



LONG-TERM AVERAGE FOREST PRODUCTIVITY INDEX

Version 2.0 (FPI_{avg} 2019)

Custodian

Department of Industry, Science, Energy and Resources

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Abstract

The Full Carbon Accounting Model (FullCAM) was developed to estimate greenhouse gas emissions and removals from the land sector, for inclusion in Australia's annual national greenhouse gas inventory. FullCAM predicts total biomass for any given stand of woody vegetation using:

- Site productivity potential
- Long-term average indices of climatic conditions, that influence the rate at which the stand grows towards maximum biomass
- Tree yield formula which provides estimates of the growth increments, and
- Allocation of biomass to roots.

The Forest Productivity Index (FPI) represents the sum of key site factors (soil type, fertility and climate) driving stand growth, regardless of the type of planting or its age. FPI is calculated using monthly rainfall, minimum and maximum air temperature, solar radiation, frost days and vapour pressure deficit, along with a soil fertility rating and leaf area index. It is produced as monthly and annual data and the long-term average (FPI_{avg} 2019) is calculated using yearly average data from 1970 to 2017.

An FPI/FPI_{avg} fraction is applied within the Tree Yield Formula (TYF) to calculate annual growth increment. The growth increment goes up or down depending on whether the FPI / FPI_{avg} > 1.0 or <1.0, respectively.

The long-term average FPI dataset (FPI_{avg} 2019) is intended for use in the FullCAM Public Release 2019. The Department does not guarantee its use outside of FullCAM Public Release 2019. Users must take full responsibility in interpreting results obtained from the use of this dataset, and must exercise appropriate precaution before making any decisions.

Defined region

Australia excluding external territories

Maintenance and update frequency

As required

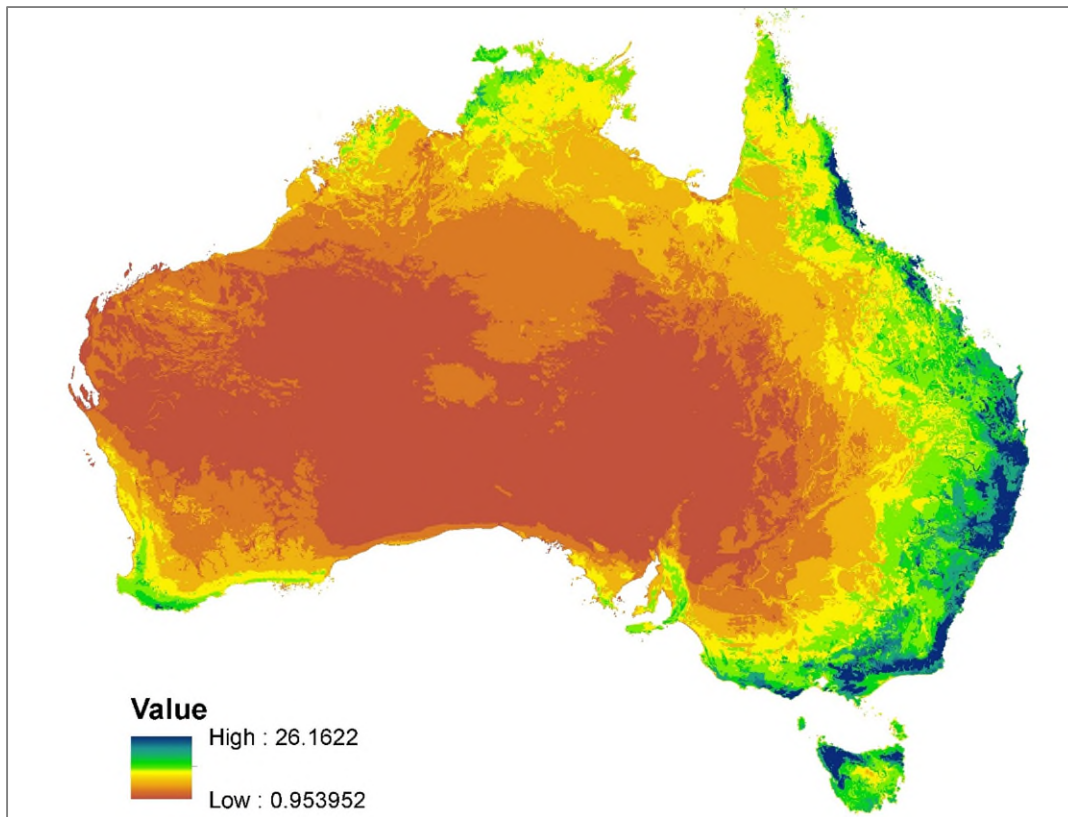


Figure 1: Long-term average Forest Productivity Index (FPI_{avg} 2019) data

Conditions of use

This data is licensed under a Creative Commons Attribution Share Alike 4.0 International Licence (CC BY-SA 4.0).

It is designed to provide a nationally consistent long-term average Forest Productivity Index for use in the FullCAM Public Release 2019. The Department does not guarantee its use outside of FullCAM Public Release 2019. Users should always consider the appropriateness of the data before using for other purposes.

Lineage

FPI is produced as a series of monthly grids, from which the annual average is calculated. FPI_{avg} 2019 is the long-term average, and was calculated from the annual averages for the period 1970-2017. Detailed technical descriptions and methodology for generating FPI datasets can be found in the National Carbon Accounting System Technical Report number 23 (Kesteven *et. al.* 2004) and Hutchinson & Xu (2019).

The weather station data and the Normalised Difference Vegetation Index (NDVI) data used for calculating monthly FPI datasets have been sourced from the Bureau of Meteorology. Bureau data has been interpolated to generate gridded climate surfaces using ANUSPLIN software developed by the ANU Fenner School (Hutchinson, *et. al.* 2009; Hutchinson and Xu, 2013).

The entire climate time series data from 1970 to 2017, used in the FullCAM Public Release 2019, have been reprocessed using the latest ANUSPLIN software version 4.6. This has resulted in significant improvements in the outputs with reduced interpolation errors.

As part of this update, ANU Fenner School has revised the FPI algorithm using the latest NDVI data, the improved climate data time series and new data from the Soil and Landscape Grid of Australia, recently published by CSIRO. The revised FPI calculation also corrected an error identified in the older production code.

FPI_{avg} 2019 is the updated version of FPI_{avg} 2016.

References

Hutchinson, M.F., Mckenney, D.W., Lawrence, K., Pedlar, J., Hopkinson, R., Milewska, E. & Papadopol, P. (2009) Development and testing of Canada-wide interpolated spatial models of daily minimum/maximum temperature and precipitation for 1961-2003. *Journal of Applied Meteorology and Climatology* 48: 725–741.

Hutchinson, M.F. & Xu, T. (2013) ANUSPLIN Version 4.4 User Guide. Fenner School of Environment and Society, Australian National University.

Hutchinson, M.F. & Xu, T. (2019) Provision of spatially distributed climate and forest productivity data for the National Inventory System – 2018. Unpublished report. Fenner School of Environment and Society, Australian National University.

Jones, D.A., Wang, W. & Fawcett, R. (2009) High-quality spatial climate data-sets for Australia. *Australian Meteorological and Oceanographic Journal* 58: 233-248.

Kesteven, J.L., Landsberg, J. & URS Australia (2004) Developing a National Forest Productivity Model. *National Carbon Accounting System Technical Report No. 23*, Australian Greenhouse Office, Canberra, Australia.

Cell size

0.01 decimal degrees (1km)

Coordinate system

Geographic; Datum: GDA 1994

Positional accuracy

Positional accuracy has not been assessed. However, FPI data ingested into FullCAM has been aligned with FullCAM data layers using a snap raster approach.

Dataset units

Relative index

Attribute completeness

Mainland Australia and most nearby islands

Data format and delivery

Geotiff

Dataset citation

Department of Industry, Science, Energy and Resources (2019). Long-term average Forest Productivity Index (FPI_{avg} 2019) Version 2.0. Commonwealth of Australia, Canberra.

Data custodian

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