania |

Table A2.5 Values, description, and meanings of urban boundaries layers' attributes

|  |  |  |
| --- | --- | --- |
| ****URBAN**** | ****URBAN\_DESC**** | ****Meaning**** |
| 0 | Rural balance | Land within a state or territory not within a major urban, other urban, nor bounded locality area |
| 1 | Major urban | Urban centres with a population of 100,000 or more |
| 2 | Other urban | Urban centres with a population between 1,000 and 99,999 |
| 3 | Bounded locality | Rural localities with a population typically 200 to 1,000 but can include some large localities with a population greater than 1,000 |

Table A2.6 Values, description, and meanings of stock route layers' attributes

| ****SR**** | ****SR\_DESC**** | ****Meaning**** |
| --- | --- | --- |
| 0 | No data/offshore | No observed stock route or no data |
| 1 | Minimal use managed Crown land (WA only) | Land managed as Crown land other than nature conservation or multiple-use public forest. Managed Crown land can be Crown land or freehold land owned by the Western Australian government. |
| 2 | QLD NSW stock routes | New South Wales and Queensland stock routes |
| 3 | WA stock routes | Western Australian stock routes |
| 7 | QLD grazing licences | Queensland Crown land licenced for grazing activities |

Table A2.7 Values and description of irrigation status layers’ attributes

| ****IRGN**** | ****IRGN\_DESC**** | ****Meaning**** |
| --- | --- | --- |
| 0 | Dryland agriculture, not ag or no data | Dryland agriculture, not an agricultural commodity or no data |
| 1 | Irrigated agriculture | Irrigated agriculture |

Table A2.8 Values and description of agricultural commodity mapping unit layers’ attributes

| **AGMAPU** | **AGMAPU\_DESC** | **Corresponding probability rasters from SPREAD II** |  |
| --- | --- | --- | --- |
| 0 | Unallocated agricultural land, non-agricultural land or no data |  |  |
| 1 | Grazing - native or naturalised pasture or native-exotic pasture mosaic | probabilitySurface\_20YY\_210\_1\_GRAZ\_NOTIMBNP.tif **a** |  |
| 3 | Grazing sown pastures | probabilitySurface\_20YY\_320\_3\_GRAZ\_NOTIMBSP.tif **a** |  |
| 5 | Winter cereals | probabilitySurface\_20YY\_331\_5\_W\_CER.tif |  |
| 6 | Summer cereals excluding rice | probabilitySurface\_20YY\_331\_6\_S\_CER\_EX\_RICE.tif |  |
| 7 | Rice | probabilitySurface\_20YY\_439\_7\_RICE.tif |  |
| 8 | Winter legumes | probabilitySurface\_20YY\_338\_8\_W\_LEGUMES.tif |  |
| 9 | Summer legumes | probabilitySurface\_20YY\_338\_9\_S\_LEGUMES.tif |  |
| 10 | Winter oilseeds | probabilitySurface\_20YY\_334\_10\_W\_OILSEEDS.tif |  |
| 11 | Summer oilseeds | probabilitySurface\_20YY\_334\_11\_S\_OILSEEDS.tif |  |
| 12 | Sugar cane | probabilitySurface\_20YY\_335\_12\_SUGAR\_CANE.tif |  |
| 13 | Pastures and crops for hay and silage | probabilitySurface\_20YY\_333\_13\_HAY.tif |  |
| 14 | Cotton | probabilitySurface\_20YY\_336\_14\_COTTON.tif |  |
| 15 | Other non-cereal crops | probabilitySurface\_20YY\_330\_15\_ONCC.tif |  |
| 16 | Vegetables | probabilitySurface\_20YY\_353\_16\_VEGETABLES.tif |  |
| 17 | Citrus | probabilitySurface\_20YY\_348\_17\_CITRUS.tif |  |
| 18 | Apples | probabilitySurface\_20YY\_341\_18\_APPLES.tif |  |
| 19 | Pears and other pome fruit | probabilitySurface\_20YY\_341\_19\_PEARS\_OTH\_PME.tif |  |
| 20 | Stone fruit excluding tropical | probabilitySurface\_20YY\_341\_20\_ST\_FRT\_EX\_TRP.tif |  |
| 21 | Tropical stone fruit | probabilitySurface\_20YY\_341\_21\_TROP\_STONE\_FR.tif |  |
| 22 | Nuts | probabilitySurface\_20YY\_343\_22\_NUTS.tif |  |
| 23 | Berry fruit | probabilitySurface\_20YY\_345\_23\_BERRY\_FRT.tif |  |
| 24 | Plantation fruit | probabilitySurface\_20YY\_340\_24\_PLANTATION\_FR.tif |  |
| 25 | Grapes | probabilitySurface\_20YY\_349\_25\_GRAPES.tif |  |

Note: 20YY denotes 2011 for 2010–11 and 2016 for 2015–16. Probability rasters naming convention probabilitySurface\_20YY\_[ALUM]\_[AGMAPU]\_[AGMAP\_DESC abbreviated].tif; NOTIMB = not in native woodland forest or native open forest; \_W\_ = Winter ; \_S\_ = Summer. **a** Probability surface represents only part of the AGMAPU as those areas with native forest crown cover of less than 80% are mapped outside SPREAD II.

# Appendix 3 – Change descriptions

Table A3.1 Values, description, and meanings of the land use observed change (LUCH) attribute

|  |  |  |
| --- | --- | --- |
|  | LUCH\_DESC | Meaning |
| 0 | No data/offshore | No data/offshore |
| 1 | Observed difference/change | Change has been observed between 2010–11 and 2015–16, at 18-class summary classification level. |
| 2 | No observed difference/change | No change has been observed between 2010–11 and 2015–16, at 18-class summary classification level |

# Appendix 4 - Data sources

Table A4.1 Land use of Australia data sources used for 2010*–*11 and 2015*–*16

| **Process** | **Dataset** | **Data custodian** | **Currency dates** | |
| --- | --- | --- | --- | --- |
|  |  |  | **2010-11** | **2015-16** |
| Protected areas layer | Collaborative Australian Protected Areas Database - Marine | Department of Agriculture, Water and the Environment | 2012, 2018 **a** | 2016, 2018 **a** |
| Protected areas layer | Collaborative Australian Protected Areas Database - Terrestrial | Department of Agriculture, Water and the Environment | 2012, 2018 **a** | 2016, 2018 **a** |
| Protected areas layer | Australia, World Heritage Areas **b** | Department of Agriculture, Water and the Environment | 2012, 2020 **a** | 2020 **a** |
| Topographic features layer | GEODATA TOPO 250K Series 3 – Hydrography - Pondage areas | Geoscience Australia | 2006 | 2006 |
| Topographic features layer | Surface Hydrology Polygons (National) | Geoscience Australia | 2015 | 2015 |
| Topographic features layer | National Aviation Facilities | Geoscience Australia | 2012 | 2012 |
| Topographic features layer | Wastewater Treatment Plants | Geoscience Australia | 2012 | 2012 |
| Topographic features layer | National Liquid Fuel Depot Areas | Geoscience Australia | 2012 | 2012 |
| Topographic features layer | National Liquid Fuel Refinery Areas | Geoscience Australia | 2012 | 2012 |
| Topographic features layer | Major Desalination Plants | Geoscience Australia | 2012 | 2012 |
| Topographic features layer and irrigation allocation | Water Observations from Space | Geoscience Australia | 2010 | 2015 |
| Topographic features layer | 2074.0 – Census of Population and Housing: Mesh Block Counts, Australia | Australian Bureau of Statistics | 2011 | 2016 |
| Topographic features layer | 1270.0.55.001 - Australian Statistical Geography Standard (ASGS): Volume 1 - Main Structure and Greater Capital City Statistical Areas. | Australian Bureau of Statistics | 2011 | 2016 |
| Topographic features layer | 1270.0.55.004 – Australian Statistical Geography Standard (ASGS): Volume 4 – Significant Urban Areas, Urban Centres and Localities, Section of State | Australian Bureau of Statistics | 2011 | 2016 |
| Catchment scale land use layer | Catchment Scale Land Use Mapping for the Australian Capital Territory 2012 | ABARES, Department of Agriculture, Water and the Environment | 2012 | 2012 |
| Catchment scale land use layer | Land Use Mapping Project of the Northern Territory | NT Department of Environment, Parks and Water Security | 2008 | 2016-2017 |
| Catchment scale land use layer | NSW Landuse | NSW Department of Planning, Industry and Environment | 2013 | 2013, 2017 |
| Catchment scale land use layer | Land use mapping – Queensland | Queensland Department of Environment and Science | 2010 | 2015 |
| Catchment scale land use layer | Land use mapping – Queensland - Fitzroy | Queensland Department of Environment and Science | 2009 | 2017 |
| Catchment scale land use layer | Land use mapping – Queensland – Mackay | Queensland Department of Environment and Science | 2009 | 2016 |
| Catchment scale land use layer | Land use mapping – Queensland – Wet tropics | Queensland Department of Environment and Science | 2009 | 2015 |
| Catchment scale land use layer | Land use mapping – Queensland - Burdekin | Queensland Department of Environment and Science | 2009 | 2016 |
| Catchment scale land use layer | Land use mapping – Queensland – Burnett Mary | Queensland Department of Environment and Science | 2009 | 2017 |
| Catchment scale land use layer | Land Use 2008 (South Australia) | SA Department of Environment, Water and Natural Resources | 2008 | 2008 |
| Catchment scale land use layer | Land Use 2016 (Adelaide Hills and Northern Adelaide Plains) | SA Department of Environment and Water | na | 2016 |
| Catchment scale land use layer | Land Use 2014 (South East and SA River Murray corridor) | SA Department of Environment and Water | na | 2014 |
| Catchment scale land use layer | Tasmanian Land Use | Tasmania Department of Natural Resources and Environment | 2009-2010 | 2015 |
| Catchment scale land use layer | Victorian Land Use Information System (VLUIS) | Victoria Department of Jobs, Precincts and Regions | 2010-2011 | 2016-2017 |
| Catchment scale land use layer | Land Use in Western Australia v7 | WA Department of Agriculture and Food | 2008 | na |
| Catchment scale land use layer | WA Cape to Cape Land Use | WA Department of Primary Industries and Regional Development | 2014 | 2014 |
| Catchment scale land use layer | Catchment Scale Land Use Mapping for Western Australia 2018 | ABARES / WA Department of Primary Industries and Regional Development | 2012, 2018 | 2018 |
| Land tenure layer | Land tenure of Australia 2010-11 to 2015-16 | ABARES, Department of Agriculture, Water and the Environment | 2010-2011 | 2015-2016 |
| Forest type layer, allocating grazing outside SPREAD II | Forests of Australia | ABARES, Department of Agriculture, Water and the Environment | 2013 (v2.0) | 2018 |
| Stock routes layer | Stock routes – Queensland | Queensland Department of Natural Resources | 2007 | 2007 |
| Stock routes layer | Conservation value of NSW Travelling Stock Reserves (TSRs) | Department of Regional New South Wales | 2017 | 2017 |
| Stock routes layer | Cadastral data - Queensland Series | Queensland Department of Natural Resources | December 2010 | May 2016 |
| Stock routes layer | Cadlite; Land Tenure | PSMA Australia | February 2012  (2012) | February 2017  (date range 2015-2016) |
| SPREAD II | Terra Moderate Resolution Imaging Spectroradiometer (MODIS) satellite | NASA | April 2010 – March 2011 | April 2015 – March 2016 |
| SPREAD II | 7121.0 - Agricultural Commodities, Australia | Australian Bureau of Statistics | 2010-11 | 2015-16 |
| SPREAD II | 4618.0 – Water use on Australian farms | Australian Bureau of Statistics | 2010-11 | 2015-16 |
| SPREAD II | Ground reference points | State government agencies, Coleambally Irrigation Co-operative Limited, the United States Geological Survey | 2000-2017 | 2000-2017 |
| Allocating grazing outside SPREAD II | Slope relief (3” resolution) **c** | CSIRO Land and Water | 2000 | 2000 |
| Cultivation constraint **d** | National Vegetation Information System - Major Vegetation Groups (Version 6.0) | Department of Agriculture, Water and the Environment | 2021 | 2021 |
| Cultivation constraint | NSW Native Vegetation Extent 5m Raster v1.2 | NSW Department of Planning, Industry and Environment | 2019 | 2019 |
| Cultivation constraint | Current extent of native vegetation - Western Australia | WA Department of Primary Industries and Regional Development | 2020 | 2020 |
| Cultivation constraint | Remnant vegetation cover - 2017 | Queensland Department of Environment and Science | 2017 | 2017 |

Note: Data currency may vary from publication date. **a** The gazettal field was used to sort data appropriate for each target field. Only parcels reflecting the target year were taken from these datasets. **b** World Heritage Areas managed as one or more of IUCN categories 1a to V. **c** Derived from NASA’s Digital Elevation - Shuttle Radar Topography Mission February 2000. **d** ALUM v8 classes used from Catchment scale land use layer for Cultivation constraint: 3.3.0 to 3.5.3 (excluding 3.4.6) and 4.2.0 to 4.5.4 (excluding 4.4.6); Horticulture constraint: 3.4.0 to 3.5.3 (excluding 3.4.6) and 4.4.0 to 4.5.4 (excluding 4.4.6); Irrigation constraint: 4.2.0 to 4.6.5.