Ozius Biome User Guide

February 2024

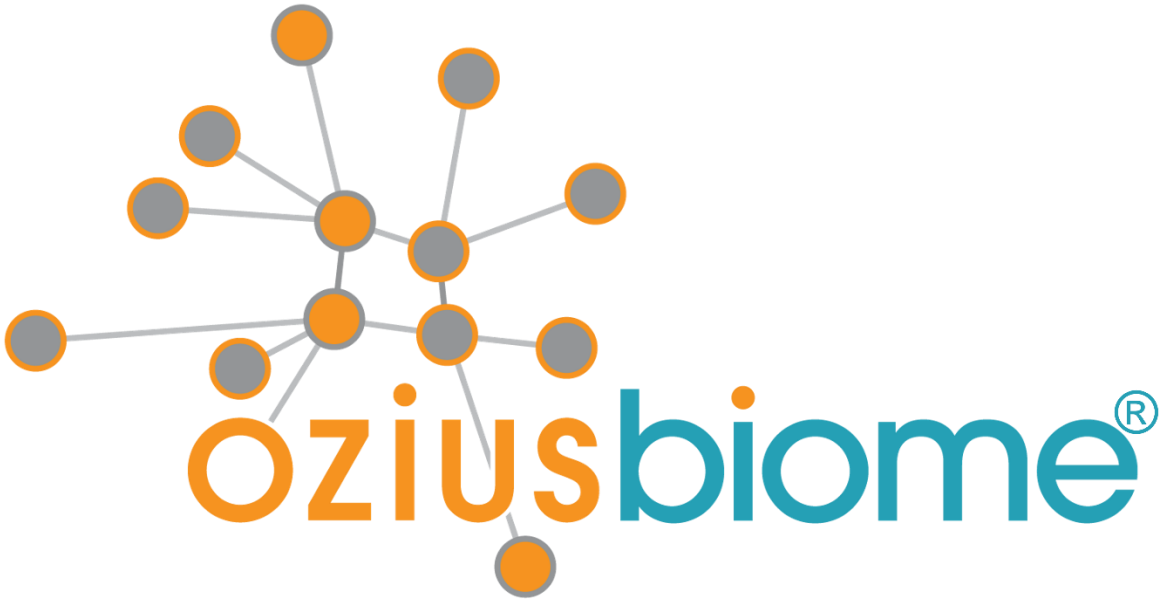

Table of Contents

List of Figures and Tables

Note: The information contained in this document are applicable for the files delivered as the Ozius Biome launch release (v3) as of February 2024.
Your feedback on these products are welcome. Please contact us via email: info@ozius.com.au.

1 About Ozius Biome

1.1 Introduction

Ozius Biome provides detailed environmental intelligence across vast landscapes. It gives you access to three-dimensional vegetation information, consistently and seamlessly across Australia.

Using Ozius Biome, you can rapidly identify opportunities and risks in the landscape. And you can unlock new potential to investigate options and act with confidence.

Our technology fuses trusted earth observation data with our advanced AI-enabled analytics engine. It generates current and comprehensive data layers, filling important knowledge gaps, seamlessly.

Enclosed is the data description and user guide for the Ozius Biome products delivered to your organisation today. We look forward to continuing to support your organisation in your commitment to sustainability and embracing technology to solve problems, identify opportunities, and overcome challenges.

Powered by proprietary processing methods

Ozius leads the way in landscape intelligence, helping organisations make robust decisions and respond quickly to challenges.

Ozius Biome was created using advanced science and technology.

Our proprietary processing methods fuse trusted earth observation data with our sophisticated AI-enabled analytics engine. The result is current and comprehensive data layers that fill critical gaps in knowledge.

1.2 Contact Ozius

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P. 1300 618 524
E. info@ozius.com.au
W. https://www.ozius.com.au/ or https://oziusbiome.earth/

1.3 Data sources

Ozius Biome contains leading-edge environmental data sets that can be seamlessly integrated with enterprise systems.

Vegetation structure metrics are created using Ozius's proprietary processing methods and the combined inputs of:

- European Space Agency's Copernicus Program: Sentinel-1 and Sentinel-2 imagery.
- NASA's Global Ecosystem Dynamics Investigation (GEDI): High-resolution laser ranging of Earth's forests attached to the International Space Station. GEDI is a full-waveform lidar instrument collecting key vegetation and topographic information.

The foundation of precise results

Biome uses data from space fused with on-ground intelligence to give you a comprehensive 3-dimensional overview of the environment, from wherever you are in Australia.

Biome helps our customers to simplify and streamline their environmental investigations and decision-making.

The result is detailed, consistent and seamless information, providing a complete picture of vast landscapes.

All products in Ozius Biome are modelled at the national scale and provide estimated values of biophysical properties.

Leveraging optical, microwave and lidar sensors, we optimise the modelling of sparse vegetation, and limit saturation in dense vegetation.

See section 4.4 for information about the capabilities and limitation of our data.

1.4 Licencing

The products are licenced to the organisation named as outlined in Ozius Biome's End User Licence Agreement (EULA).

Ozius's Standard EULA will apply, unless Biome's UNFAO Forest Definition product was selected from our Open Data section, in which case Ozius's Open Data licence will apply. Please get in contact with Ozius Pty Ltd (info@ozius.com.au) if you have any questions regarding licence conditions or would like to discuss your use case with us.

The appropriate EULA included in the suite of files you have downloaded.

2 Product overview

Ozius Biome incorporates a suite of products that accurately and consistently reconstruct biophysical and structural vegetation characteristics across the continent of Australia.

Our products cover three themes:

- **Biodiversity vegetation products,** provides information on the vegetation structure of habitats**.**
- **Biome Core products**, investigating fundamental vegetation biophysical parameters: Canopy Cover and Vegetation Height.
- **Natural Capital products**, harmonised to key local and global forest frameworks and providing information on baseline Forest and Biomass conditions.

Quick guide to Ozius Biome products

Table 1 introduces the suite of products available in Ozius Biome. Each product is described in more detail in Section 3 of this manual.

Table 1 Summary of Ozius Biome products.

Product Theme	Product name	Product description	Product specifications
Biome Core	Vegetation height	Shows estimated heights of vegetation in a vertical plane. Heights are available at 90th percentile as default.	See page 11
Biome Core	Canopy cover	Shows canopy cover based on the proportion of the ground area covered by the vertical projections of the outer extent of the tree canopy crowns.	See page 13
Biodiversity	Foliage projective cover	Shows canopy density based on the proportion of the ground area covered by foliage held in a vertical plane.	See page 14
Biodiversity	Plant projective cover	Shows the proportion of the ground area covered by the vertical projection of all woody plant materials.	See page 15

Biodiversity	Height of Maximum Foliage Density (MFD)	Ozius Biome's Maximum Foliage Density product estimates the vegetation height above ground where the maximum foliage density occurs in the vertical profile.	See page 16
Biodiversity	Biome Modified Specht Forest Classification.	Combines cover and 3D height structural information to classify forest growth forms seamlessly across Australia based on the Specht (1970) classification.	See page17
Natural Capital	Biome NGGI Forest Definition (Australia's Forest and Woodland Vegetation)	Shows woodland and forest combined as a single layer following Australia's National Greenhouse Gas Inventory definition (NGGI). ***Woodland*** is defined as vegetation that is from 2m high with 5% or higher canopy cover. ***Forest*** is defined as vegetation that is from 2m high with 20% or higher canopy cover.	See page 19
Natural Capital	UN-FAO forest definition extent (fao)	Shows forest that meets the UN-FAO global forest definition, identifying areas of a minimum size of 0.5ha, with vegetation greater than 5m in height and canopy cover greater than 10%, excluding predominantly urban and agriculture areas.	See page 21
Natural Capital	Kyoto forest extent (kyo)	Shows forest that meets the criteria for Kyoto forest, defined as vegetation that is from 2m high and 10% or greater canopy cover.	See page 20
Natural Capital	Forest Cover (Carbon Estimation Classes)	Identifies wooded land (forest), Carbon Estimation Areas (CEA), potential CEA and non-woody areas.	See page 23

Biodiversity vegetation products

Ozius Biome® Biodiversity vegetation products allow users to examine specific vegetation characteristics to better characterise biodiverse habitats across large areas. Products can be used alone or in combination to address knowledge gaps and locate sites of interest.

Understanding Vegetation Biophysical parameters related to Biodiversity and habitats.

Ozius Biome produces key vegetation metrics incorporating 3-dimensional vegetation structure information. These metrics are available for areas throughout Australia.

Key metrics include:

- **Foliage Projective Cover (FPC)** which is defined as a measure of the proportion of the ground area covered by foliage (or photosynthetic tissue) held in a vertical plane and is a measure of canopy density (as defined by TERN).
- **Plant projective cover (PPC)** which is defined as the proportion of the ground area covered by the vertical projection of all woody plant materials (branches, leaves).
- **Height of Maximum Foliage Density (MFD)** identifies the height of peak foliage density through the vertical profile. This product is useful to separate understory-dominant vs over-story-dominant vegetation communities.
- **Biome Modified Specht (1970) Forest Classification** combines cover and 3D height structural information to classify forest growth forms seamlessly across Australia.

Biome Core vegetation products

Biome Core vegetation products focus on the fundamental structural characteristics of vegetation from which many definitions or criteria can be applied. Ozius produces Vegetation Height (90th percentile) and Canopy Cover products to unlock nationally consistent, gap-free information on vegetation structure across Australia. For some applications or use cases, Biome enables sites across Australia to be compared quantitatively and with consistency for the first time.

Understanding Vegetation Biophysical parameters related to core structural characteristics.

Ozius Biome produces key vegetation metrics incorporating 3-dimensional vegetation structure information. These metrics are available for areas throughout Australia.

Key metrics include:

- **Vegetation Height (90th percentile)** which estimates the height above ground where 90% of the plant material is detected.

- **Canopy Cover (CC)** is defined as a measure of the proportion of the ground area covered by the vertical projection of the outer extent of tree canopy crowns.

Natural Capital and Carbon projects

Ozius Biome provides several forest cover products aligned to different frameworks and classification systems, including:

- Biome NGGI Forest Definition (Australia's Forest and Woodland Vegetation)
- Kyoto Forest extent
- United Nation's FAO Forest extent

Each framework defines forest differently, with these definitions fit for different purposes.

Table 2 summarises the forest criteria and definitions used in Ozius Biome.

Table 2 Reference guide for forest definitions applied within Ozius Biome.

Product Name	Class	HEIGHT	COVER	Value	Filename
Biome NGGI Forest Definition - Australia's Forest and Woodlands	Woodland	2m	5%	1	biome_aus_20200101_forestwoodlandpixel_aus_v03.tif
	Forest	2m	20%	2	
Kyoto Forest	Forest	2m	10%	1	biome_aus_20200101_forestpixel_kyo_v03.tif
UNFAO Forest	Forest	5m	10%	1	biome_aus_20200101_definition_fao_v03.tif

Ozius Biome also provides information to support forest characterisation such as Australia's Carbon Estimation Area and Biomass snapshot.

- Biomass
- Australia's Carbon Estimation Areas.

3 Product specifications

The following section outlines the specifications for each Biome product.

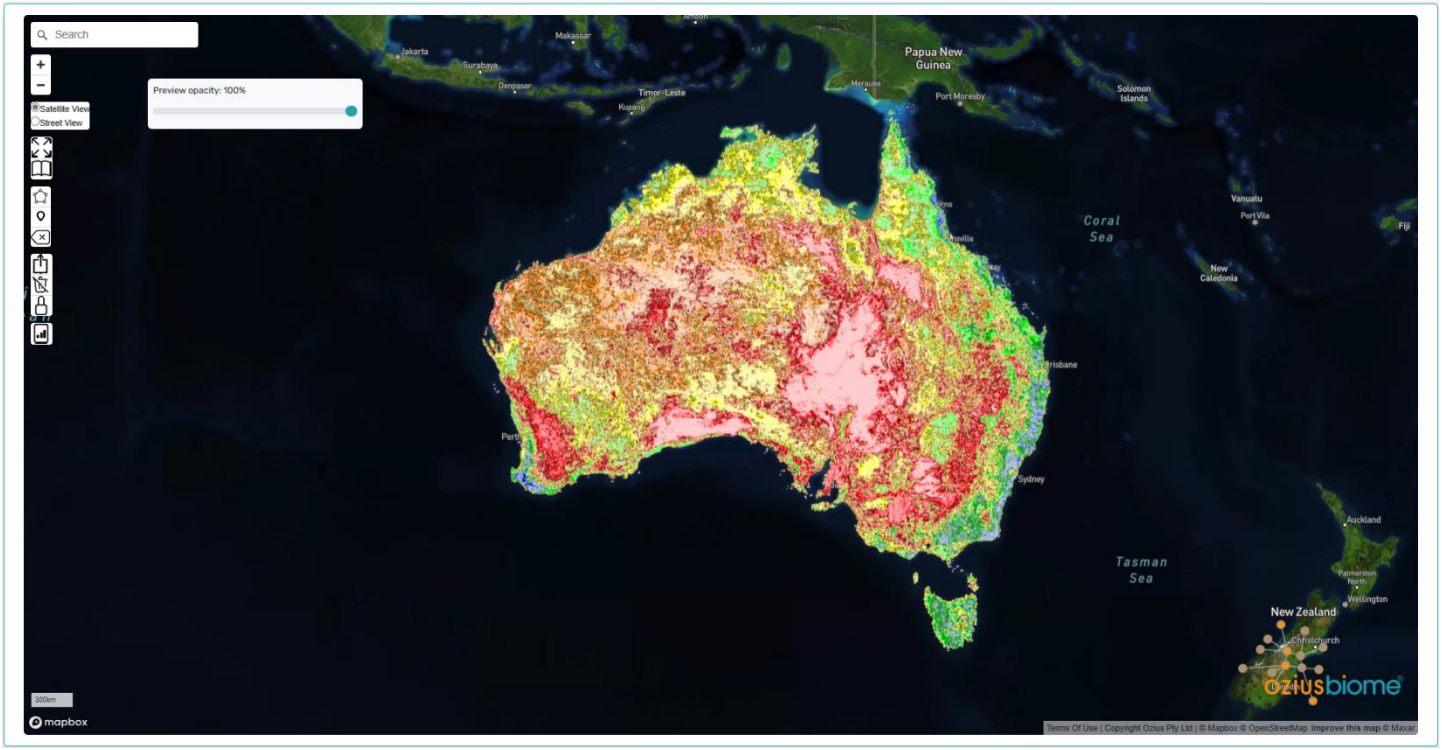

Figure 1: Image of Ozius Biome's Specht Forest cover assessment product over Australia.

3.1 Vegetation height

Ozius Biome's Vegetation height product shows height estimates at in a vertical plane. This product is provided at 10cm intervals (in decimetres) with a pixel spatial resolution of 20m x 20m.

Vegetation height is available in the following height representation (relative height above ground):

- **90th percentile**

The vegetation height product can be used to identify areas of forest that meet the desired height criteria.

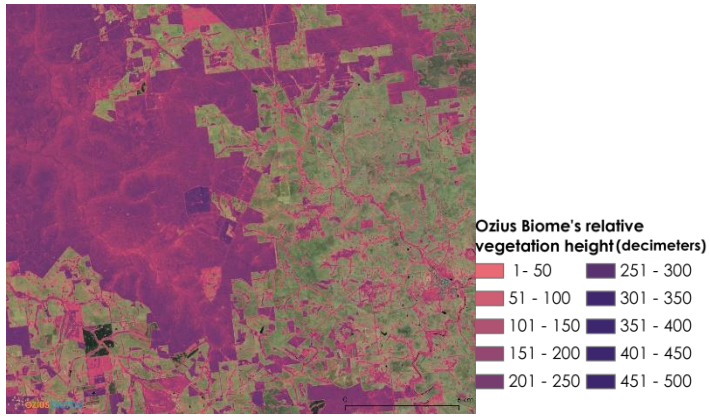

Figure 2 Relative Vegetation Height (90th percentile) sample product with colour classes applied.

File name

biome_aus_20200101_rh_90p_v03.tif

Other products available by contacting Ozius (info@ozius.com.au)

biome_aus_20200101_rh_95p_v03.tif

biome_aus_20200101_rh_75p_v03.tif

biome_aus_20200101_rh_50p_v03.tif

Data description

The height above ground where 90% of the plant material is detected.

This product is delivered in ***decimetres***.

Data type

16-bit Integer

Value range

0 to 500

Value 20=2m (height of 90% of plant material); Value 50=5m (height of 90% of plant material); Value 250=25m (height of 90% of plant material), Value 328=32.8m (height of 95% of plant material).

Greyscale 16-bit unsigned integer rasters are delivered for this product. Colour tables for this product are to be set by users. Values range between 0 and 497. NoData value is +9999. Example colour table is presented below. Zero has a transparency applied.

3.2 Canopy cover

Canopy cover (CC) is defined as a measure of the proportion of the ground area covered by the vertical projection of the outer extent of tree canopy crowns (includes internal canopy gaps in open canopies).

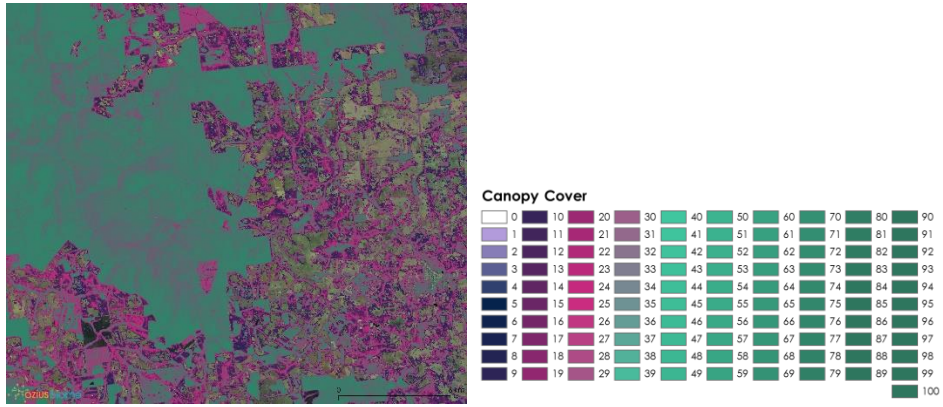

Figure 3 Canopy cover (total) sample product with a colour ramp applied.

File name

`biome_aus_20200101_ccp_total_v03.tif`

Data description

Percent of total Canopy cover

Data type

Integer

Value range

0 to 100

No Data Value

255

Product Resolution

The values in Ozius Biome's Canopy Cover product relate to the canopy cover across a pixel area (20m x 20m).

3.3 Foliage Projective Cover

Foliage Projective Cover is defined as a measure of the proportion of the ground area covered by foliage (or photosynthetic tissue) held in a vertical plane and is a measure of canopy density (as defined by TERN). The values in Ozius Biome's FPC product relate to FPC within a homogenous segment area.

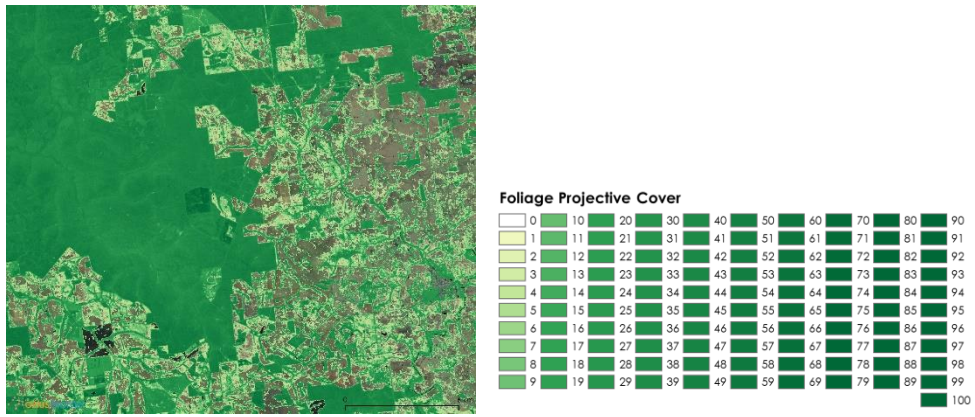

Figure 4 Foliage Projective Cover (total) sample product with a colour ramp applied.

File name

`biome_aus_20200101_fpc_total_v03.tif`

Data description

Percent of total Foliage projective cover

Data type

Integer

Values range

0 to 100

No Data Value

255

Product Resolution

The values in Ozius Biome's Foliage Projective Cover (FPC) product relate to the FPC across a pixel area (20m x 20m).

3.4 Plant Projective Cover

Plant projective cover (PPC) is defined as the proportion of the ground area covered by the vertical projection of all woody plant materials (branches, leaves).

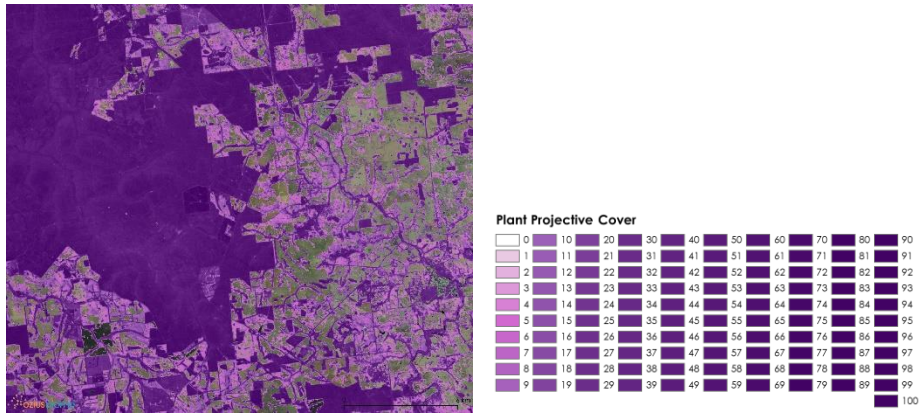

Figure 5 Plant Projective Cover (total) sample product with a colour ramp applied.

File name

`biome_aus_20200101_ppc_total_v03.tif`

Data description

Percent of total Plant projective cover

Data type

Integer

Values range

0 to 100

No Data Value

255

Product Resolution

The values in Ozius Biome's Plant Projective Cover (PPC) product relate to the PPC across a pixel area (20m x 20m).

3.5 Height to maximum foliage density (MFD)

Ozius Biome's Height to maximum foliage density (MFD) product vegetation height estimates at in a vertical plane where the peak vegetation density is detected. This product can be used to characterise understory and overstory vegetation structure.

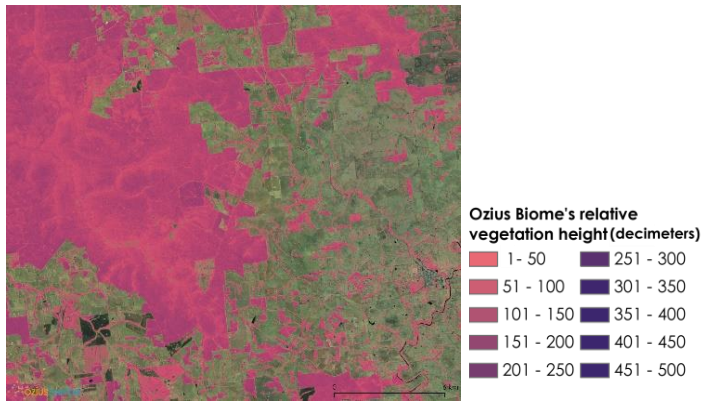

Figure 6 Vegetation height to maximum foliage density (MFD) sample product with colour classes applied.

File name

`biome_aus_20200101_rhpixel_maxfoliagedensity_v03.tif`

Data description

Ozius Biome's Maximum Foliage Density product estimates the vegetation height above ground where the maximum foliage density occurs in the vertical profile.

This product is delivered in ***decimetres***.

Data type

16-bit Integer

Value range

0 to 500

Value 20=2m (height of MFD); Value 250=25m (height of MFD); Value 10=1m (height of MFD).

No Data Value

+9999.

Product Resolution

20m x 20m pixels

3.6 Forest Classification - Specht (1970)

The Ozius Biome's Specht Forest Classification product is based on the Specht (1970) framework (Figure 7). This product can be used by organisations with a need to determine Forest classes in terms of density and height growth forms and structural information.

The framework has been modified by Ozius to produce spatially explicit classes (with no overlaps or gaps in the class definitions). This modification has reclassified the Tall Shrublands to a maximum of 5m tall (down from 8m) however the Tree classes remain a minimum of 5m tall.

	Percentage foliage cover of tallest plant layer			
Life form and height of tallest stratum	**Dense (70 – 100%)**	**Mid-dense (30 – 70%)**	**Sparse (10-30%)**	
Trees >30m	Tall Closed - forest	Tall open - forest	Tall woodland	Tall open - woodland
Trees 10 - 30m	Closed - forest	Open - forest	Woodland	Open - woodland
Trees 5 - 10m	Low closed - forest	Low open - forest	Low woodland	Low open - woodland
Shrubs 2 - 5m	Closed - scrub	Open - scrub	Tall shrubland	Tall open - shrubland
Shrubs 0 - 2m	Closed - heath	Open - heath	Low shrubland	Low open - shrubland

Figure 7 Specht 1970 classification framework. Modified for Ozius Biome® to produce spatially explicit classes. Tall shrublands are modified to be defined between 2-5m and Trees are inclusive from 5m.

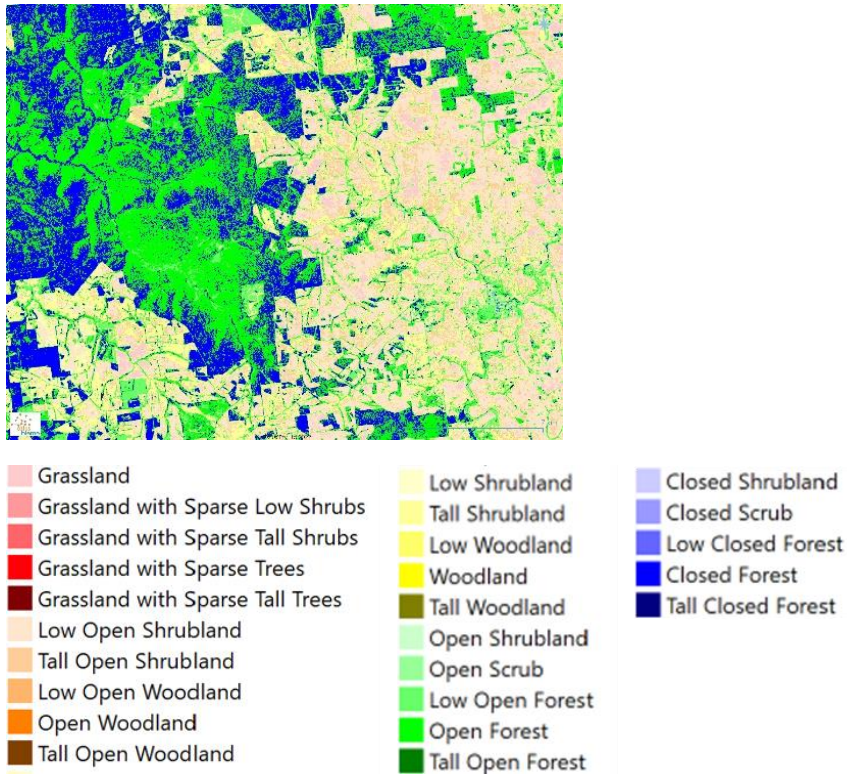

Figure 8 Example map of Ozius Biome's Specht Forest cover assessment product.

Ozius Biome's Specht Forest Classification combines cover and 3D height structural information to classify forest growth forms seamlessly across Australia (Figure 8). This product excludes land use information and criteria.

Ozius Biome's Specht Forest Classification product is ideal for assessing habitat complexity or structural boundaries with consistency across Australia.

File name

Classification values and class names

The "values" of the raster data delivered are used to describe the Forest classes under the modified Specht (1970) classification.

Value	Class name
0	Grassland
1	Grassland with Sparse Low Shrubs
2	Grassland with Sparse Tall Shrubs
3	Grassland with Sparse Trees
4	Grassland with Sparse Tall Trees
10	Low Open Shrubland
11	Tall Open Shrubland
12	Low Open Woodland
13	Open Woodland
14	Tall Open Woodland
20	Low Shrubland
21	Tall Shrubland
22	Low Woodland
23	Woodland
24	Tall Woodland
30	Open Shrubland
31	Open Scrub
32	Low Open Forest
33	Open Forest
34	Tall Open Forest
40	Closed Shrubland
41	Closed Scrub
42	Low Closed Forest
43	Closed Forest
44	Tall Closed Forest

3.7 Biome NGGI Forest Definition (Australia's Forest and Woodland Vegetation)

This product aligns to the Australia's sparse woodland and forest vegetation definition (NGGI) for woodland (>=2m and >=5% canopy cover and <20% canopy cover) and forest (vegetation >=2m and >=20% canopy cover) combined into one layer.

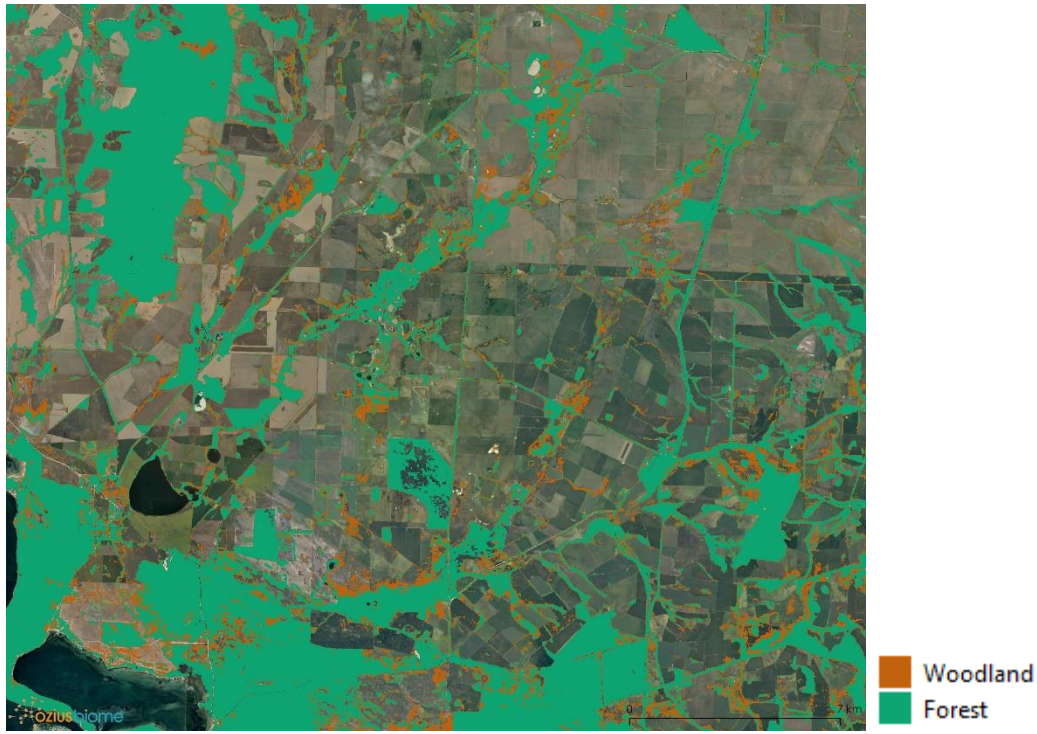

Figure 9 Biome NGGI Forest Definition (Australia's Forest and Woodland Vegetation) sample product with a colour ramp applied.

File name

`biome_aus_20200101_forestwoodlandpixel_aus_v03.tif`

Classification system applied (harmonised)
The Forest Definition utilised in Biome's NGGI product is based on Australia's definition of woody forest vegetation where forests are where vegetation height is >2m and a canopy cover is >=20%.

The "values" of the raster data delivered are used to describe the extent of the Forest under Australia's definition.

No Forest `[value 0]`
Locations that do not meet the Forest criteria are considered not forest. This includes landscape features such as bare areas, grasslands, and exposed soil, trees that a <2m in height and/or do not meet canopy density requirements.

Woodland `[value 1]`
Value 1 is the extent of Sparse woodland vegetation.

Forest `[value 2]`
Value 2 is the extent of Woody Forest vegetation.

3.8 Kyoto forest

Figure 10 Kyoto Forest (kyo) sample product with a colour ramp applied.

File name

biome_aus_20200101_forestpixel_kyo_v03.tif

Classification system applied (harmonised)
This product aligns with the Kyoto Protocol definition of Forest where vegetation >=2m in height and >=10% canopy cover meets the criteria for Forest (Figure 10).

This product can be used for those organisations with a need to determine Wooded land component that meets the Kyoto Forest definition.

This product is ideal for understanding your potential forest disturbance footprint (impact) prior to development, locating areas suitable for preservation, and selecting sites prior to field data collection and assessing connectivity of key habitats.

No Forest `[value 0]`
All locations that do not meet the Forest criteria.

Forest `[value 1]`
Locations that meet forest criteria are considered forest where Canopy Cover is greater than10% and canopies are greater than 2m.

3.9 Biome's FAO 2020 forest extent

This product can be used for those organisations with a need to determine Wooded land component that meets the UN-FAO definition of Forest, with predominantly urban and agricultural land uses excluded. This product provides a 2020 baseline.

Ozius Biome Forest Cover - FAO product contains information on all wooded areas >5m in height, a canopy cover >10%, and a minimum patch size of 0.5ha for non-urban and non-agricultural land uses (Figure 11).

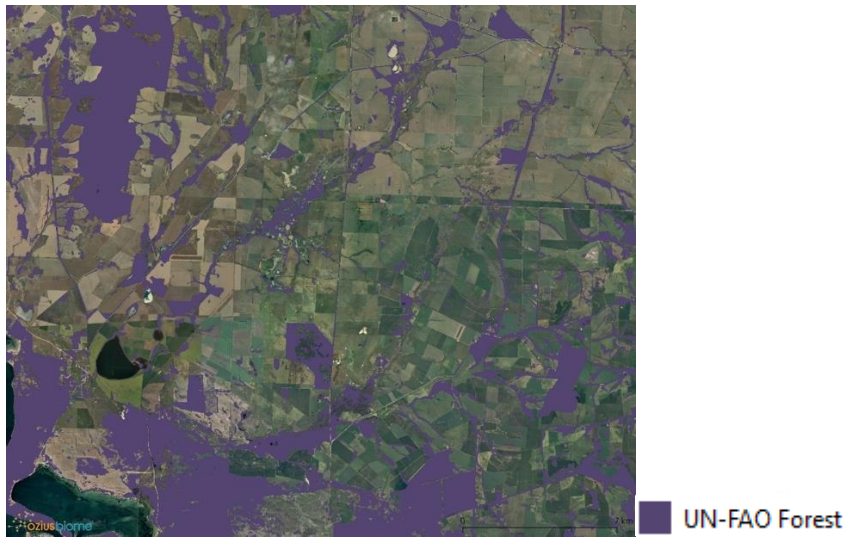

Figure 11 UN-FAO Forest 2020 Baseline(fao) sample product with a colour ramp applied.

Minimum mapping unit applied: 0.5ha
What does this mean? The smallest unit that is classed is 0.5ha in area (as per the definition). Isolated features (vegetation, water, soil) with an area smaller than 0.5ha may be grouped with other classes – either Forest or No Forest.

File name

biome_aus_20200101_forestpixel_fao_v03.tif

Classification system applied (harmonised)
Ozius Biome Forest Cover - FAO product is harmonised to align with the forest extent definitions within the broader UN-FAO Global Forest definition.

Values range

The "values" of the raster data delivered are used to represent the extent of Forest which meets the classification definition.

Excluded classes: Land use filtering has been applied to remove predominantly Urban and Agriculture land uses. Further filtering will be required if additional criterion is required.

Forest `[value 1]`
Locations that meet forest criteria are considered forest where Canopy Cover is greater than10% and canopies are greater than 5m over a 0.5ha.

No Forest `[value 0]`
All locations that do not meet the Forest criteria.

For example, an individual tree surrounded by bare ground may be classed as 'No Forest', despite a tree present – the area being too sparse to be considered Forest. Trees that exceed 10% canopy cover but are not >5m in height consistently across a 0.5ha area may not be considered structurally tall enough over a large enough area to meet the criteria of Forest. These areas may also be classed as 'No Forest' despite the presence of dense trees.

Land use
For Australia, the Catchment scale Land Use of Australia (Update December 2020) has been applied to remove predominantly Urban and Agricultural land uses as per the UN-FAO the Forest definition.

Known Issues
There are a known issues with this product that Ozius are actively working on to address. A new update will be released to account for these known issues. However, we would rather release the data at this stage, as most of the data will not change with further updates.

Known Issues	Description
Terrain 'drop outs' and Forest underestimations	Some areas of steep slopes in dense vegetation 'drop out' of the forest classification. This is due to a height estimation falling below the hard stop of 5m. Not all terrain 'drop outs' are incorrect – some are correctly not forest and are escarpments of rock – but some areas are likely missed Forest. These complex areas will be addressed in a new update during 2024.
High-biomass pasture in high-rainfall zones Forest overestimations	Some areas of high-biomass pastures produce overestimations and are classified as Forest. These are overestimations predominantly occur in the Atherton Tablelands region. These will be addressed in a new update during 2024.
Fire impacts and considerations	During the 2019/2020 Fires, some areas that would usually be considered Forest, were fire-affected. Biome estimates Forest according to the landscape conditions of 2020.

Licence Options:
For Ozius Biome's FAO 2020 Forest product, we have made this product available under Ozius's Open Data Licence.
Please ensure you have read and agree to Ozius's Open Data Licence prior to use; else Ozius's standard End User Licence Agreement will apply, along with the applicable fee.

3.10 Forest Cover product (Carbon Estimation Area classes)

Our Forest Cover – CEA Classes product is tailored to meet Carbon Market needs across Australia.

This product is ideal for locating areas suitable for Human-induced Regeneration vegetation methods for Carbon Farming Initiatives, scanning large areas for to assess for carbon investment potential, and optimising field work across large areas (in combination with base biophysical products).

Ozius Biome's Forest Cover – CEA Classes product contains information on wooded land (Forest), Carbon Estimation Areas (CEA), potential CEA and non-woody areas (Figure 12).

Carbon Estimation Areas (CEA) `[values 5-19 and 105-119]`
Where a Carbon Estimation Area class is located, the area includes information on the Canopy Cover density (between 5% and 19% canopy cover) combined with vegetation height.

Two canopy strata are represented: 2-5m and >5m.

Minimum mapping unit applied: 0.2ha
The smallest unit that is classed is 0.2ha (as per the definition). Isolated features (vegetation, water, soil) with a smaller area than 0.2ha may be grouped with other classes. For example, an individual tree surrounded by bare ground may be classed as 'No Forest', despite a tree being present.

The output attribute table is described in Table 3.

File name

Classification system applied (harmonised)
The Forest cover and Carbon Estimation Area definitions utilised in this product (Figure 12) is based on the requirements for "Human-induced regeneration of a permanent even-aged native forest" for the Clean Energy Regulator.

The "values" of the raster data delivered are used to classify the different forest types. Excluded classes: Baseline vegetation. This product does not include baseline vegetation characterisation.

No Forest `[value 0]`
Locations that do not meet any forest, CEA or Potential CEA criteria are considered not forest. This includes landscape features such as waterbodies, bare areas, grasslands, and exposed soil.

Potential CEA `[value 1]`
Potential CEA is identified at meeting the CEA density values but are a shorter canopy height (1.5m-2m). There may be trees that meet CEA criteria within this zone, but these would fall below the minimum mapping unit of consistent height across 0.2ha.

CEA `[values 5-19 and 105-119]`
Coded values to represent Carbon estimation opportunities with Canopy Covers between 5%-19% between two strata: >2m and <5m (values 5-19) and >5m (values 105-119).

Forest `[values 2, 200]`
Forest is characterised by two different classes within values 2 and 200.

Value 2 are areas of Low Forest. These areas meet the canopy cover requirement for Forest but have very low canopies of 1.5-2m. Some areas of spinifex may enter this class.

Value 200 are areas of Forest as per the Clean Energy Regulator approved description: Canopy Cover >20% and vegetation height >2m.

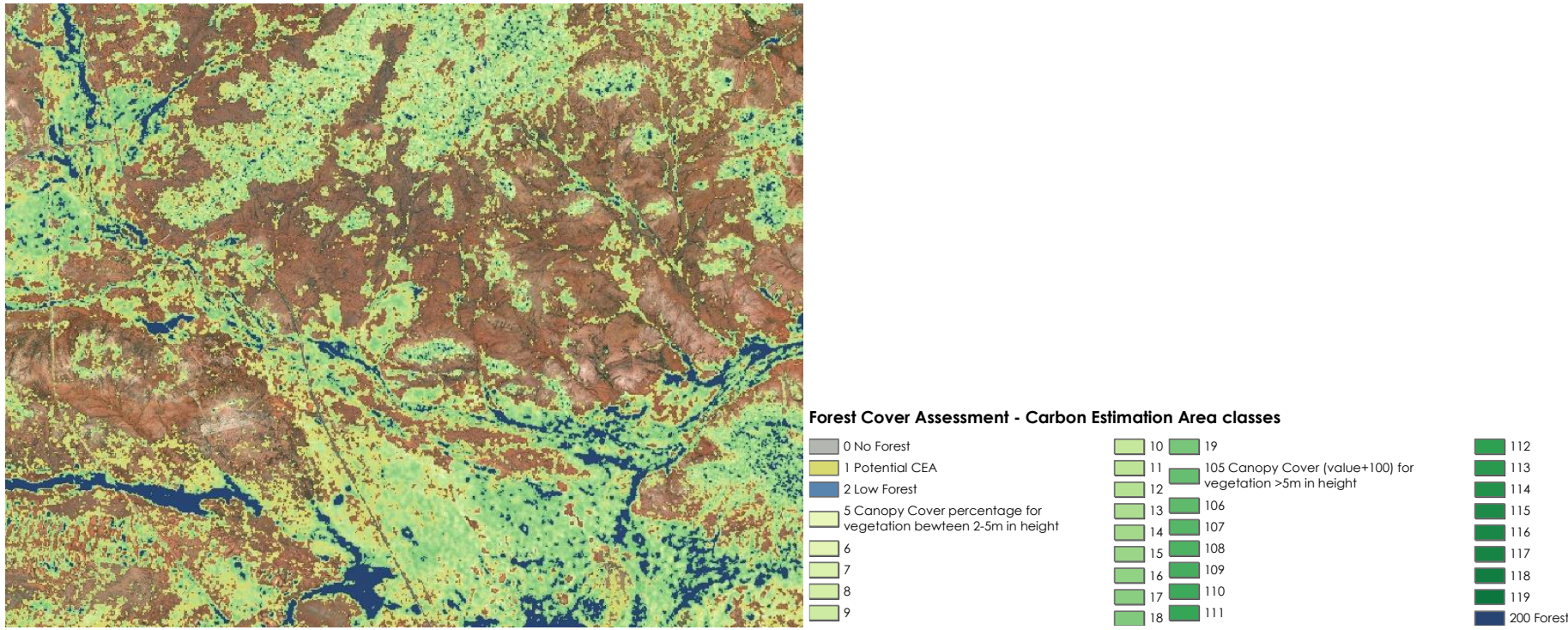

Figure 12 Example map of Forest cover assessment (CEA) product (cea_classes).

Table 3 Ozius Biome's Forest Cover Assessment product (Carbon Estimation Area).

Values (cea_classes)	Definition	Class name	Class Description
0	Canopy Cover <5%	**No Forest**	Bare soil, water, vegetation that does not meet the above criteria.
1	Canopy Cover >=5% and <20%; Height 1.5-2m.	**Potential CEA**	>=5% Canopy Cover; Vegetation where canopy heights are between 1.5-2m
2	Low Forest: Height 1.5-2m and Canopy Cover > 20%	**Forest**	2020 Forest (>=20% Canopy Cover and >=2m) or or low forest (>=20% Canopy Cover and >1.5m-<2m)
200	Canopy Cover >=20% and height >2m		
5 – 19	Canopy Cover value and Height 2m to 5m.	**Carbon Estimation Area (CEA)**	>=5% Canopy Cover and <20% Canopy Cover with density and heights 2m-4m.
105 –119	Canopy Cover value + 100 and Height >5m		>=5% Canopy Cover and <20% Canopy Cover with density and heights greater than 5m.

4 Projections, validation and limitations (for all products)

4.1 Projection

All datasets are delivered in Australian Albers (EPSG:3577) projection on Datum GDA94.

4.2 File delivery and naming convention

Ozius Biome products are interoperable with both QGIS and ESRI platforms (among other GIS that can read GeoTIFF format).

The colour tables have been applied to Ozius Biome's standard symbology for each product.

You can also select 'unique values' to visualise the values, to add your own labelling or edit the symbology to your meet your organisation's visualisation needs.

File name convention for Ozius Biome vegetation products:

`biome_sitename_startdate_parameter_metric_version.tif`

`eg biome_aoi1_20200101_fpcpixel_total_v03.tif`

File name convention for Ozius Biome height Products:

`eg biome_aoi1_20200101_rhpixel_[90pc]_v03.tif`

File name convention for Ozius Biome Forest Cover Products:

`Biome_sitename_startdate_forestpixel_framework_v03.tif`

`Eg: biome_aoi1_20200101_forestpixel_[cea_classes, fao, kyo]_v03.tif`

4.3 Accuracy

Ozius Biome brings together dynamic data and advanced AI-enabled technology to analyse the environment with a high degree of precision.

Our products have been validated against SLATS star transect sites using 10-fold cross-validation for each biophysical product (FPC, CC, PPC). The Vegetation Height product has been validated against limited samples of airborne lidar, with further validation being undertaken across Australia. The results are outlined in Table 4.

Table 4 Accuracy assessment results

Biophysical parameter	Root mean square error (RMSE)	Median Absolute Error (MAE)
Foliage Projective Cover (FPC)	7.3%	1.98%
Canopy Cover (CC)	9.0%	2.05%
Plant Projective Cover (PPC)	8.4%	2.74%
Vegetation height (90th percentile)	2.4m	1.7m

4.4 Capabilities and Limitations

For all Ozius Biome products the following capabilities and limitations apply:

Spatial

The datasets are nominally based on 20m pixels, to incorporate the best optical, radar and lidar data together.

Features smaller than the minimum mapping unit may not be detected as individual features.

Temporal

Ozius Biome currently contains a snapshot of information aligned to represent the landscape of 2020. An area affected by fire may not be measured at its 'maximum' canopy cover (or other biophysical parameters). This applies for Forest products too, where fires may affect canopies and the value 'Forest' may not be assigned to a fire-affected area. The data from Ozius Biome is 'true' to its biophysical state for the landscape of 2020, and this needs to be considered in the context of project use cases and applications.

Masking

Ozius Biome products are free from cloud and cloud-shadow.

Ozius has applied water masks and have clipped the datasets to the boundary of Australia.

Multi-modal-footprints

We have applied advanced approaches to bring together information about the landscape from >=10m optical sensors, >=20m SAR sensors and a 25m full waveform space-based lidar sensor. This is called 'multi-modal data fusion'. For small (<0.16ha) or unique features, we recommend higher-resolution optical, SAR and/or lidar (or a combination) and the use of our hyperlocal services to apply Biome to localised datasets.

Ozius is happy to discuss any or all limitations and work with you to identify options to ensure a fit-for-purpose solution is identified to meet your organisations' needs.

Hyper-local services

Please get in touch with Ozius directly at info@ozius.com.au to discuss options for providing similar products at higher-resolutions and/or at more frequent time steps with increased detail and specificity.

5 Acknowledgements

We acknowledge that Ozius Biome has leveraged modified data products from the following amazing agencies and programs:

NASA – GEDI Program (https://gedi.umd.edu/mission/mission-overview/

ESA – Copernicus Sentinel Program (https://www.esa.int/Applications/Observing_the_Earth/Copernicus/The_Sentinel_missions) (Sentinel-1 and Sentinel-2).

Australia's Terrestrial Ecosystem Research Network (TERN) field data https://www.tern.org.au/tern-observatory/tern-ecosystem-surveillance/ which is co-invested by the following state governments: Queensland, New South Wales, Western Australia, South Australia.

Specht, R.L. (1970) Vegetation. Pages 44–67 in Leeper, G.W. (ed.), "*Australian Environment*", 4th edn. Melbourne University Press, Melbourne.