



Forest Productivity Index

Version 1.0 (2024 Release)

Custodian

Department of Climate Change, Energy, the Environment and Water

Publication Date

September 2024

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 National Greenhouse Gas Accounts](#) produced annually. Forest Productivity Index (FPI) data is used within FullCAM during the modelling process, to incorporate the impact of climate variability on yields of woody biomass.

Knowledge of the spatial and temporal patterns of forest growth is fundamental to estimating the carbon stocks (and biomass) of mature forests and rates of carbon accumulation in any forest regrowth.

The FPI estimates forest growth using a simplified version of the 3-PG (Physiological Principles Predicting Growth) growth model, as described in Australian Greenhouse Office Technical Report No.23 (Kesteven et al. 2004). The growth model is based on the relationship between the amount of photosynthetically active radiation absorbed by plant canopies (APAR) and various productivity modifiers that affect plant growth.

To create the FPI a wide variety of inputs are used including various soil and climate inputs as well as a normalised difference vegetation index (NDVI). The NDVI provides an estimate of vegetation health and a means of monitoring changes in vegetation over time and is one of the most common vegetation indices derived from remotely sensed data.

Defined region

Australia excluding external territories.

Maintenance and update frequency

It is currently expected that the release of the FPI datasets will be aligned to both new [FullCAM](#) public release versions or any associated updates of FPI datasets to existing public release versions of [FullCAM](#) accessed. This supply relates to the dataset used in the National Inventory Report 2022 (published in 2024) and FullCAM public release 2024.

Date Range

1 January 1970 – 31 December 2022

Conditions of use

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

The data are designed for the purpose of providing a nationally consistent FPI product. Users should always consider the appropriateness of the data before using for other purposes.

Lineage

The Department of Climate Change, Energy, the Environment and Water (and its predecessors) has commissioned the Australian National University (ANU) to generate the FPI for its use in FullCAM and other activities related to [Australia's National Greenhouse Accounts](#). Updates to the source data for FPI has occurred since documented in the "Developing a National Forest Productivity Model. National Carbon Accounting System Technical Report No. 23" (see references) these are detailed below.

The soil input components are derived from the "Soil and Landscape Grid of Australia" see <https://www.csiro.au/en/research/natural-environment/land/soil-and-landscape-grid-of-australia> for further information.

The climate data is sourced from the Bureau of Meteorology (BoM) weather stations and then ANU Fenner School has interpolated climate surfaces consistent with the input requirements used in the Australia's National Inventory Reporting. These climate surfaces have been produced by applying the [ANUSPLIN](#) surface interpolation software as developed and implemented at the ANU Fenner School (Hutchinson and Xu 2013). The climate data was resampled to 0.01 decimal degrees where required, and expanded across inland lakes, 2km beyond the Australian coastline and to small offshore islands. These values were filled by extending the data from neighbouring pixels.

The NDVI is derived from a combination of AVHRR (1970-2000) and MODIS (2001-2022) satellite Imagery.

All data undergoes a rigorous quality assurance process before inclusion into [Australia's National Greenhouse Accounts](#).

Please note: that the formula for the LAI (Leaf Area Index) in the "Developing a National Forest Productivity Model. National Carbon Accounting System Technical Report No. 23" (see references) is incorrect and should be as follows:

$$LAI = \ln(1 - (NDVI * 1.0611 + 0.3431)) / (-0.5)$$

References

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

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

Cell Size

0.01000 degrees (~1 km)

Coordinate System

Geographic; Datum: GDA 1994

Dataset units

unitless Index

Attribute Completeness

Full Continental Coverage.

Positional Accuracy

Aligns to the underlying National Inventory Grid.

Geographic Completeness

Mainland Australia and most nearby islands.

Data format and delivery

Tiff files delivered on a per-tile basis (see figure 2)

Dataset citation

Department of Climate Change, Energy, the Environment and Water (2024). Forest Productivity Index v1.0. Commonwealth of Australia, Canberra.

Data Custodian

Modelling and Geospatial Team
National Inventory Systems & International Reporting Branch
Department of Climate Change, Energy, the Environment and Water

GPO Box 3090
CANBERRA ACT 2601
Phone: (02) 6213 6000
ncas-gis-rsmog@dcceew.gov.au

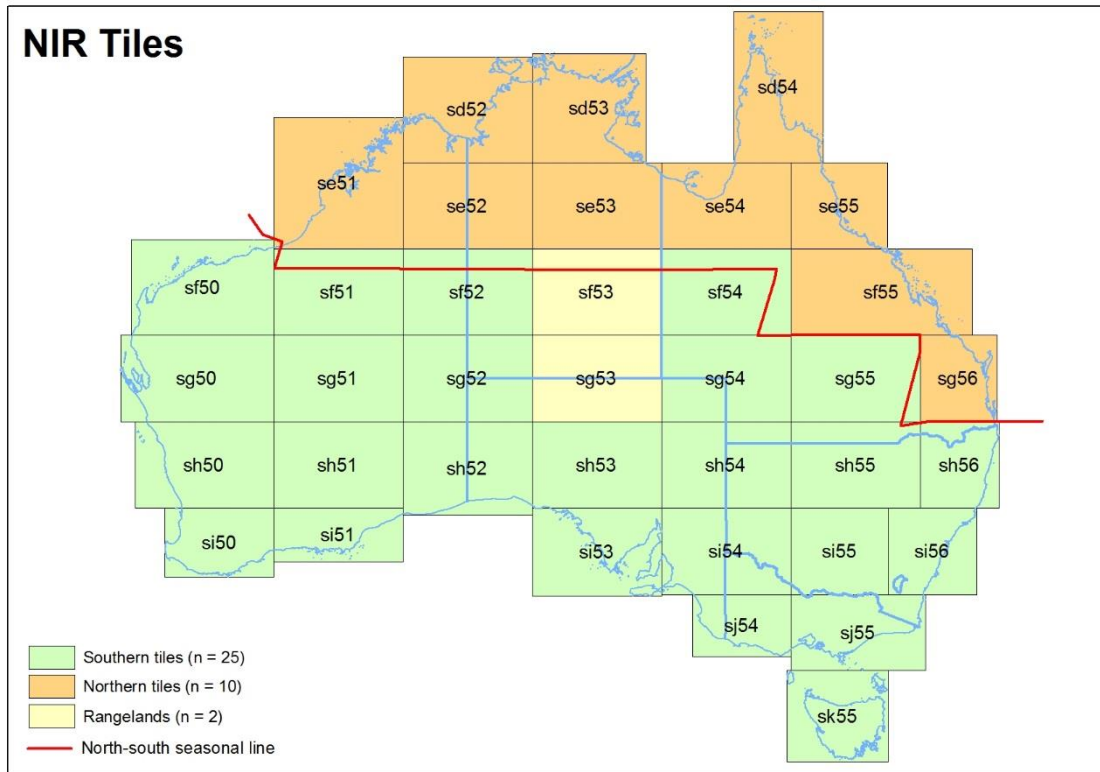


Figure 2: The Forest Productivity Index is broken down into 37 tile regions across Australian .