FLINTpro

Assessment of the carbon balance of NSW forests

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Project Team

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Project Scope

1. Quantify the trend in carbon stock, carbon stock change and net greenhouse gas emissions of NSW forests for the period 1990 to 2019

2. Quantify the trend in carbon stock, carbon stock change and net greenhouse gas emissions of NSW forests for a range of future policy, management and climate scenarios to be agreed between the Service Provider and the Commission

3. Identify and prioritise research needed to improve predictions of the impact of policy, forest management and climate change on the carbon balance of NSW forests, including opportunities to enhance the storage of carbon in NSW forests

Why?

- The NSW emissions reporting relies on the State and Territory Greenhouse Gas Inventory (STGGI)
- Methods are robust, but the scale is not appropriate for deeper insights into the variation in forest carbon stock
- This project aimed to provide insights into the temporal and spatial variation in forest carbon stock as well as emissions
- Allow detailed breakdown by:
  - Ecological regions
  - All tenures

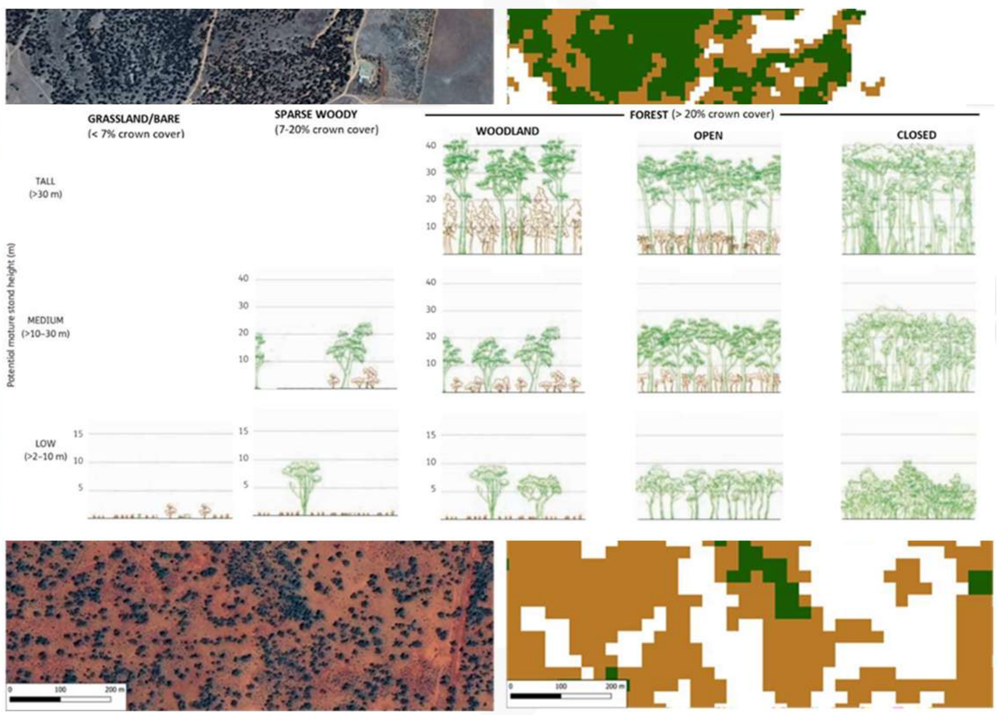
What is a forest

The Theory

An area that is dominated by trees with a mature stand height that is more than 2 metres and crown cover equal to or greater than 20 per cent.

In Practice

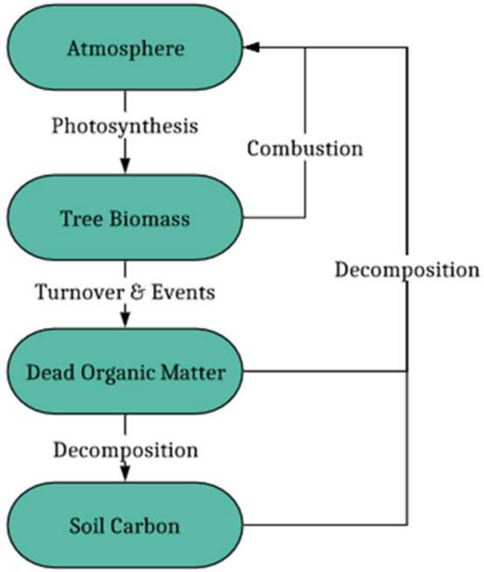
An area of land that is mapped as ‘forest’ by the National Forest and Sparse Woody Vegetation Data



(Adapted from Australian Land Information Group and JA Carnahan (1990))

What do we care about?

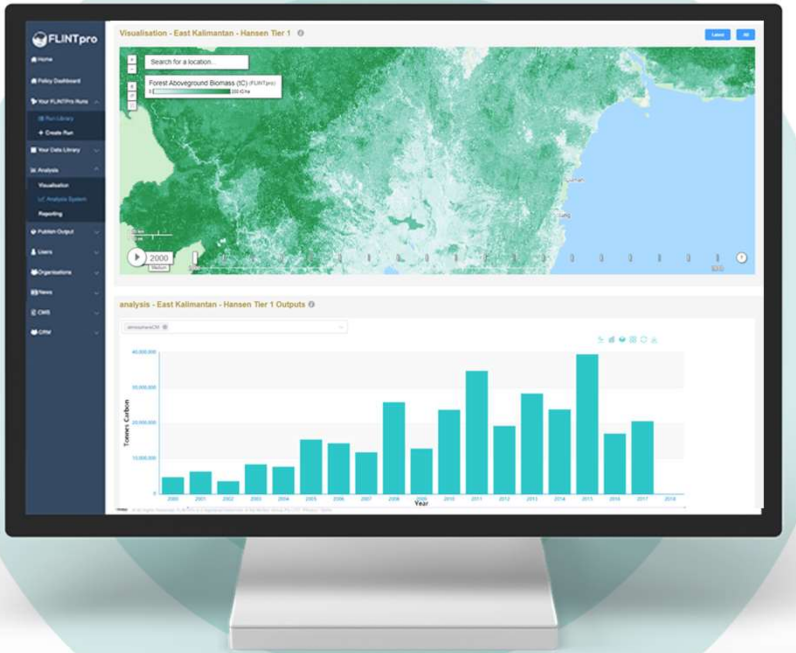
- Forest carbon is stored in 'Pools', and moves between 'pools' as 'fluxes'
- Forest Carbon Stock is important information, but Stock Change is generally more so.
- Changes in forest carbon is driven by:
  - Processes
  - Events
- This means tracking processes and events for every forest in NSW
  - Forest Growth
  - Decomposition
  - Land clearing
  - Reforestation
  - Fire
  - Timber harvest



The Solution

A system for monitoring forest carbon

- If you do something once - brute force is okay
- If you need to do it multiple times, you need a system
- Improved datasets:
  - NSW fire severity data
  - NSW forest cover data
  - NSW based soil data
  - NSW silvicultural data
- While only one report was produced, over dozens of state wide simulations were completed




Configuration for the NSW Forest System
FLINTpro
Data Sets
NRC
Admin Boundaries
NCAS
Forest Cover Product
NVIS
Natural Forest Type Data
ABARES
Plantation Extent
NCAS
Forest Biomass Parameters
Forest Corp
Harvest History
Forest Corp
DB of Harvest Data
Forest Corp/RFS
Fire History
ANU
Climate Data
Harvested Wood Products Module
CO2
FLINTPRO
Tier 3 Forest Module (CAMFor)
Tier 3 Soil Module (RothC)
Spatial Time-Series Outputs
Complete Output Database
General and Customised Reporting
Built-in Visualisation and Analysis
Projections

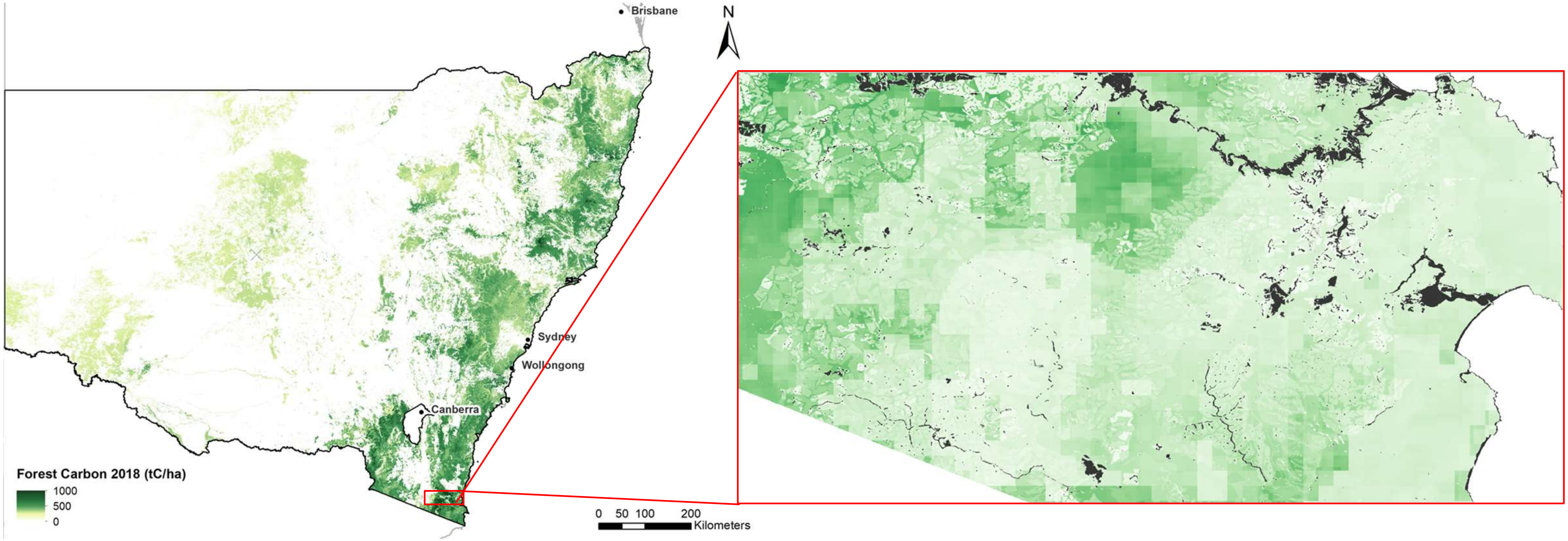
Key Assumptions

- Model Started in 1935 to allow a ‘spin up’
- Remote sensing used to identify forest cover loss and gain events
    - If a pixel was forest in 1988 (when forest cover data starts) an initial age of 15 was applied
    - Forests Modelled using the same growth curves as used in Australia’s National GHG Inventory FullCAM
- Natural Forests were harvested according to spatial harvest data, or burned according to spatial fire data
- Plantations were managed on a standard management regime by species.

Outputs

Spatial Outputs - Forest Carbon Stock

Quantifying the trend in carbon stock, carbon stock change and net greenhouse gas emissions of NSW forests for the period 1990 to 2019



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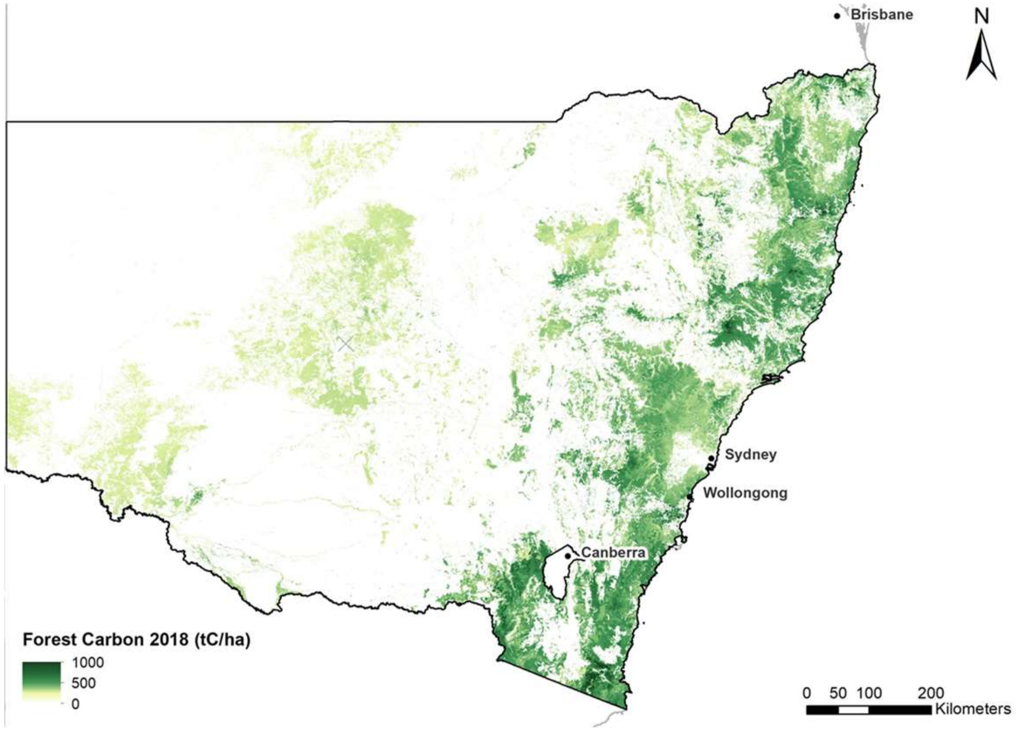
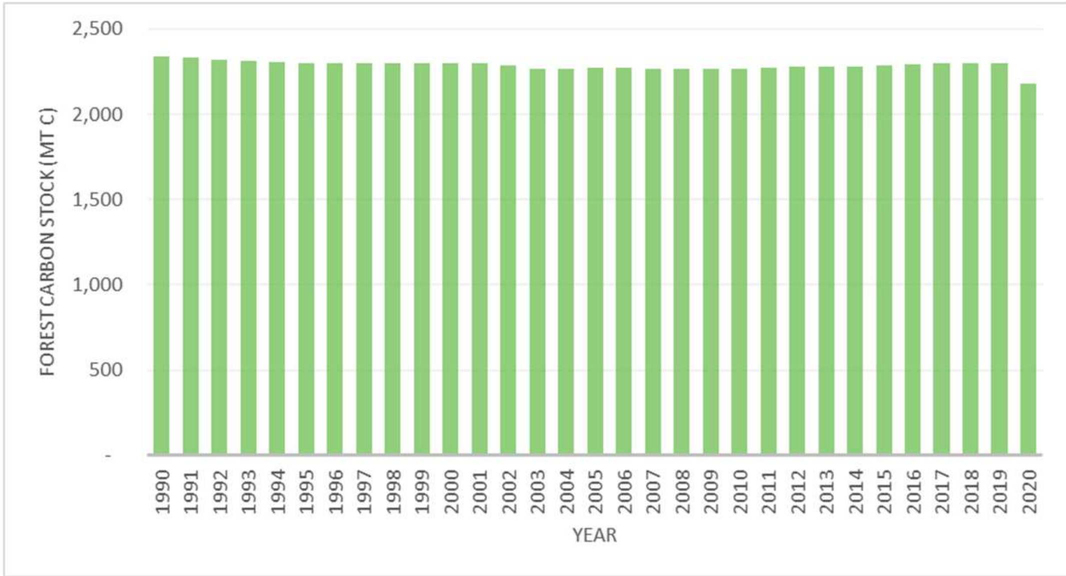
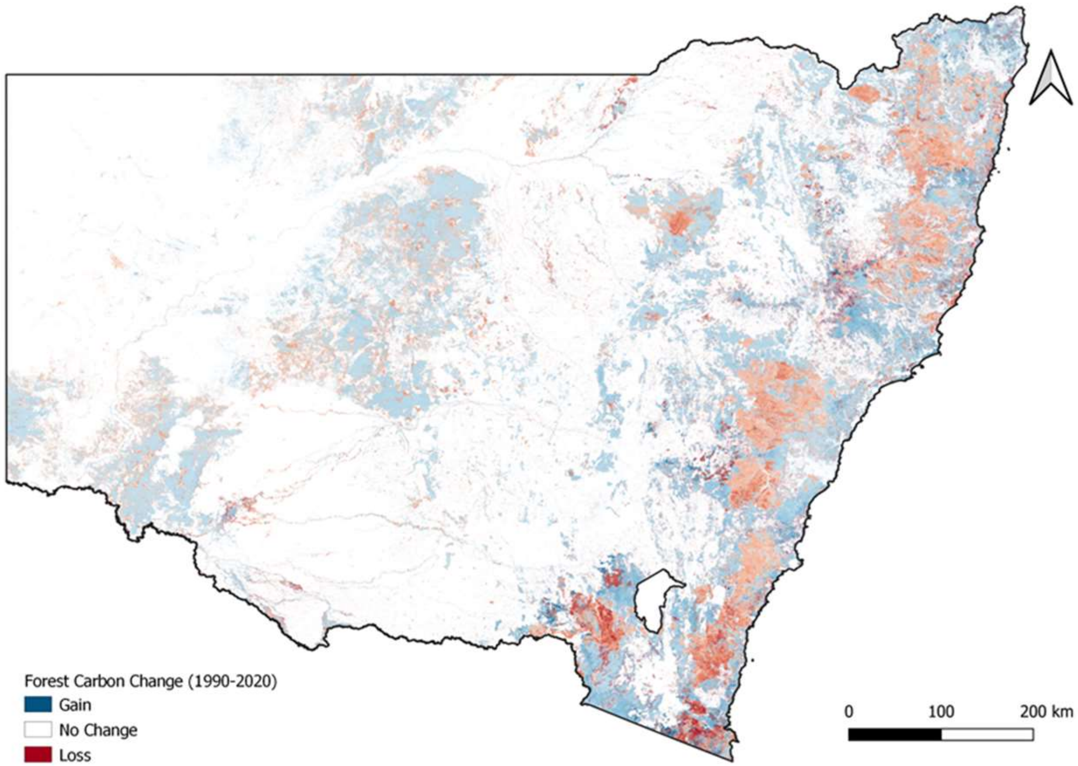




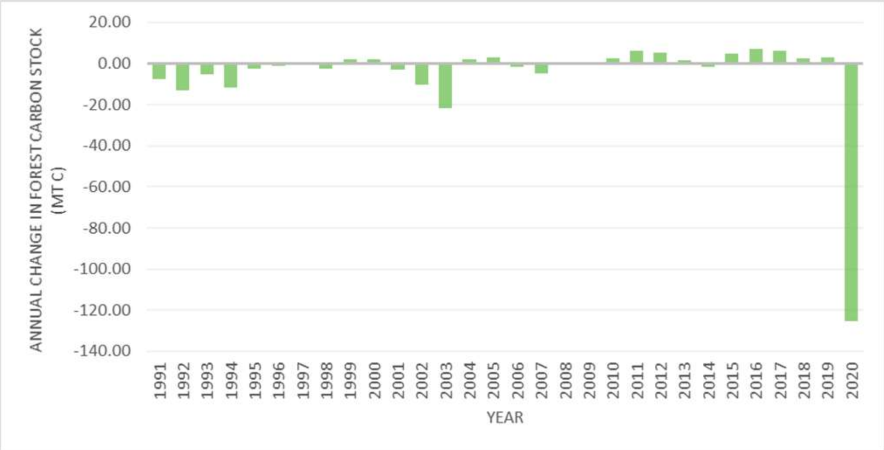
Spatial Outputs - Change in Forest Carbon Stock

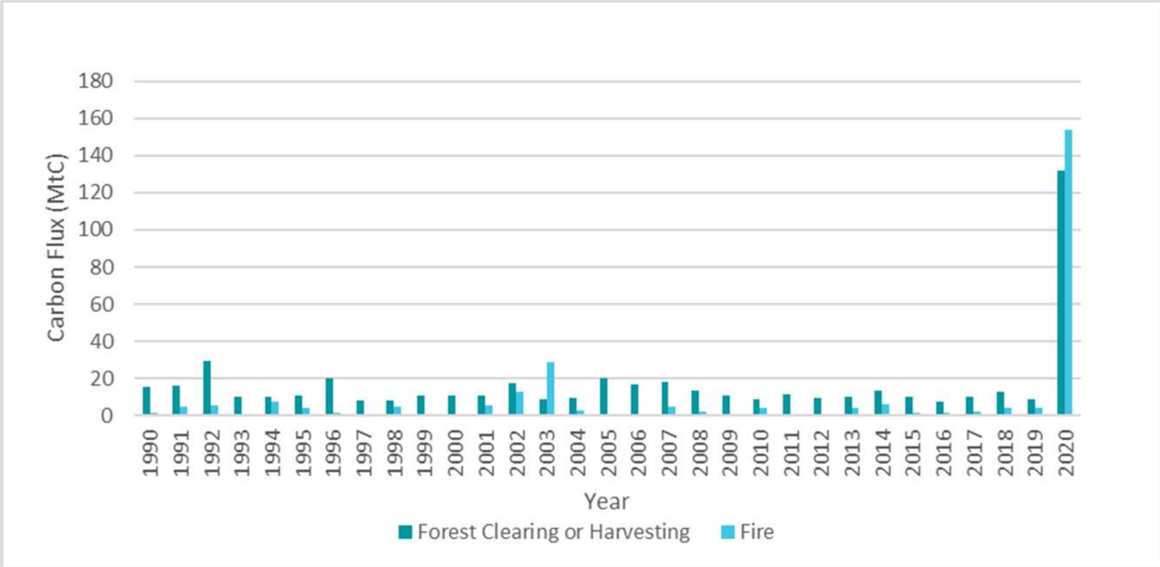
Change was not consistent across the state



Change in Forest Carbon Stock

There are multiple drivers of change





Carbon Stock Reports

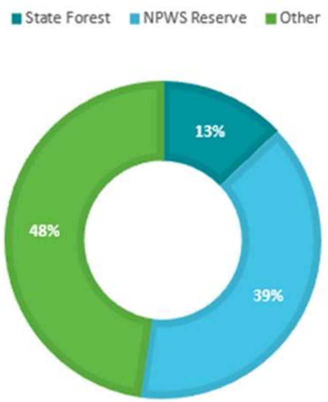
Forest Carbon Stock by tenure - State Forest, National Park, and Other land (other Crown land and Private)

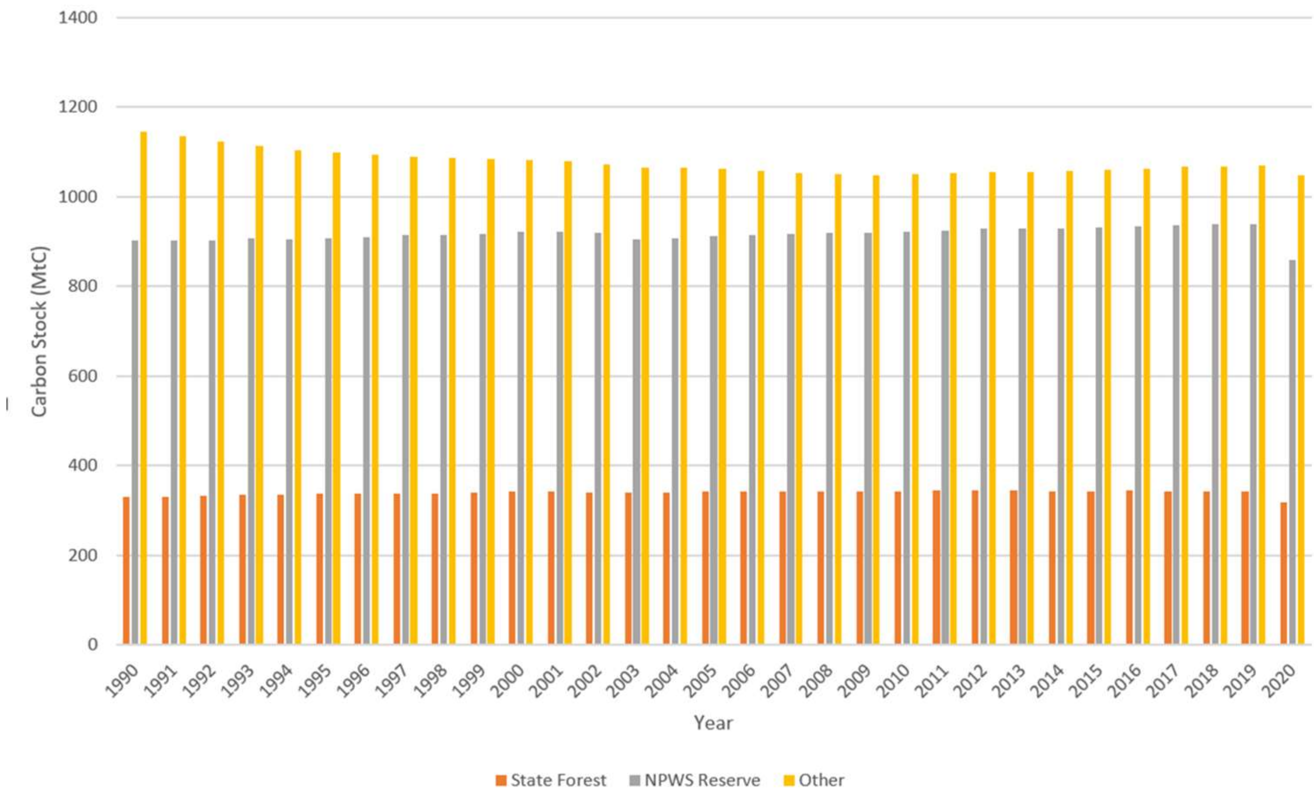
Pre 2020 Fire Carbon Stock

State Forests

National Parks

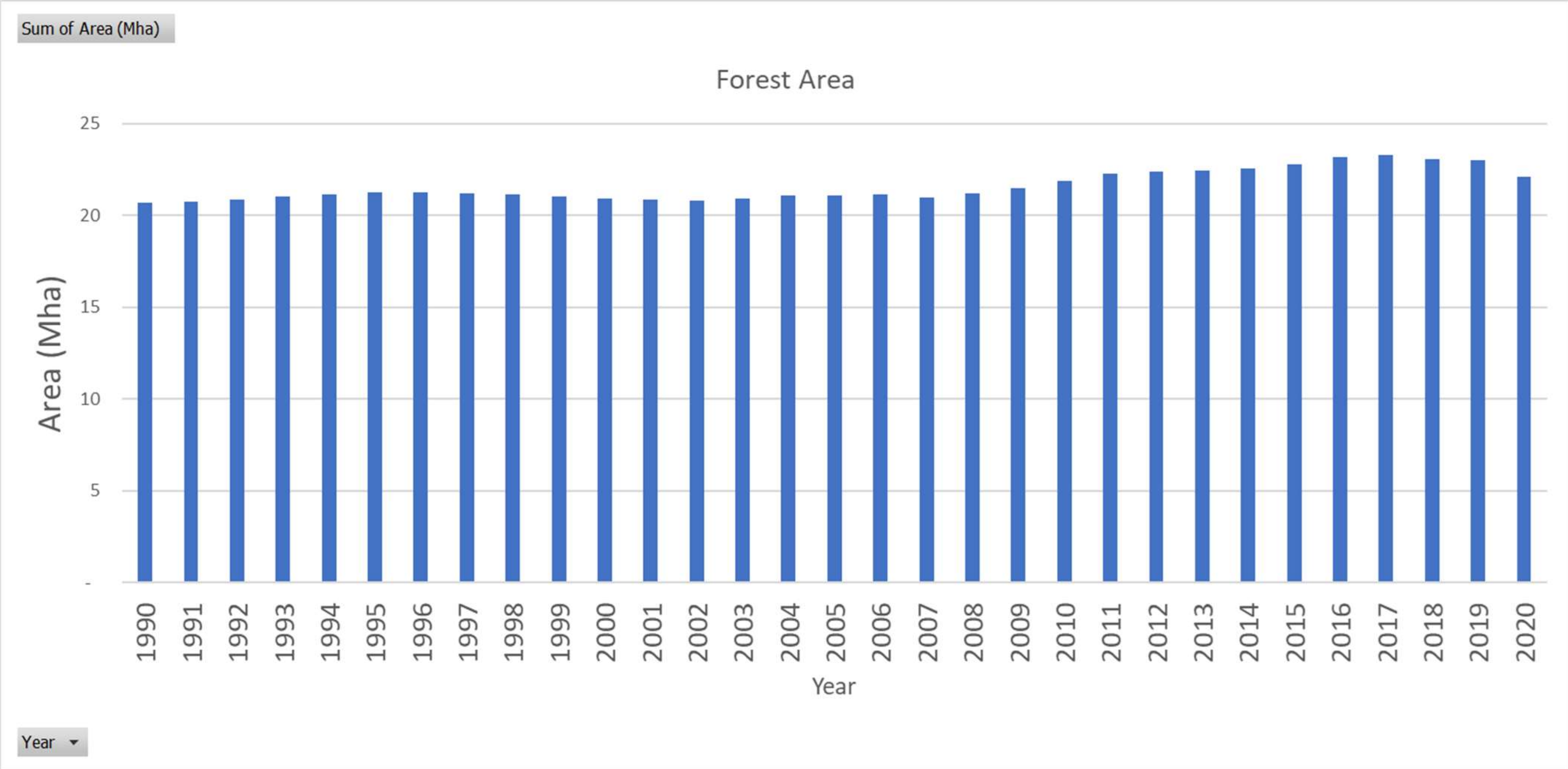
Other





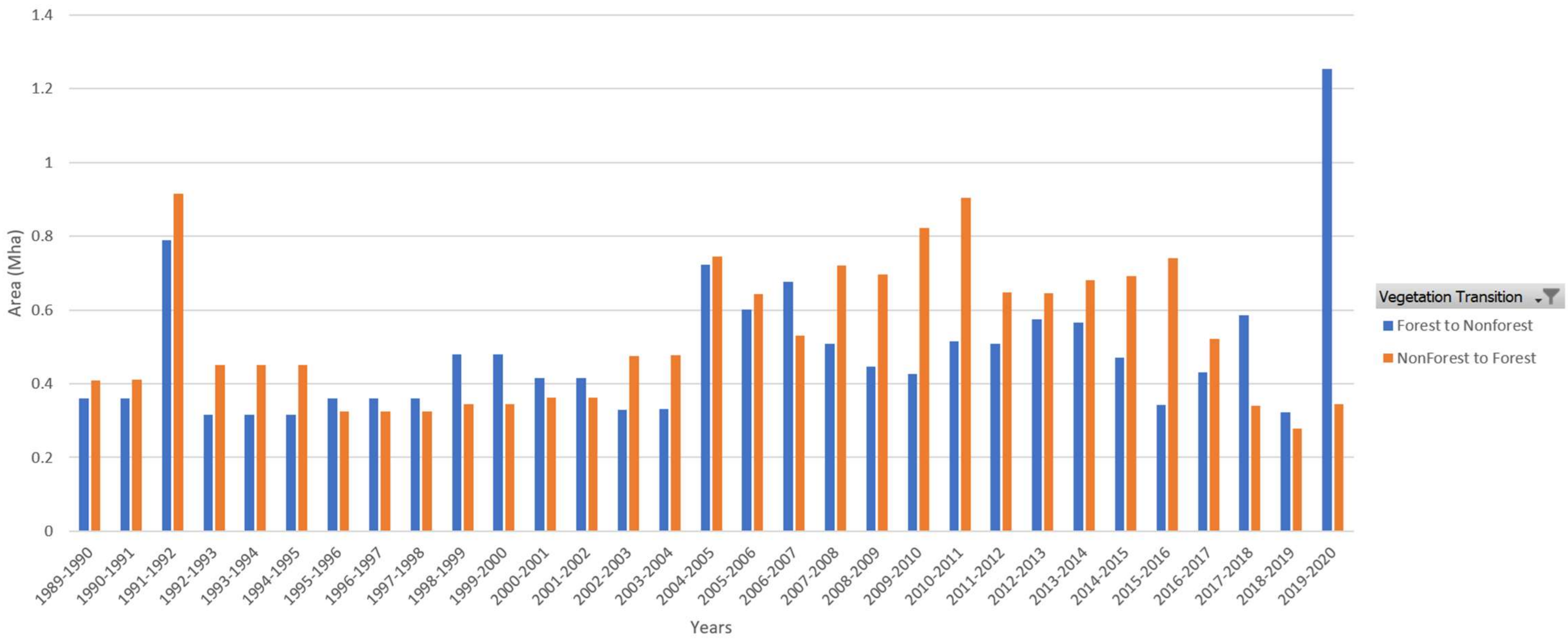
Drivers of change

There was a net increase in forest area across NSW between 1990 and 2019.



Drivers of change - (Forest Cover loss is not always Deforestation)

Each year there are substantial changes in forest area - gains and losses.



What did we find?

- Forests are dynamic, regardless of tenure
- Time and space all matter!
  - Forests outside of the National Parks and State Forests changed more than those within them
  - There needs to be a large amount of new forest to offset an old forest that is lost
- The 10 years before the 2020 fires were positive in terms of forest area and forest carbon stock.
- The 2020 fires were the biggest event to impact NSW forests in the past 30 years

Recommendations

- Integrate more data!
    - More data is becoming available, it should be used.
    - Attribution of change would be beneficial
- Continue to monitor forest carbon stock annually
- Improve the underpinning models to support modelling of future climate scenarios
- Continue investment in systems, not reports, to yield better long term outcomes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Natural Capital Solutions for Climate Action