



Program update

NSW FOREST MONITORING AND
IMPROVEMENT PROGRAM

Coastal IFOA monitoring program



The monitoring program

The Commission is independently overseeing a monitoring program with the NSW Forest Steering Committee to ensure the ongoing effectiveness of the Coastal Integrated Forestry Operations Approval (Coastal IFOA) in achieving its objectives and outcomes.

The Environment Protection Authority and the Department of Primary Industries jointly approved the Coastal IFOA Monitoring Program in March 2020.

 Coastal IFOA - Approved Monitoring Program 2019-2024 (March 2020)

» How was the program developed?

Coastal IFOA monitoring program

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NOW AVAILABLE AT
[HTTPS://WWW.NRC.NSW.GOV.AU/IFOA-MER](https://www.nrc.nsw.gov.au/ifoam-mer)

Draft NSW Regional Forest Agreements MER Plan

DO NOT DISTRIBUTE - This is a DRAFT plan being developed by a cross-agency Technical Working Group.

The NSW Government has committed to ecologically sustainable forest management under the NSW Forest Management Framework and Regional Forest Agreements (RFAs). The Framework and RFAs commit NSW to ongoing improvement of reporting and management through monitoring and research.

The NSW Regional Forest Agreements Monitoring, Evaluation and Reporting Plan (the RFA MER Plan) sets out actions, roles and responsibilities for monitoring, evaluating and reporting on the ecological, social, cultural and economic outcomes promised in the three NSW RFAs. This covers outcomes for all forests on all tenures within the three NSW RFA regions.

Themes

The RFA MER Plan is structured around five ecological, social, cultural and economic themes that address the revised NSW Ecologically Sustainable Forest Management Criteria and Indicators – referred to as the Sustainability Indicators in the NSW RFAs. Each theme is divided into focus areas for monitoring, evaluation and reporting on the outcomes of the NSW Regional Forest Agreements. A sixth theme sets out the governance and reporting roles and responsibilities to implement the MER Plan.



Conservation Values



Ecosystem Health



People and Forests



Products and Services



Climate Change



Performance and Reporting

• MER Plan development

• NSW RFA regions

• RFA Clause lookup

• RFA research priorities

• Sustainability indicators

Working draft RFA MER Plan

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AVAILABLE IN IN EARLY 2021

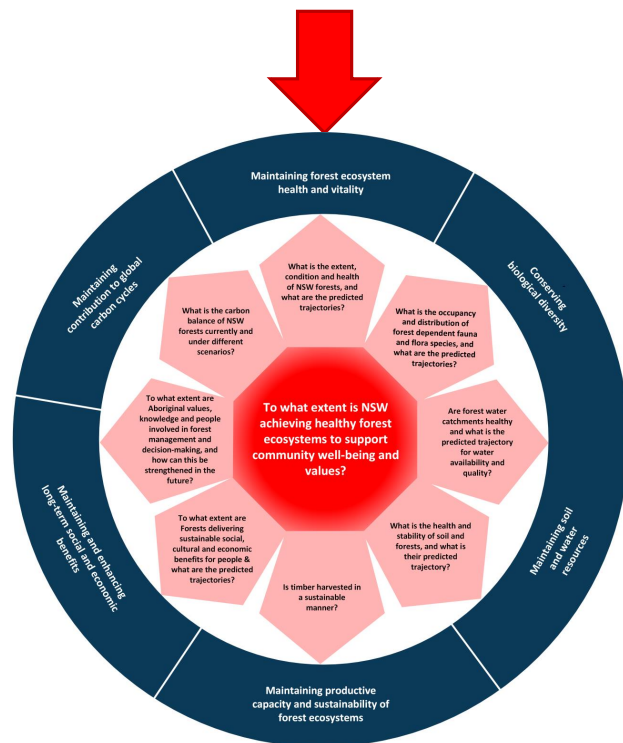


Program MER & outcomes framework

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Forest extent, condition and health



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PRIMARY INDUSTRIES
Forest Science



Spatial Vision



RMIT
UNIVERSITY

What are we aiming to achieve?

- Determine metrics for indicators of forest extent, condition and health values
- Develop conceptual framework to identify indicator metrics
- Establish baselines for the indicators of forest extent, condition and health
- Determine trends in the indicators of forest extent, condition and health

Where are we up to?

- Developed method to determine trends in forest extent using existing data
- Produced interim outputs for forest extent involving:
 - Baseline and reference years
 - Breakdown by tenure, IRBA and forest types
- Proposed a methodology for discussion with EES on habitat connectivity/fragmentation

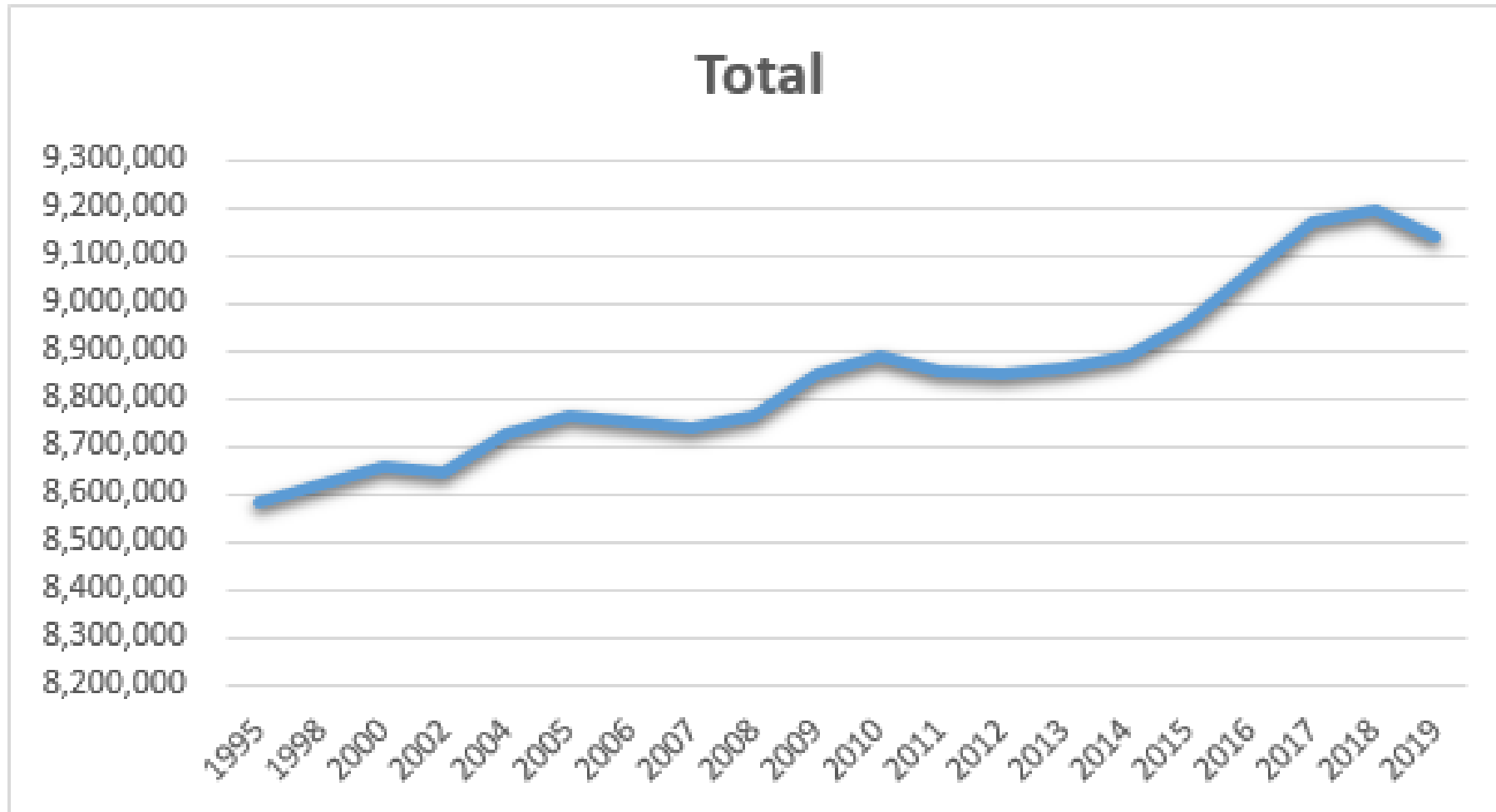
Key challenges to date

- Understanding the processes behind each existing extent product (NGGI National Grids, SLATS, State of the Forest) that are available for use.
- Understanding the role of key disturbances, such as drought and fire, in the landscape, particularly in forested areas with no obvious disturbance.
- Ensuring we can understand and explain the relationship (or alignment) of tabular results for forest extent presented in various reports.
- There appears to be little or no reliable information on forest structure. Especially at the landscape scale.

Emerging insights and opportunities

- Overall, forest extent, by projected foliage cover, has increased
- The millennial drought had a significant impact on the cover and health of NSW's forests. In particular in vegetation types that do not cope or recover well under moisture stress
- Opportunities lie in linking this current work on baselines and trends to current programs such as SLATS and future directions in forest extent capture

Trends in forest extent (RFA regions)



Next steps

- Develop trends in regeneration
- Working with Environment Energy and Science, develop method to determine trends in habitat connectivity and fragmentation
- Using Department Primary Industries' programs, assign drivers of change and trends in forest health
- Engage with state-wide technical working group
- Establish baselines for all indicators
- Continue to QA outputs



Post-fire ecological resilience and recovery planning



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What are we aiming to achieve?

- A remote sensing method to measure the proportion of regrowth since a fire relative to the unburnt or pre-fire state, at regular post-fire intervals.
- New remote sensing tools for forest managers to undertake risk assessments and subsequently plan and report on post-fire ecological recovery.
- Inform recovery planning and potential indicators of ecological resilience

Where are we up to?

- A preliminary model developed to best to define the pre-fire state and develop programming code to allow repeatable rapid processing and analysis of candidate recovery indices
- Field testing of candidate recovery indices is underway to will continue as field data is captured for quantitative comparisons.
- A test case in the Blue Mountains has identified resilience of unburnt refugia

Key challenges to date

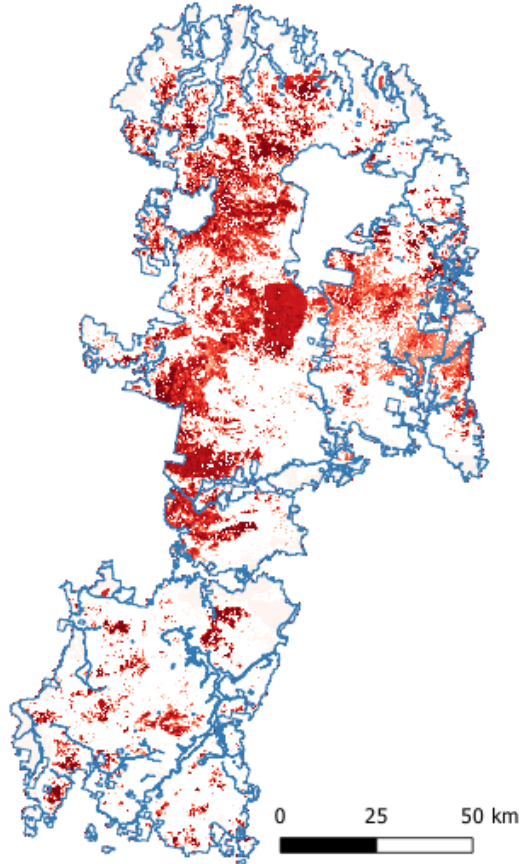
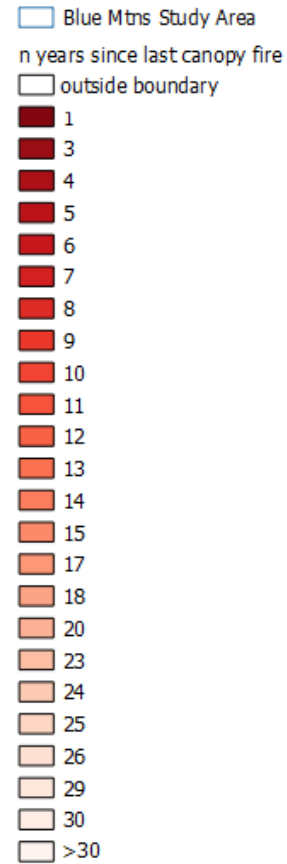
- Timing issues - project staff were diverted to 2019/20 post-fire recovery assessments delaying the project
- Limited post-fire digital air photography capture across northern NSW. This has flow on effects on establishing the early stages of training FESM for the recovery index.

Emerging insights and opportunities

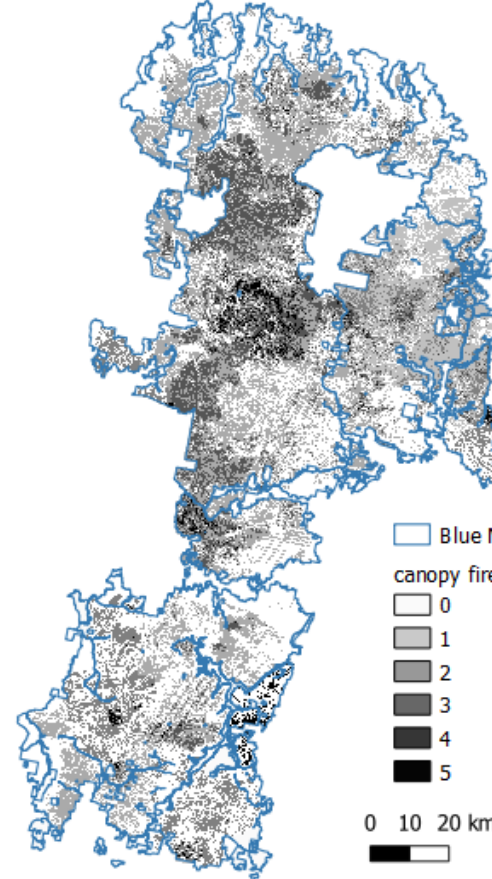
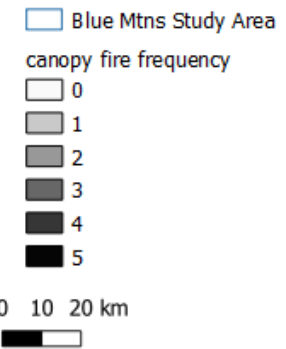
- Terrestrial Laser Scanning has been incorporated into the field testing providing greater precision and quality than the previously proposed field methods
- Longer term goal is to integrate recovery indices with the DPIE-RFS semi-automated fire severity mapping system (FESM)

FESM historical severity derived composite products; time since canopy fire (a) and canopy fire frequency (b).

Time Since Canopy Fire - 30 yrs to 2019/20



Canopy Fire Frequency - 30 yrs to 2019/20



Next steps

- Develop fire severity derived post-fire ecological recovery decision support tools
- Explore candidate spectral and fractional cover indices across a wider range of vegetation, climate and topographic conditions
- Preliminary analysis to generate predictive maps of recovery duration over the 2019-2020 fire extent



7 weeks
post-fire



5 months
post-fire

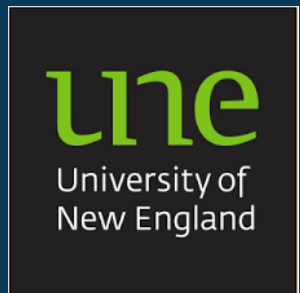
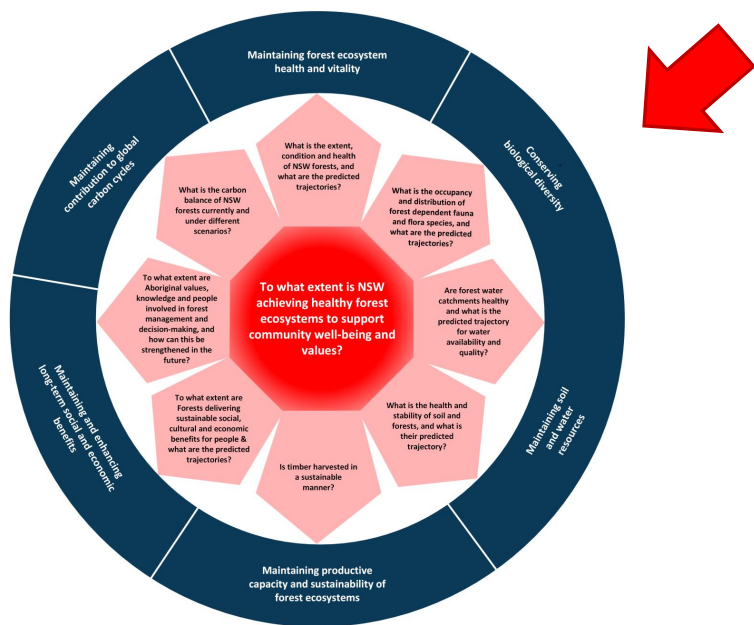


12 months
post-fire



Baselines, drivers and trends in species occupancy

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What are we aiming to achieve?

- Determine indicators for forest-dependent fauna and flora species
- Develop a conceptual framework to analyse trends over time for indicators and threats to species
- Establish baselines for the indicators of species occupancy and distribution
- Determine trends in the indicators of species occupancy and distribution

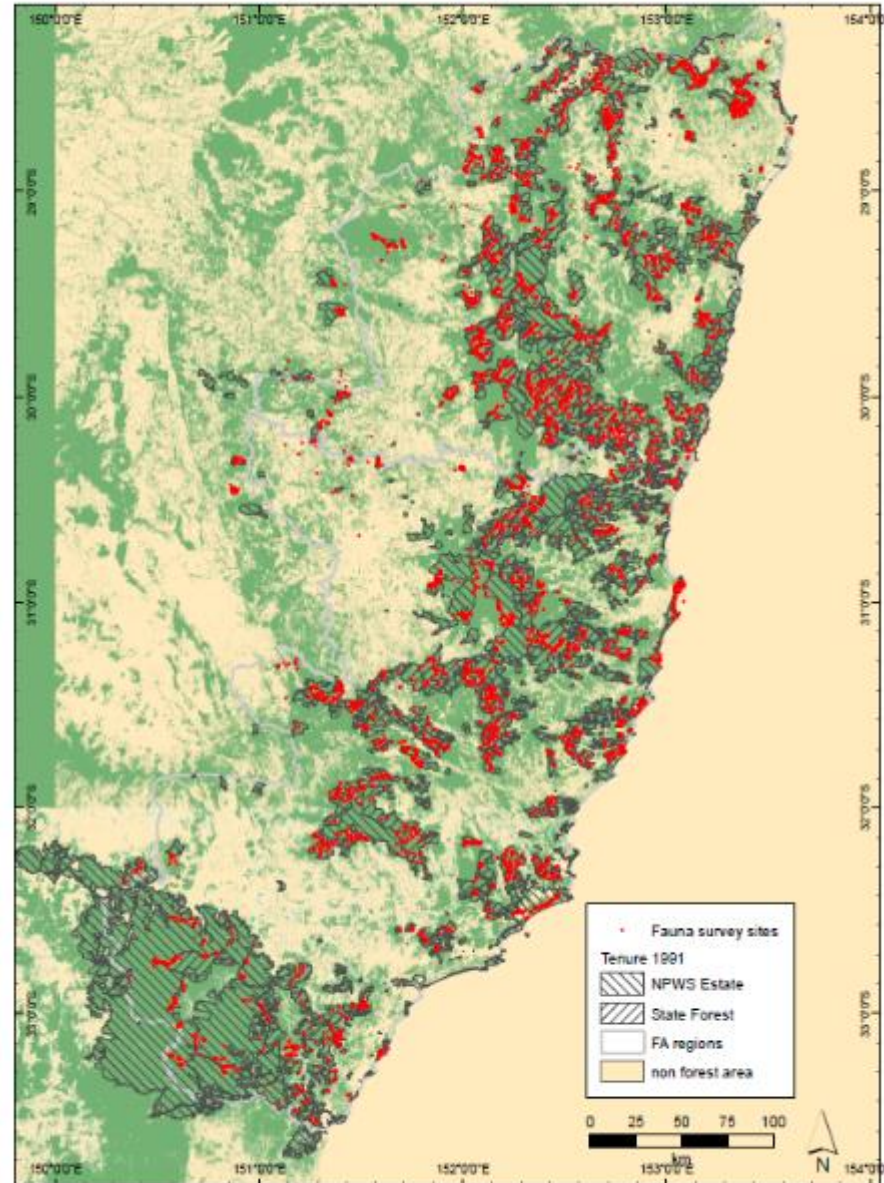
Where are we up to?

- A list of species (indicators) and landscape-scale metrics to describe occupancy and distribution
- Conceptual framework of drivers and threats to forest biodiversity
- Historic datasets (1990s) for the UNE and LNE compiled
- Early preliminary modelling of predicted occupancy and distribution for Greater Glider, Golden-tipped Bat and Powerful Owl

Key challenges to date

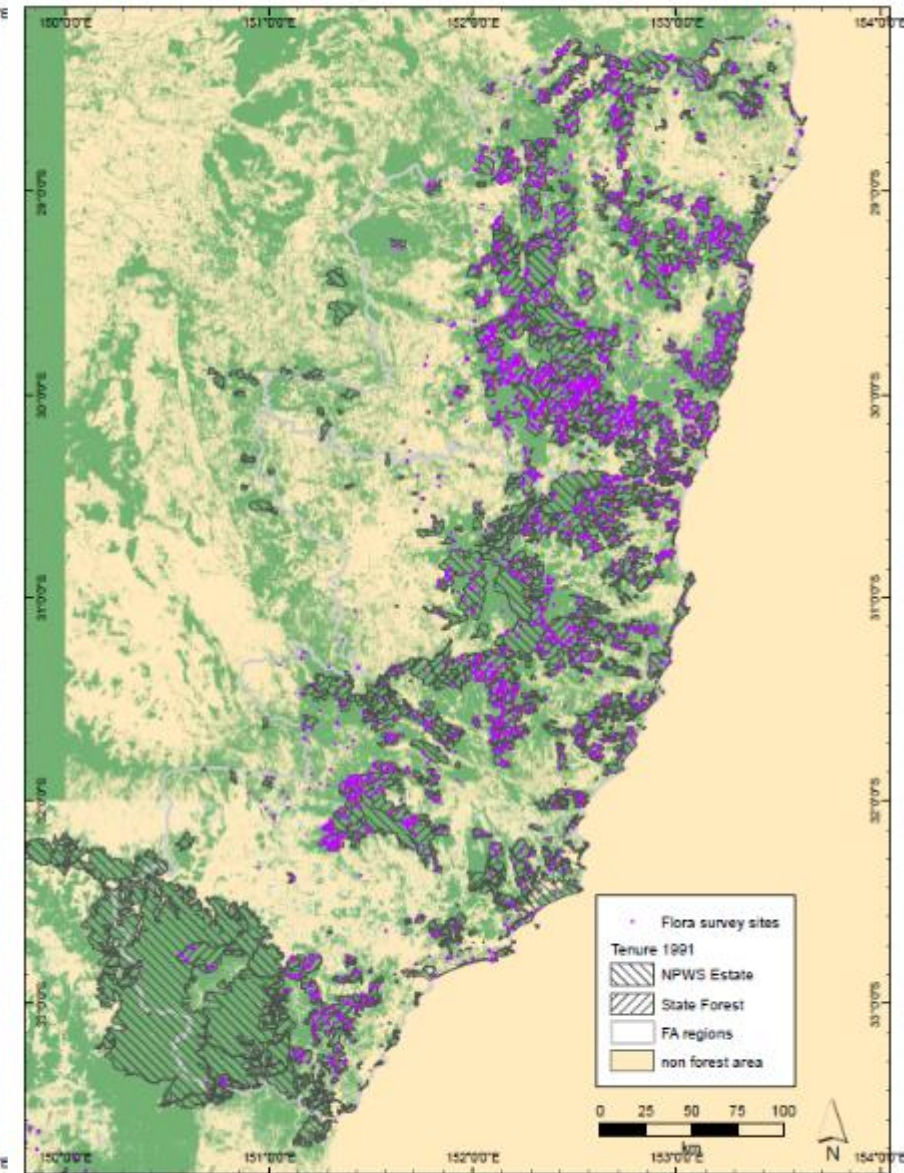
- Locating and extracting baseline information
- Identifying suitable methods to investigate trends in flora over time

Figure 5: Fauna survey sites: Tenure (1991) and Forest Distribution (1995)



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Figure 6: Flora survey sites: Tenure (1991) and Forest Distribution (1995)



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Emerging insights and opportunities

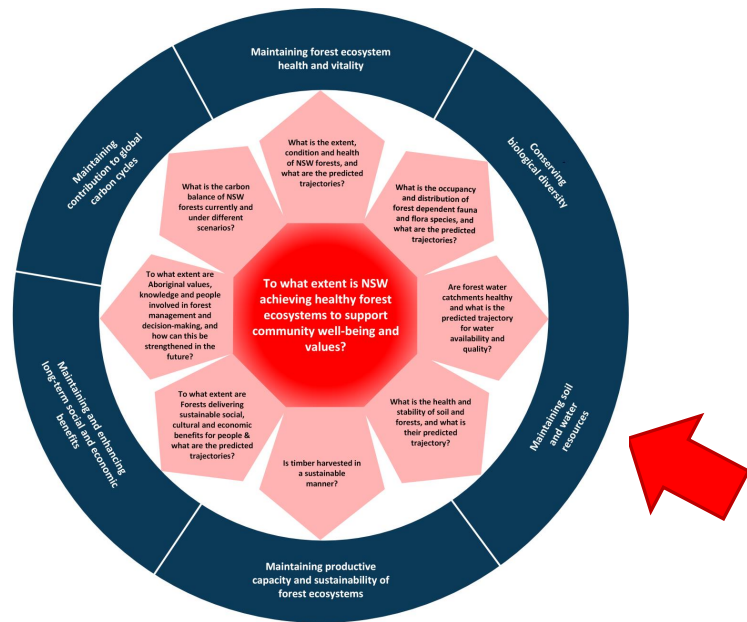
- Repeat surveys required for occupancy modelling rather than presence only or presence/absence data
- Trend analysis will incorporate survey and monitoring data from a range of programs across the State
- Information on detectability using a range of survey techniques will provide input for continued monitoring
- Persistence in the Landscape Project study (funded under NSW SOS and Koala Strategy) will be adapted for the program
- Ongoing QA

Next steps

- Determine a way forward for flora
- Continue occupancy and distribution modelling for priority species and analyse trends over time
- Engage and collaborate with state-wide technical working group on products and results



Evaluating the forest road network



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alluvium

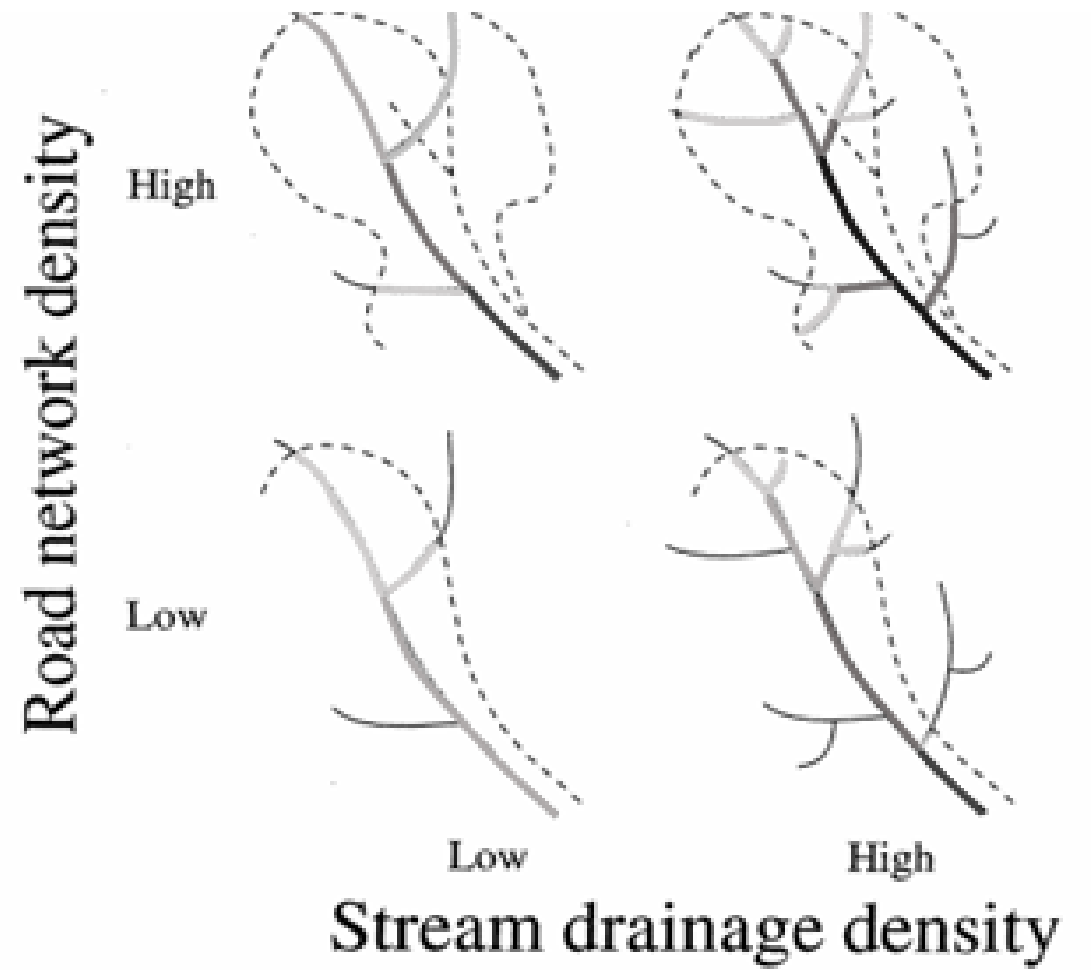
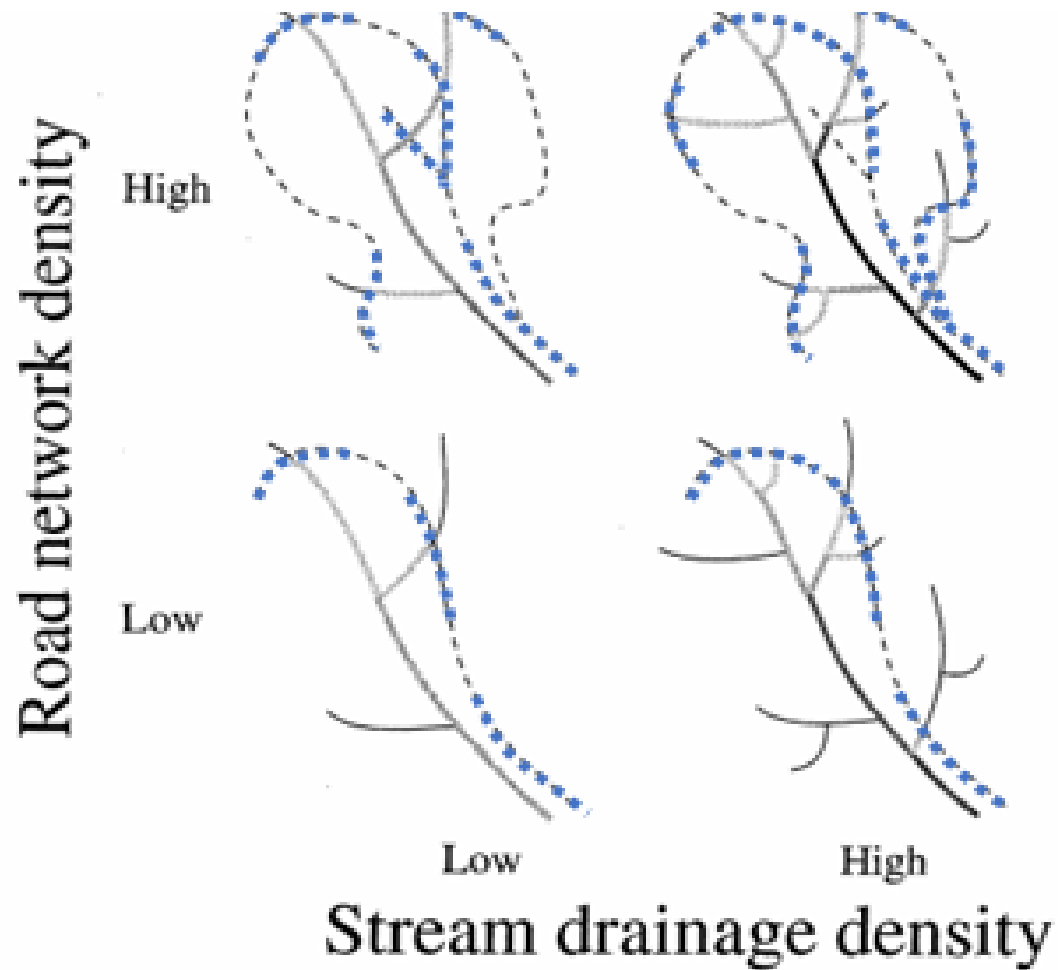


What are we aiming to achieve?

- A cost effective method of evaluating the effectiveness of forest road networks in protecting
- Evaluate the effectiveness of current best practice conventions and design standards.
- Strategically identify the road networks that generate the greatest risks. Region, tenure, soil type, etc.
- Prepare a work plan for road network evaluation over the next 20 years.

Where are we up to?

- Draft methodology developed and distributed for comment.
- Field trip in Jan 2021 to ground truth methodology



(left) Effect of increasing draining densities of the road network (dashed lined) and the stream network (solid line) on the number of road-segment crossing in a landscape. Blue dashed line indicates where on the road network there is a potential for road-stream coupling.

(right) Spatial patterns of peak-flow disturbance patches (greater effect in shaded tones) created by road network (dashed lined) and the stream network (solid line).

Emerging insights and opportunities

- Land managers agree that there is currently no feasible mechanism for evaluating the performance of road networks. Land managers broadly agree that the proposed methodology could address this need.
- End users also see the potential to use the outputs of the method for management in other areas such as risk assessment and asset management.
- Opportunity to drive greater consistency in road and track design and management across different tenures.

Next steps

- Test the methodology in a sample of forest road networks across the state.
- Strategically identify priority areas for detailed evaluation
- Prepare work plan to evaluate priority areas
- Engage state-wide and Coastal IFOA technical working groups



Estimating forest-dependent jobs

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What are we aiming to achieve?

- A standard method to estimate employment – direct and indirect – across NSW forests
- Align with ABS methods where possible
- Separable across activities (e.g. logging, apiary, sport) and tenures/land-use (e.g. State forests, national parks, plantations, private native forest)
- Practical for agencies to use – comparable and scalable

Where are we up to?

- Project working group established
- Initial data gap analysis complete
- Consultation underway with some data inputs received
- Working interim methods paper in place
- Pilot area identified to test interim method – planned for early 2021

Key challenges to date

- Delays in engaging some stakeholder groups in consultation (e.g. recreation groups, tourism organisations)
- Delays in obtaining data and information from agencies (i.e. lack of data, inconsistent, poor quality)
- Stakeholder consultation period extended

Emerging insights and opportunities

- Ad hoc studies, inconsistent data and different methodologies prevent any meaningful analysis of employment
- Need to focus on key gap in knowledge – tourism, recreation, sport/fitness – which may require further research in the future
- Even where stakeholder engagement has been extensive + positive, the information received has been limited due to basic data not being collected at all or inconsistently

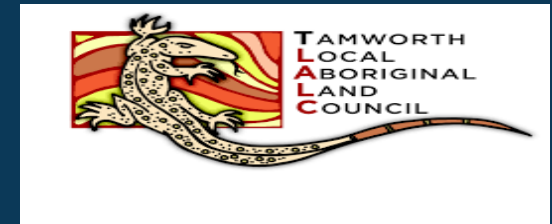
Next steps

- Majority of consultation complete by end-2020
- Data analysis and modelling, revising of the method report, and pilot study progressed throughout January
- Methods paper will be refined across several areas based on the data still to be obtained from stakeholders and the pilot



Aboriginal values

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What are we aiming to achieve?

- To develop and trial a model of Aboriginal values assessment in NSW forests through case studies
- Better understanding and response to fire risk and impacts on these values
- Aboriginal-led, Country-based assessments, monitoring, and research
- Scalable state-wide approach across forest tenures

Where are we up to?

- Interagency working group established
- Coordinator role for case studies
- Case study 1 (Coffs Harbour LALC) and working group established with research agreement – on-ground assessments underway
- Case studies 2 (Tamworth LALC) and 3 (Tumut – Brungle LALC) engaged and soon to commence

Key challenges to date

- Aboriginal peoples do not have access to data and/or the capability to use spatial data available
- Gaps in key source of information – the Aboriginal Heritage Information Management System (AHIMS)
- Other data is in many individual archaeology reports, artefacts collected, reburied, removed
- Community engagement critical to prioritise and ground-truth values – need to consider resourcing, accessibility, gender sensitivities

Emerging insights and opportunities

- Data focus largely on cultural heritage sites and impacts not values and proactive management
- Need to include wider values than just heritage sites e.g. species, water quality, well-being, and qualitative perspectives e.g. stories
- For fire, focus on risk management in place, systems and response processes co-designed with Aboriginal peoples
- Where values are impacted or destroyed, need to consider processes for renewal of values

Next steps

- Initiation of case studies 2 and 3 and associated working groups
- Further on-ground assessments throughout 2021
- Case study reports
- Synthesis report end-2021



Carbon balance of NSW Forests

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What are we aiming to achieve?

- Establish repeatable system to monitor changes in carbon balance of NSW forests and predict future changes under different scenarios
- Use best available inputs and improve over time
- Define improvement priorities
- Report trends in carbon emissions and removals from 1990 to 2018

Where are we up to?

- System operating and initial run completed using coarse data
- Improved input data recently acquired
- Final system configuration nearing completion
- Draft conceptual framework and method report completed

Key challenges to date

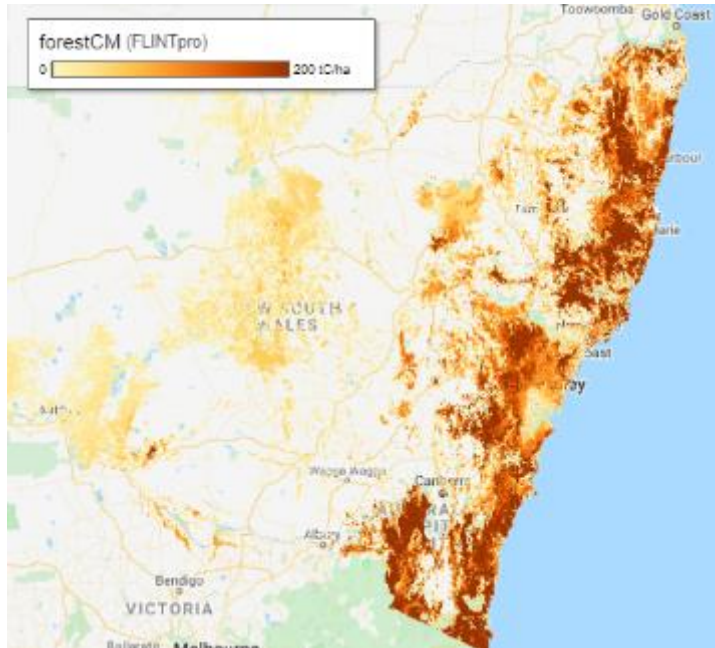
- Access to existing data in a timely manner
- Time to develop future scenarios

Emerging insights and opportunities

- Incorporating additional existing data, particularly disturbances, can substantially improve carbon balance estimates for NSW forests
- Outputs from ecosystem health and vitality, and soil monitoring expected to further improve carbon cycle monitoring

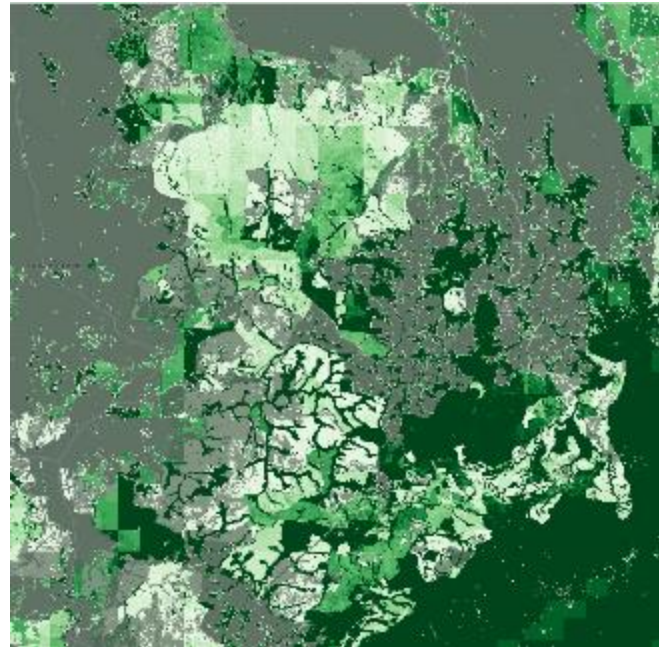
Example carbon balance outputs

Example of output at state level



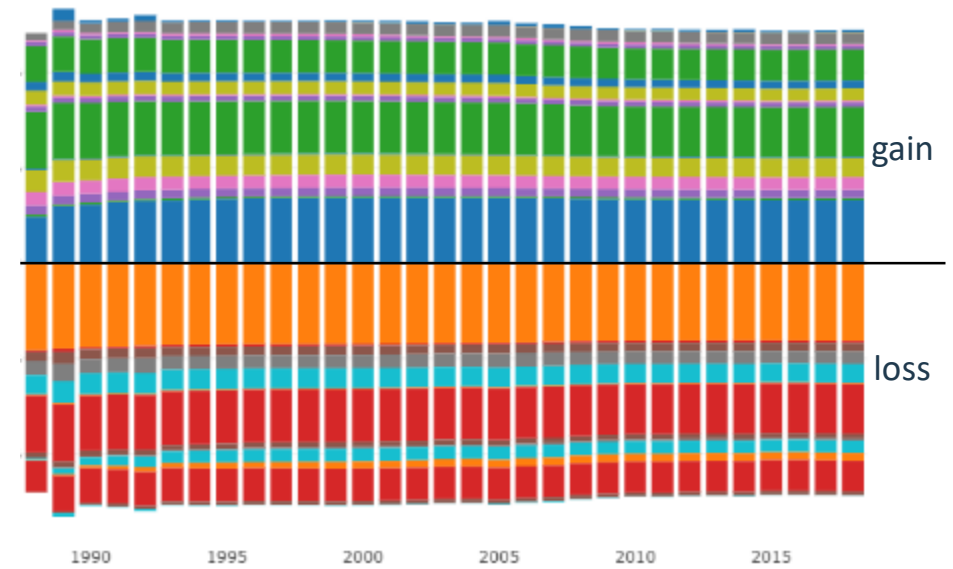
25m resolution

Example of fine scale output



Change detected by remote sensing

Example carbon flux by pool

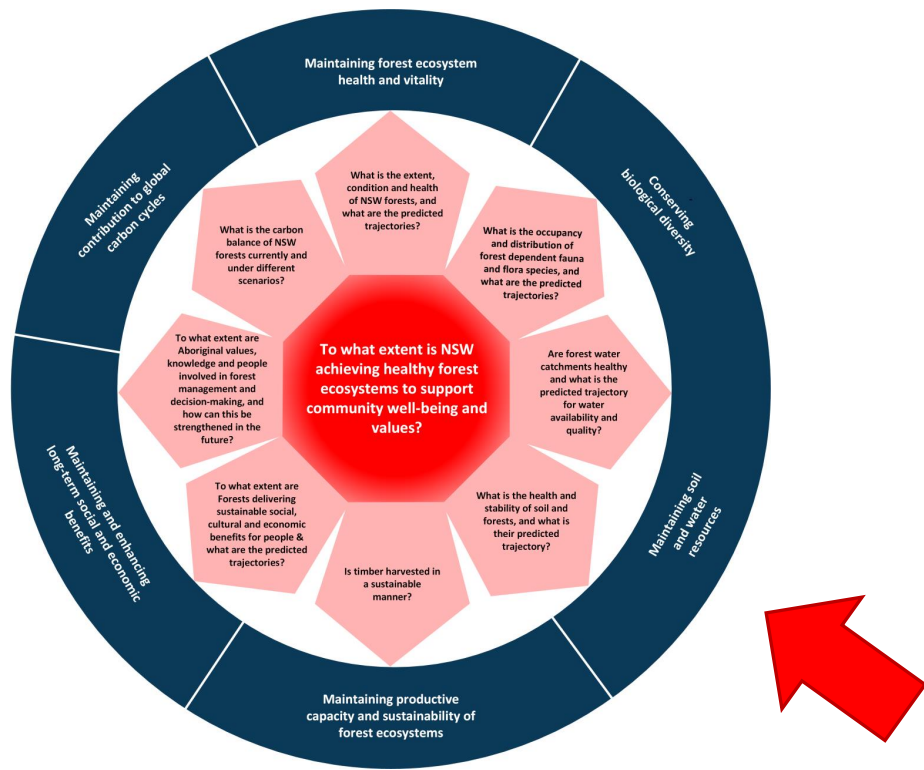


Annual gain and loss of carbon stock quantified for each carbon pool

- For illustrative purposes only

Next steps

- Run model to produce historical baseline and trends
- Review data and system and propose improvements
- Finalise report, data presentation and recommendations for further work
- Engage with state-wide technical working group



Baselines, drivers and trends in water quality and quantity

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THE UNIVERSITY OF
MELBOURNE

What are we aiming to achieve?

- To deliver baselines and trends for environmental values related to water quality and quantity, for NSW Forest Monitoring and Improvement Program and the Coastal IFOA monitoring program
- Develop a cross-tenure conceptual water quality and quantity monitoring framework
- Determine metrics for indicators of water quality in Coastal IFOA state forests

Where are we up to?

- All current and archival water quantity and quality data across the RFA regions has been compiled
- Key indicators of forest water quantity and quality have been reviewed and proposed
- A analytical framework has been proposed for analysing baselines and trends from 1990
- Recommendations for future monitoring of proposed key indicators across all tenures

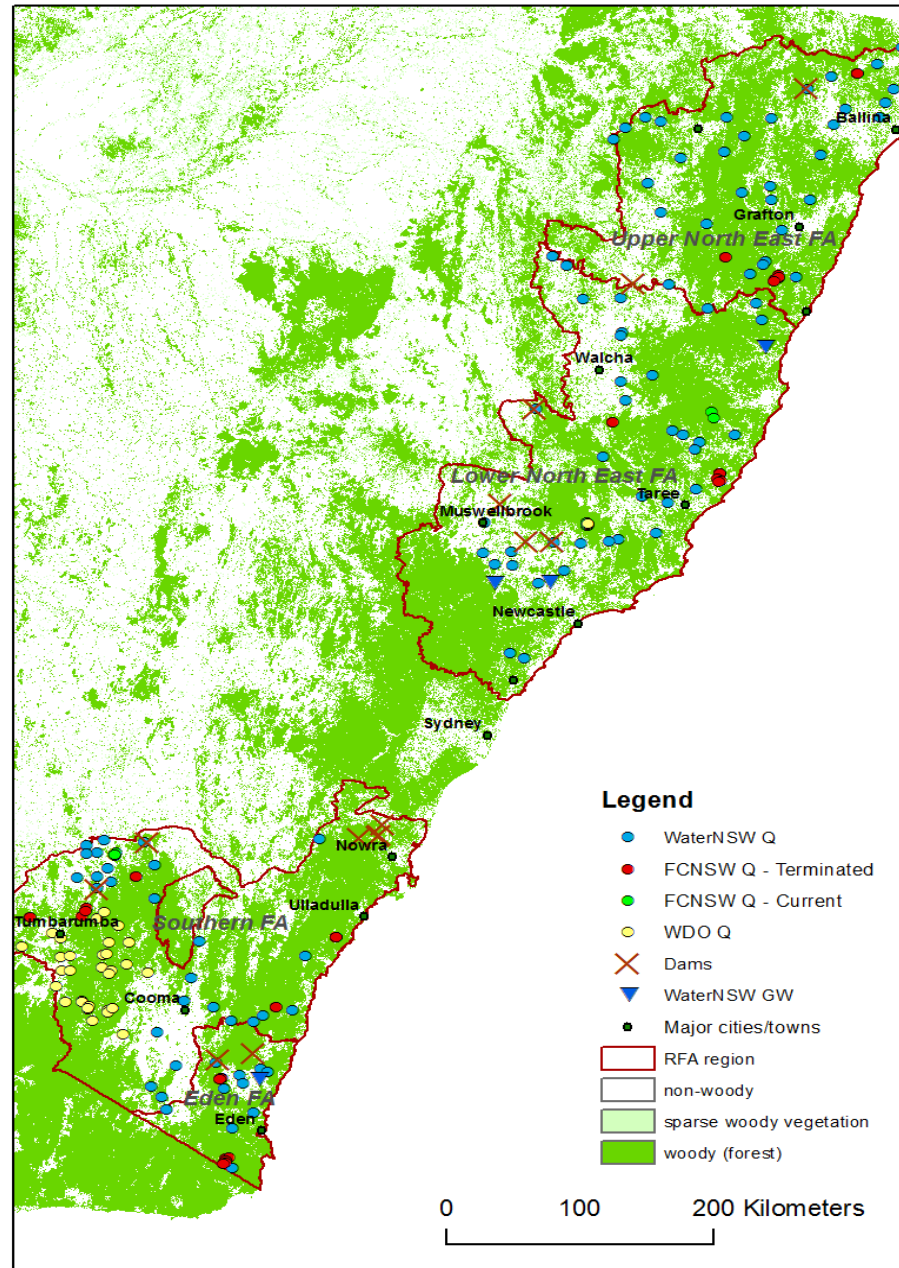
Key challenges to date

- Obtaining metadata on archival forest water monitoring stations has been time consuming
- A number of stations were destroyed in the 2019/20 wildfires.

Emerging insights and opportunities

- Indicators have been identified using criteria such as sensitivity to forest management, suitability and availability of data for landscape-scale assessment, statistical power of data analyses, and effort required for future monitoring.
- Analyses underway will provide evidence to prioritise recommissioning damaged water stations

Monitoring sites



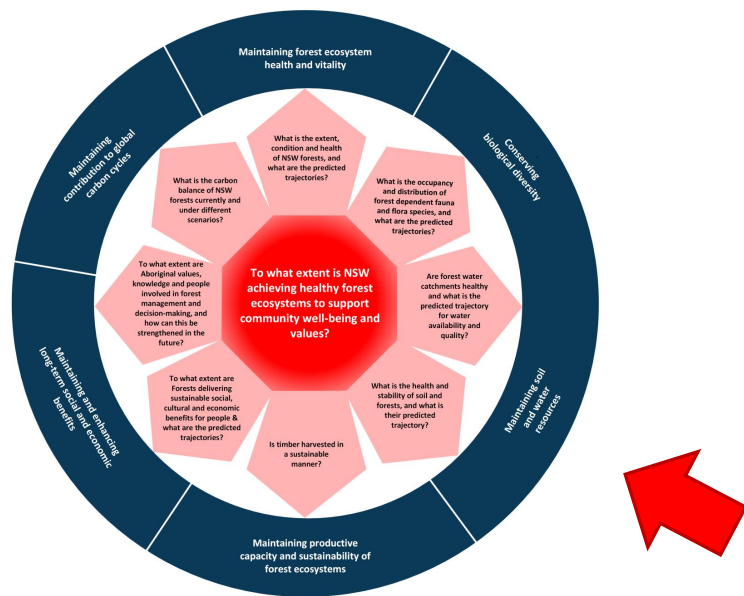
Next steps

- Baseline and trend analysis post-1990
- Incorporate new forest change cover data into water budget model
- Establish current reference conditions to enable modelling of future values under various scenarios and using monitored values to test hypotheses
- Engage state-wide technical working group





Baseline, drivers and trends in soil health and stability



What are we aiming to achieve?

- To deliver a forest soil health monitoring framework
- Develop historic baselines for the indicators of soil health and stability in forests post 1984
- Analyse trends in the indicators of soil health and stability in forests

Where are we up to?

- Overall methodology including modelling approaches developed
- Review and collation of existing datasets related to soil health and stability, identifying key gaps, including spatial gaps.
- Recommended soil health metrics
- State-wide collation of data cube for forests of NSW and associated spatial testing.

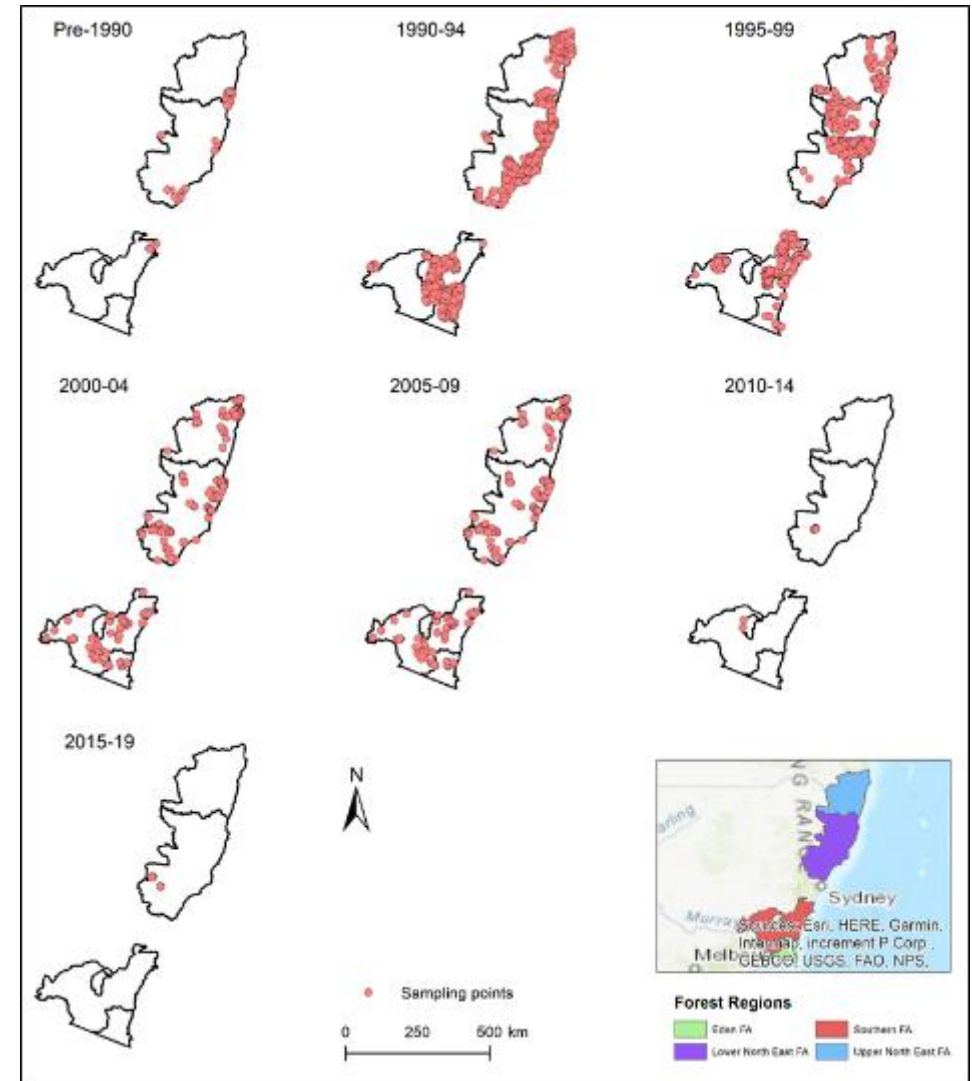
Key challenges to date

- Data availability post-2010 has declined
- Few Soil MER sites were established in forests.
- Reliable predictions will be constrained in the space-time analysis.

Emerging insights and opportunities

- The project is focussing on total soil carbon as the preferred measure of soil health. It has clear synergies with the related carbon modelling project.
- The project has highlighted the disconnect created with the termination of the former soil condition MER project and its lack of integration with forest management.

Spatial distribution of surface organic carbon measurements



Next steps

- Integrate soil and land management history data into interpretative machine learning approach
- Test analysis models ability to identify causal factors leading to change in soil total carbon
- Engage state-wide technical working group

Conceptual framework for predicting soil health and stability

