Information relevant to the NSW Government's **Forestry Industry Action Plan**

NSW GOVERNMENT | Natural Resources Commission

A briefing by the Natural Resources Commission to the
Independent Forestry Panel
October 2024

The Independent Forestry Panel asked the Natural Resources Commission to provide information to inform its advice to the NSW Government on the Forestry Industry Action Plan

This paper presents information on:

- Sustainability of current and future forestry operations in NSW (**Slide 17**)
- Environmental and cultural values of forests, including threatened species (**Slide 24**)
- The role of State Forests in maximising the delivery of a range of environmental, economic and social outcomes (**Slide 43**)
- Greenhouse gas emission impacts of different uses of forests and assessment of climate change risks to forests (**Slide 49**)
- The future of softwood and hardwood plantations and the continuation of Private Native Forestry in helping meet timber supply needs (**Slide 53**)
- Opportunities to realise carbon and biodiversity benefits and support carbon and biodiversity markets, and mitigate and adapt to climate change risks (**Slide 56**)

Since 2009, the Commission has provided government with independent policy and scientific advice on forestry matters

- In response to previous **community concerns**, the NSW Government committed significant investment to **independently oversee monitoring on state forests** since 2019. The Government has recently recommitted **ongoing funding** over 20 years.
- Significant progress has been made to **deliver new data and evidence** including landscape scale baselines for biodiversity, forests and carbon. Large scale monitoring programs are now in place to collect **consistent and reliable data.** Over time, this will **reduce scientific uncertainty** and provide **authoritative evidence** on forestry and ecosystem response.
- There is clear evidence that **good, science-based practice is applied on state forests** such as multi-scale planning to distribute harvesting through space and time, retention forestry to promote fauna persistence and riparian management to protect water quality.
- There is also **sufficient evidence on some matters** such as declining timber size in some regions and importance of hollow bearing trees to further improve sustainable NSW forest management.
- Overall, there is **no comprehensive evidence base** at this point of time to definitively suggest forestry operations are having a detrimental impact on long-term forest values.

- Forest use and management is a **highly contested space**. The native forestry sector is subject to **significant community scrutiny** and policy shifts. The **scientific evidence base** on forestry is also **contested**.

- There is **strong consensus** that **all NSW forests and ecosystems** whether they are on state forests, national parks or private land are **under sustained threats** from a changing climate and other drivers such as invasive species, population and economic growth and intensification of agricultural and urban land uses.

- There are **cumulative risks** associated with forestry and significant landscape disturbance events such as fire. However, sound risk management and monitoring can help to mitigate these risks. Where there are extreme risks, the onus should be on taking cautionary actions to reduce or eliminate those risks.

- Fostering **climate smart, resilient NSW forests and ecosystems** across all tenures is essential to maintain the service and values they provide to the community. This needs a **strategic focus** and **mutual understanding** between stakeholders to achieve lasting outcomes. Forest ecosystems are dynamic and complex.

- Importantly, there are **recognised good practice principles** that, when applied together provide the necessary roadmap to achieve **more positive futures**. Foundations include a **contemporary policy** that establishes the principles, diverse values and outcomes to be managed for across all tenures, followed by **strategic plans** to inform investment and interventions.

- NSW forests and communities are diverse. Regional approaches tailored to community needs and future climate trajectories are required.

Good practice forest management principles

1. **A clear, contemporary forests policy** – outlines the principles and values to be managed

2. **Robust conservation strategies and measures** – aligned with international agreements, and reflecting alignment with forest ecosystems dynamics, including responses to climate change impacts and adaption

3. **A cross-tenure Forest Management Plan** – based on multi-scale landscape planning and encouraging heterogeneity to increase resilience of forests

4. **Adaptive management with capacity to conduct proactive interventions** – with adaptive management principles across public and private native forests

5. **Traditional-owner led and managed areas** – informed by community engagement processes, with appropriate levels of capacity building, policy support and resourcing

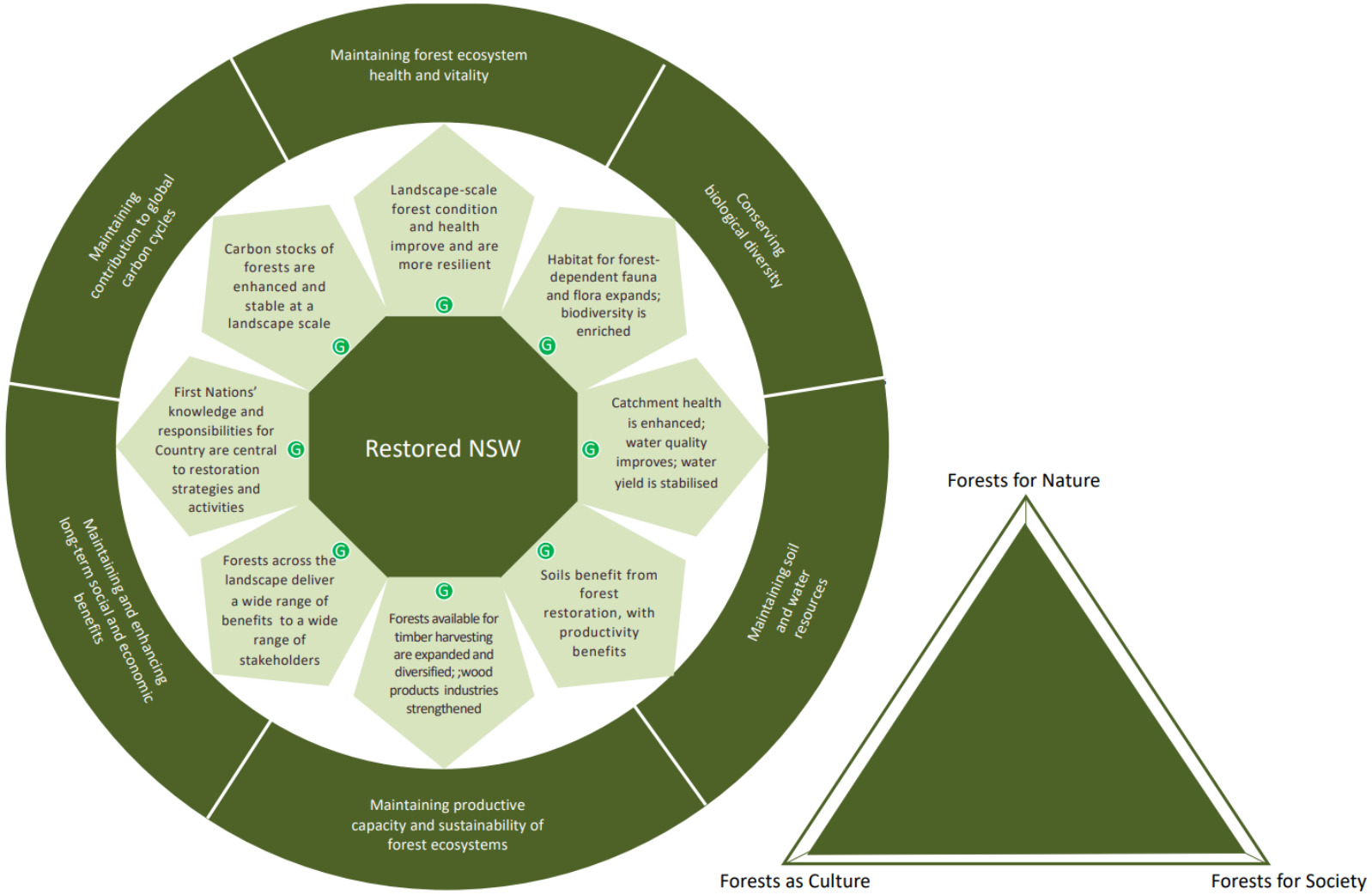
6. **Securing diverse economic benefits from sustainable use of ecosystems services** – from provisioning services or regulating services and supporting active and adaptive management of natural resources

7. **Financial incentives and support for private native forests** – encompassing conservation measures through to improved productivity and production

8. **Strong regulatory regime founded on collaboration and improvement in practices** – to build capacity across stewardship and compliance functions and strengthen the social contract

9. **Cross-tenure independent research, monitoring and reporting** – timely reporting on forest health and other forest values, with feedback loops for adaptive management

Applying good practice principles delivers diverse values sustainably

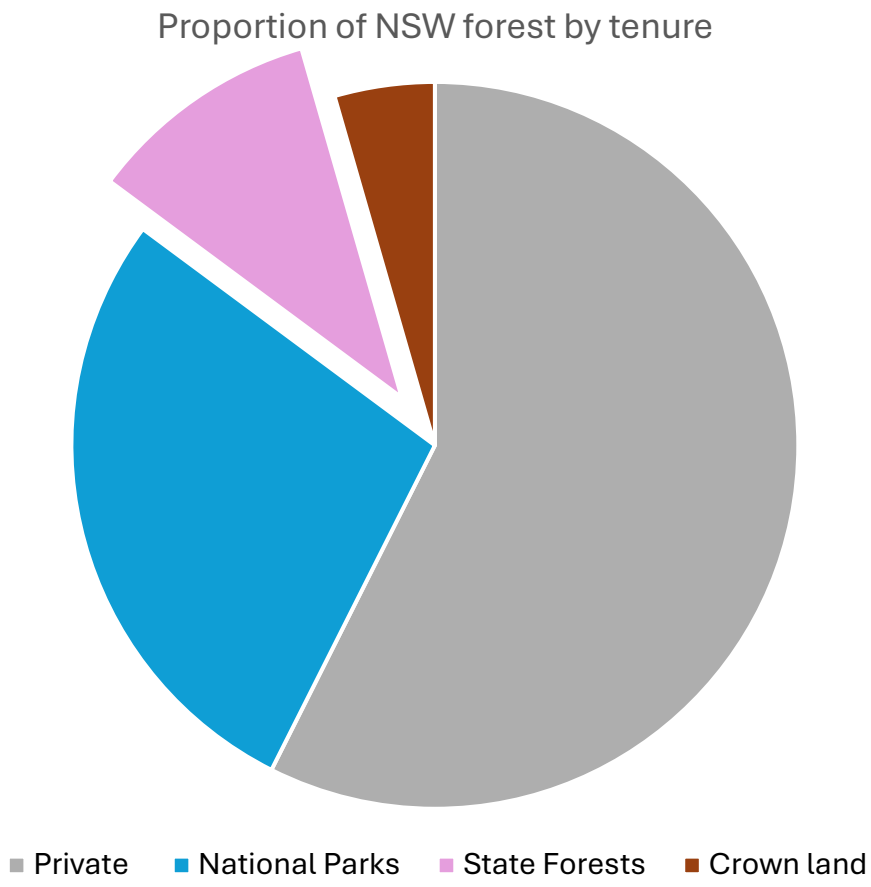


Source: Kanowski, P., Cork, S., Lade, S, Ferrier, S. (2022) *NSW Future Forest Scenarios*. Australian National University. A report to the Natural Resources Commission

NSW forests and forestry

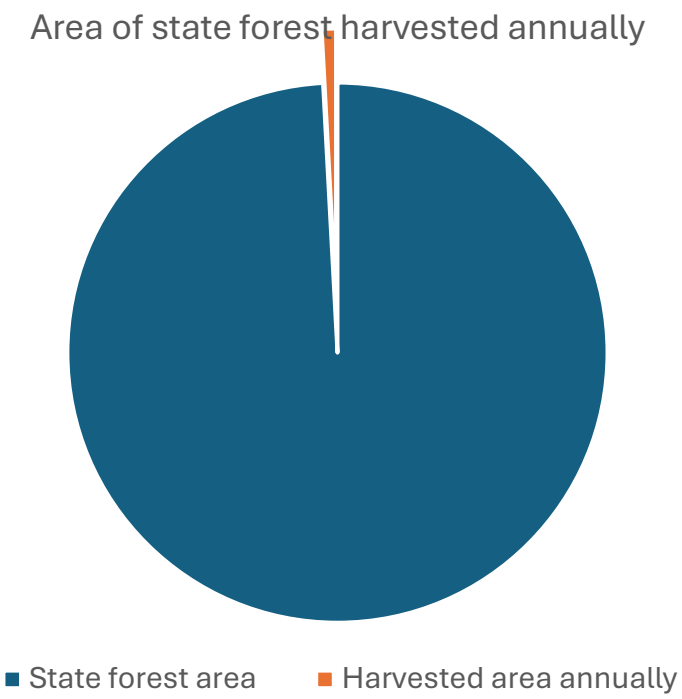
A relatively small proportion of NSW forests are found on state forests

- **Around 10 %** of NSW's 20 million hectares of **forests** are found on multifunction **state forests** [1]
- **More than half** of NSW forest extent is on **private or leasehold land**
- **Just over 28% of forest extent** in NSW is found on **national parks**
- In the coastal IFOA region, a **combined 45% of forest extent** is found on national parks and formal and informal reserves on state forests [2]



Less than 1 % of the total state forest area is harvested annually

- **Retention forestry** is practiced on state forest which reflects **world best practice**
- **Under 18,000 hectares** was harvested per year on state forests since 2013-14 – this is **less than 1 percent** of all state forests in NSW annually
- Over **50 percent** of state forests are **permanently excluded** from harvesting in the coastal IFOA region

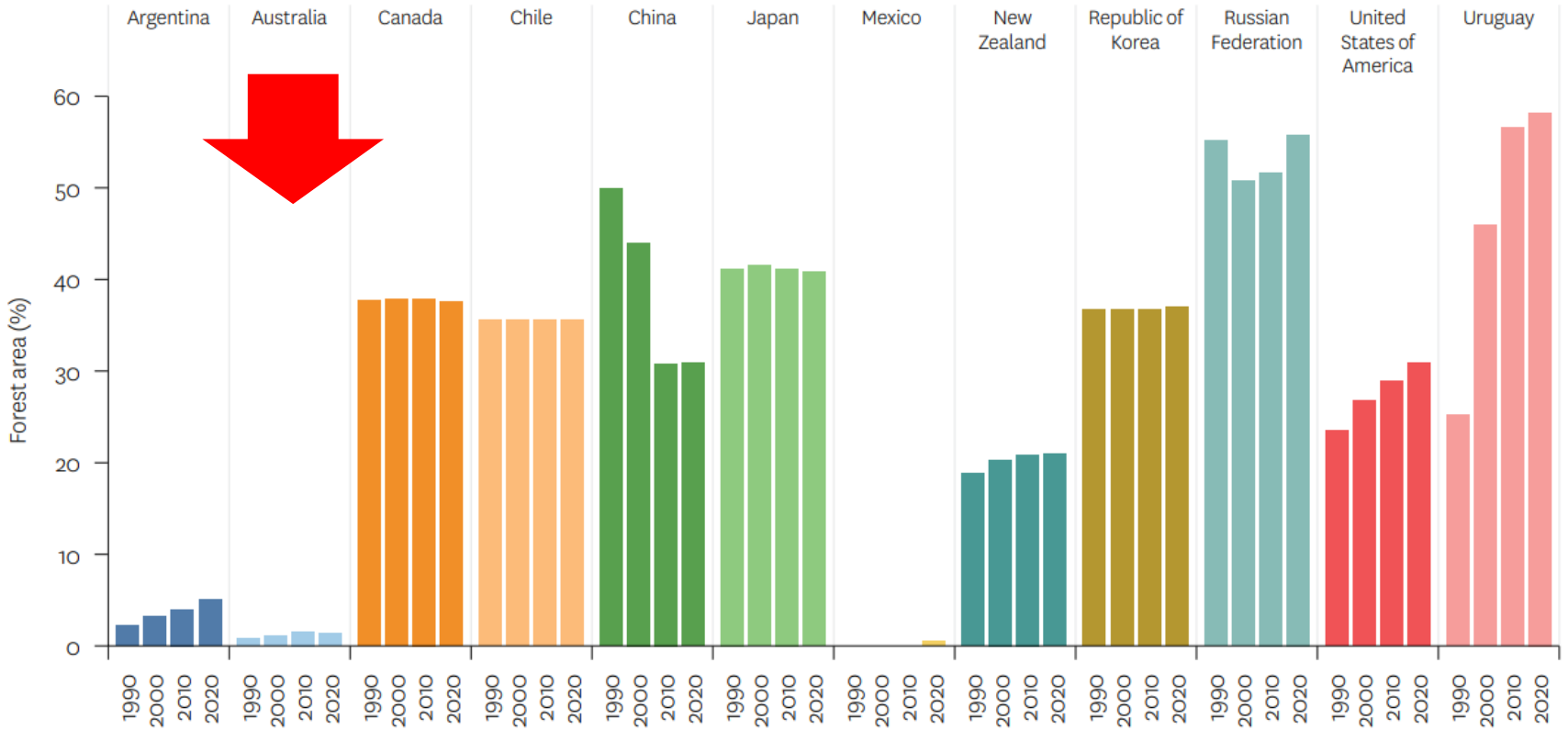


	Area (ha)	Average annual harvest as proportion of total area	Actual harvest (2022/23) as proportion of total area
All state forests	2,134,200	0.94%	0.62%
Harvestable area within state forests*	1,164,200	1.72%	1.01%

* Includes state forest areas in Forest Management Zones 3b and 4, excluding additional retained areas within Coastal IFOA compartments

Australia has a relatively low proportion of forests available for wood production[3]

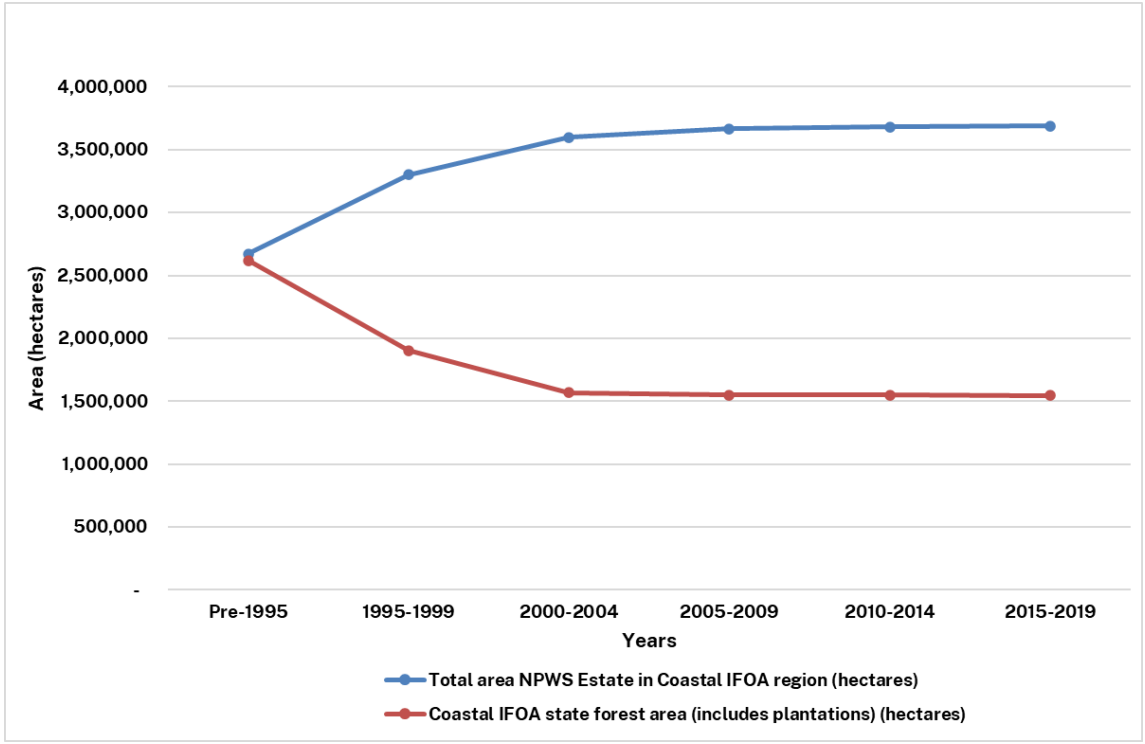
Proportion of forest area with a primary designated management objective of wood production (1990, 2000, 2010, 2020)



Figures include plantations and natural forests

NSW native forest area available for harvesting has reduced over time

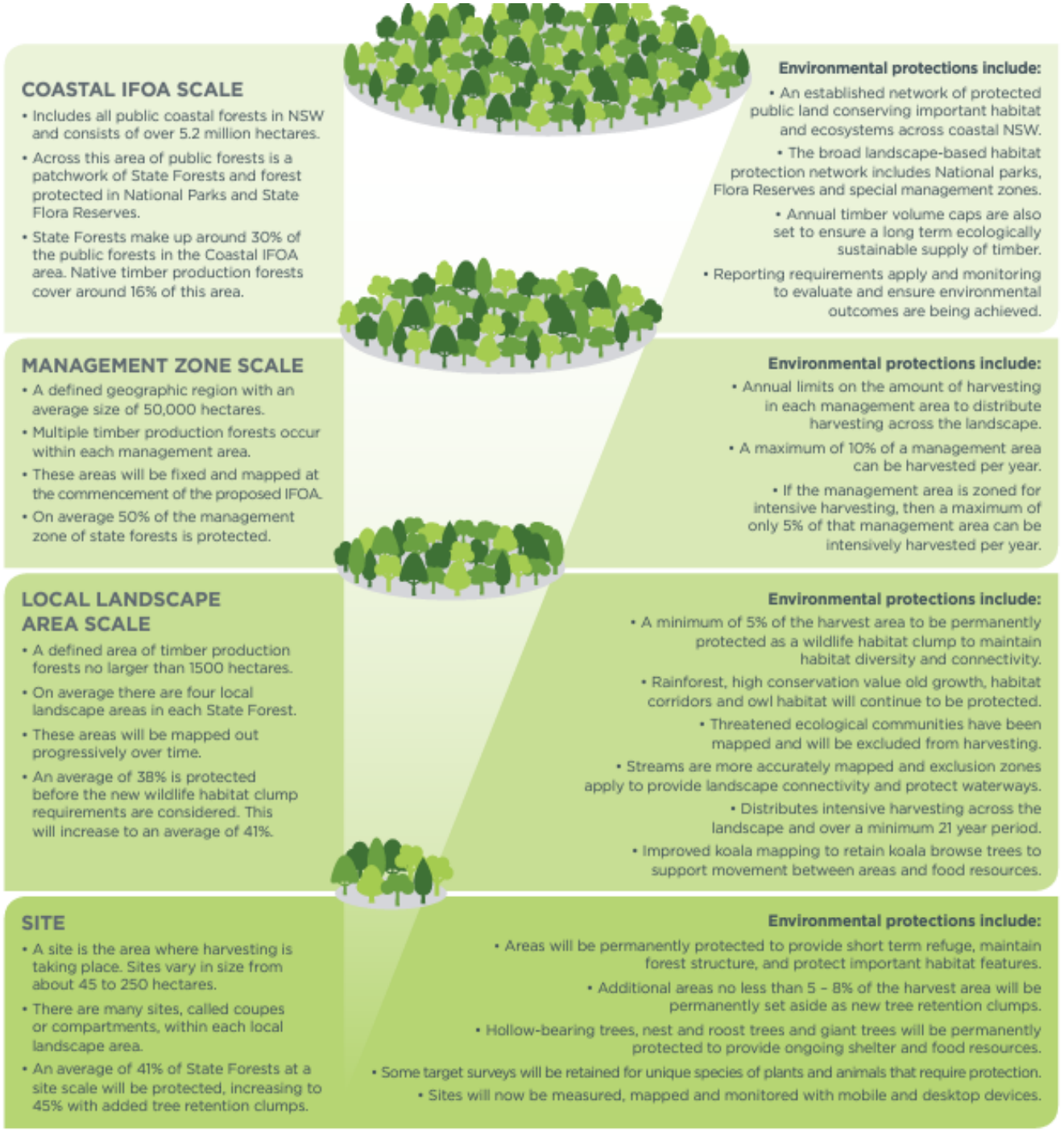
- Since the IFOAs were first implemented in 1999-2003, there have been **significant transfers of state forests** to the reserve system
- For example:
  - **1999** – 420,000 hectares of north coast forest land as a result of the Regional Forest Agreement
  - **2002** – 63,000 hectares of north coast forest land as part of the NSW Government's ICON Decision
  - **2010** – 110,000 hectares river red gum forest land were established as national parks or reserves or vested in the Minister for the Environment for transfer to Aboriginal ownership
  - **2016** – 11,800 hectares to establish the Murrah Flora Reserves on the south coast (still remain on state forest, but excludes harvesting)



Data source: Collaborative Australian Protected Areas Database (CAPAD): NSW dataset for state forest estate

NSW has adopted a best practice approach to forestry

- Internationally recognised **retention forestry** is adopted in NSW, that focuses on '**what to retain**, rather than **what to harvest'**.[4]
- The Coastal IFOA applies a **landscape- based approach** to forestry management[5]
- There are **mutually reinforcing** rule settings operating at multiple scales to **protect environmental values** and promote regeneration through space and time.



Northern NSW supplies over half of all wood products in the state

- NSW state forests supplied over **14 million cubic metres** of wood products since 2010[6]

- **High quality and pulpwood** and other residues are the **primary wood products** sourced from state forests since 2010

Different types of harvesting tailored to forest characteristics and markets

Region	Operation type	% total standing log volume removed*	Average growth rate (m^3/ha/yr) over 100 years	Log grades included
North Coast	Selective	30%	4.9	HQ, LQ, pulpwood
South Coast	Selective	43%	2.5	HQ, LQ, pulpwood
Tumut	Selective mixed hardwood	32%	1.3	HQ, LQ, pulpwood
Tumut	Selective Alpine Ash	48%	6.2	HQ, LQ, pulpwood
Eden	Alternate coupe	73%	4.5	Pulpwood, HQ, LQ, residues

Notes: Includes measured standing volume divided by volume of sawlog and pulpwood harvested. Excludes waste left on site which becomes coarse woody debris.
HQ = high quality; LQ = low quality
Data source – FCNSW

Quantity of log by grade harvested in Coastal IFOA region in 2023/24

Coastal IFOA Subregion	HQ Large Sawlog + Large Veneer (m^3)	HQ Small Sawlog + Small Veneer (m^3)	Poles, piles & girders (m^3)	LQ Sawlog (tonnes)	Pulpwood (tonnes)
Upper North East	36,405	15,328	12,893	47,197	0
Lower North East	56,171	15,958	12,452	82,076	28,229
Southern	14,868	3,122	278	17,094	44,009
Eden	16,363	2,785	0	0	298,094
CIFOA Total	**123,806**	**37,193**	**25,623**	**146,366**	**370,331**

HQ = high quality; LQ = low quality
Data source – FCNSW

State forests contribute to international and national protected area targets

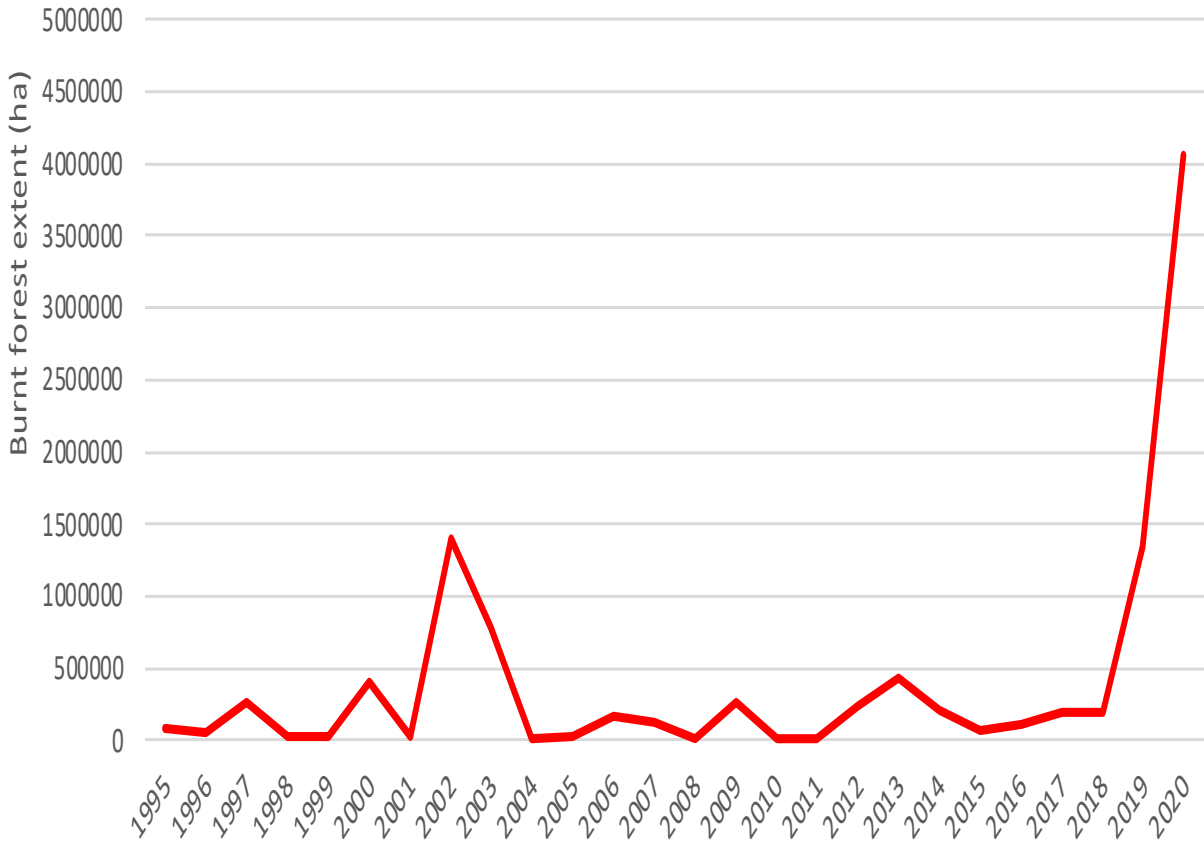
- State forests contain **formal and informal reserves** that are designed to **JANIS dedicated reserves** in the National Forest Policy Statement[7]

- Areas such as **Flora Reserves** are gazetted in NSW Parliament and protect high conservation values such **as old growth** and **rainforests**

Forest Management zone		Area on native state forest (%)		Description
		State-wide	Coastal	
1	**Special protection (Flora Reserves**	3.7%	4.9%	• Management to maximise protection of very high natural and cultural conservation values • Equivalent to IUCN – Protected Area Categories I, II, III or IV • Includes HCV Old Growth forests and rainforest
2	**Special Management**	9.4%	12.9%	• Specific management and protection of natural and cultural values where it is not possible or practical to include in Zone 1 • Equivalent to IUCN – Protected Area Categories II, III, IV or VI • Includes rainforest
3a	**Harvest exclusions**	12.7%	14.7%	• Areas where harvesting is excluded but other management and production activities preclude Zone 1 or 2 • Designed to meet JANIS 'values protected by prescription' but to fullest extent possible they will be managed to meet requirements of JANIS informal reserves.
3b	**Special prescription**	5.4%	3.2%	• Areas where other management and production activities are also facilitated. The activities are minimised in their design and implementation to maintain or enhance the values that the area is zoned to protect. • Designed to meet JANIS 'values protected by prescription'. They are designed for both protection of the values contributing to the CAR reserve system.

Forest health and productivity is at risk across all tenures

- **Climate change**, including increasing frequency and intensity of drought and wildfire is the **greatest threat to forest health**
- **Other drivers** such as invasive species, population growth, economic growth and intensification of urban and agricultural land uses will continue to place **increasing demands and pressure** on NSW forests
- **Strategic interventions** that actively address **emerging risks** and promote **climate resilient forests** are required to achieve more positive futures[8]

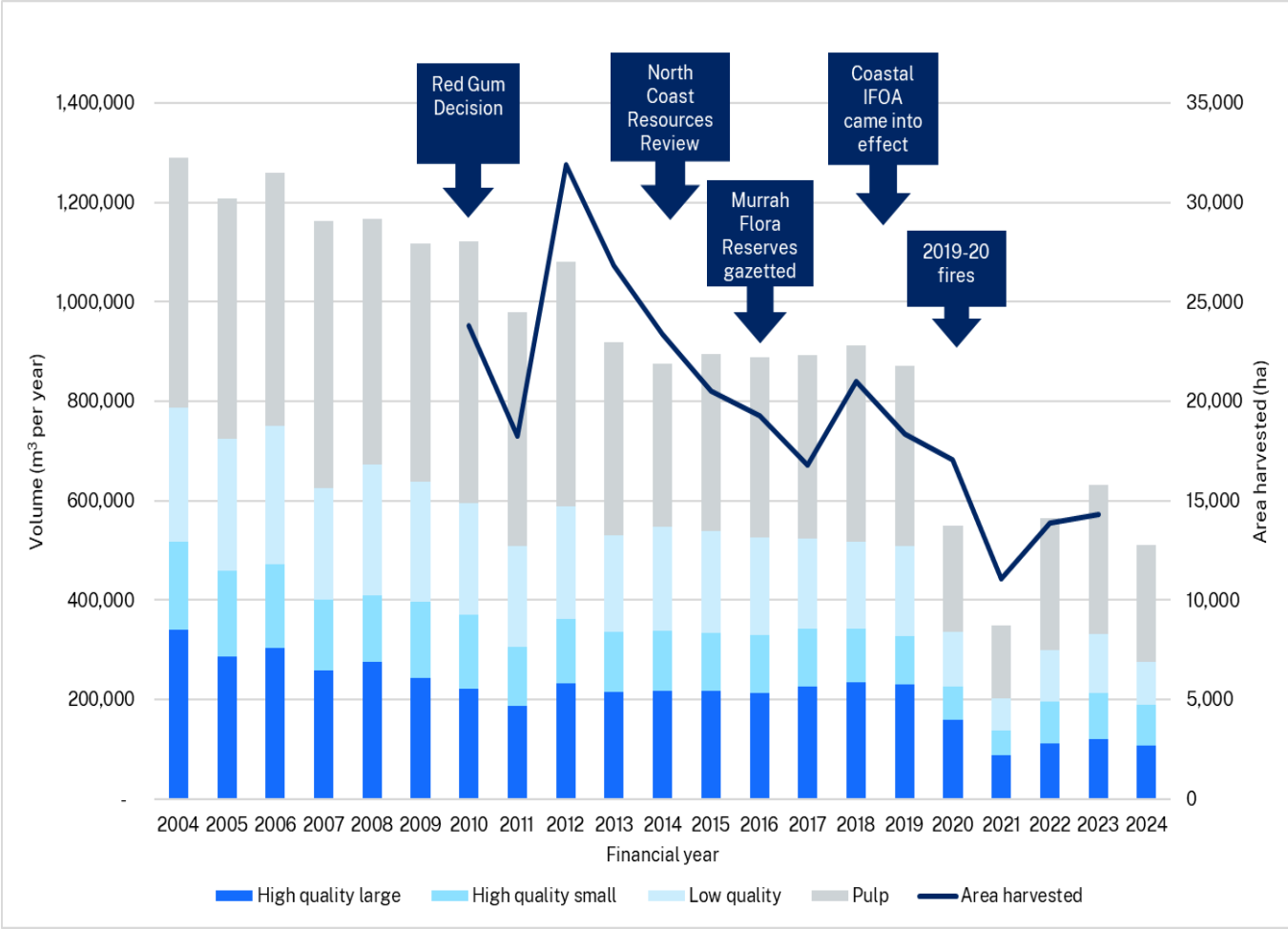


Fire history (burnt forest extent, hectares) for coastal NSW 1995-20208

Sustainability of current and future forestry operations in NSW

Hardwood supply has decreased over time

- The **volume of wood produced** from all state forest native forests has d**ecreased** reflecting **changes in the area available for harvesting** and regulation changes
- Harvest volumes for **high quality** (large and small), **low quality** and **pulp** have all **declined** over time
- Wood supply **reduced markedly** following the **2019-20 fires**, as extensive and severe fires affected much of the coastal state forests
- **Major rainfall events** and flooding occurred in 2020 and then more significantly in 2022, **disrupting coastal forest access** and road infrastructure

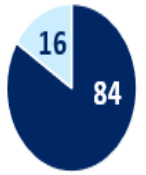
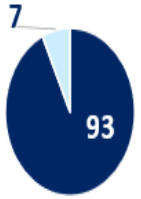
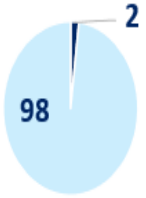
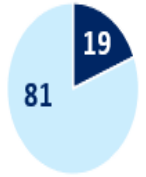


Total annual harvest volume and area from NSW public native forests over time

Data source: FCNSW (NRC annotations)

Wood supply on south coast most impacted by 2019-20 wildfires

- Following the 2019-20 fires, **wood production** was most affected in the South Coast and Eden subregions
- This was due to the **greater extent and severity of fire** in these areas, as well as the **lack of hardwood plantation** resources to supplement harvesting of native forests in these regions[9]

Subregion	Actual wood supply reduction in 2020 vs. average of preceding five years	
	Reduction in high quality supply	Notes
South Coast	-84% 	▪ Down from 47,225 to 7,545 cubic metres ▪ Primarily spotted gum ▪ Tablelands species harvest was extremely limited (less than 200 cubic metres harvested)
Eden	-93% 	▪ Down from 19,505 to 1,380 cubic metres ▪ Primarily silvertop ash ▪ Pulpwood supply also fell by 75 percent
Tumut *high quality alpine ash	-2% 	▪ Limited change in alpine ash supply from 22,510 to 22,155 cubic metres ▪ Production supplemented by fire salvage operations
North Coast	-19% 	▪ Down from 256,500 to 207,830 cubic metres ▪ Native forest supply reduced by 58 percent, but supply was supplemented by plantation harvest ▪ Blackbutt availability increased due to plantation harvesting, but north coast spotted gum supply fell by 92 percent and blue gum, tallowwood and brush box decreased by 35 percent.

% Expected high quality supply delivered

% Reduction compared with previous 5 years

North coast plantations offset post-fire impacts

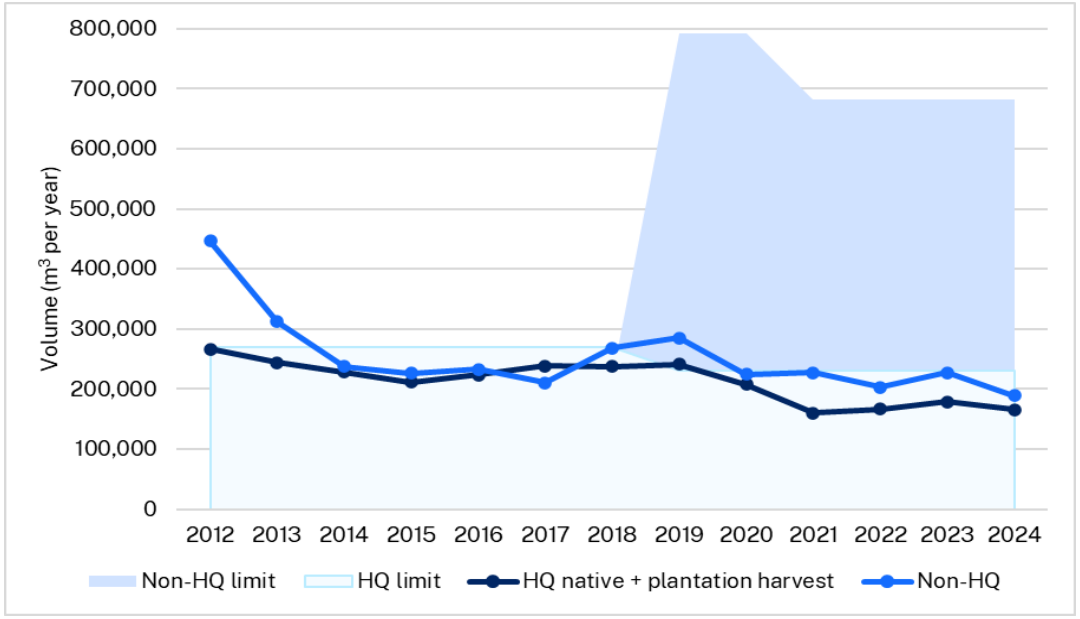
- **Loss of supply of high-quality logs** from native forests on the north coast was **offset** by early harvesting of **hardwood plantations**
- However, the higher level of plantation harvesting in the post-fire period has **drawn down the future** available stock of hardwood plantations
- This means this **resource is not available** to supplement native forest supply if there are further large-scale fires in the coming years

North East NSW region annual harvest volume and area from public native forests over time

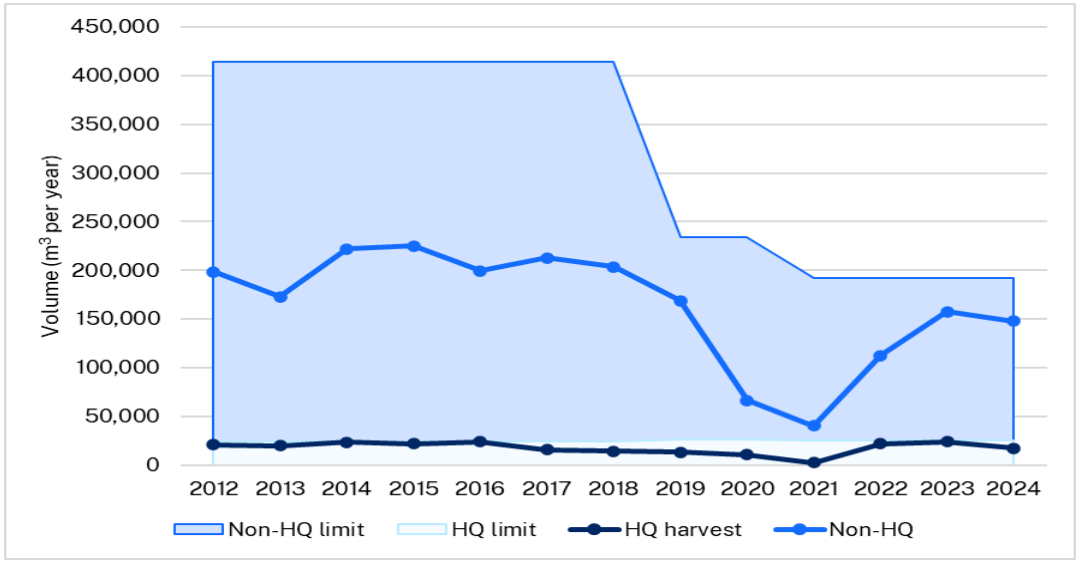
Note: area data is provisional in FY24 and unvalidated in FY04-09.
Data source – FCNSW

Historical harvest volumes are within sustainable limits

- In general, harvest volumes are within modelled sustainable yield limits **across all forestry regions** including annual overcut allowances
- Prior to 2018, harvest volumes for low quality products in the north-east and south-coast sub-regions were more than the volume specified in the Regional Forest Agreement (RFA)
- RFAs allowed for additional low-quality supply provided **high-quality volume limits were not exceeded**
- Remodelling in 2018 showed the low-quality sustainable yield was estimated to be much higher in these regions than the RFA specified volumes, which had been based on the historic supply of LQ when the RFA was signed



North East harvest volumes compared to harvesting limits (includes public native forest and hardwood plantations) Data source – FCNSW



Southern-Eden harvest volumes compared to harvesting limits
Data source – FCNSW

Sustainable yield estimates should better account for climate change

- RFAs require sustainable yield estimates based on a 100-year non-declining yield. In addition, estimates must be **independently reviewed and modelled yields** reconciled with actual harvest volumes. FRAMES models wood supply at the strategic landscape scale over the short-to-long term.[10]
- Independent reviews have recommended **actions to improve** sustainable yield modelling including **accounting for climate change forecasts** and remeasuring plot data more regularly to **build confidence** in longer-term estimates.[11]
- Sustainable yield modelling outputs are **highly contested**, have impacted **community trust** and need further work.

Regulation needs to be more outcomes focused and adaptive to reflect the dynamic nature of forests

- NSW's shift to a **contemporary regulatory framework** such as an outcomes-focused, multi-scale licence for the Coastal IFOA **reflects good forestry management practice**.

- However, in practice, the prevailing regulatory model is still characterised by a decision-making process that depends **heavily on prescriptive regulation** of surrogates for environmental values, as opposed to adaptive management to achieve specified outcomes.

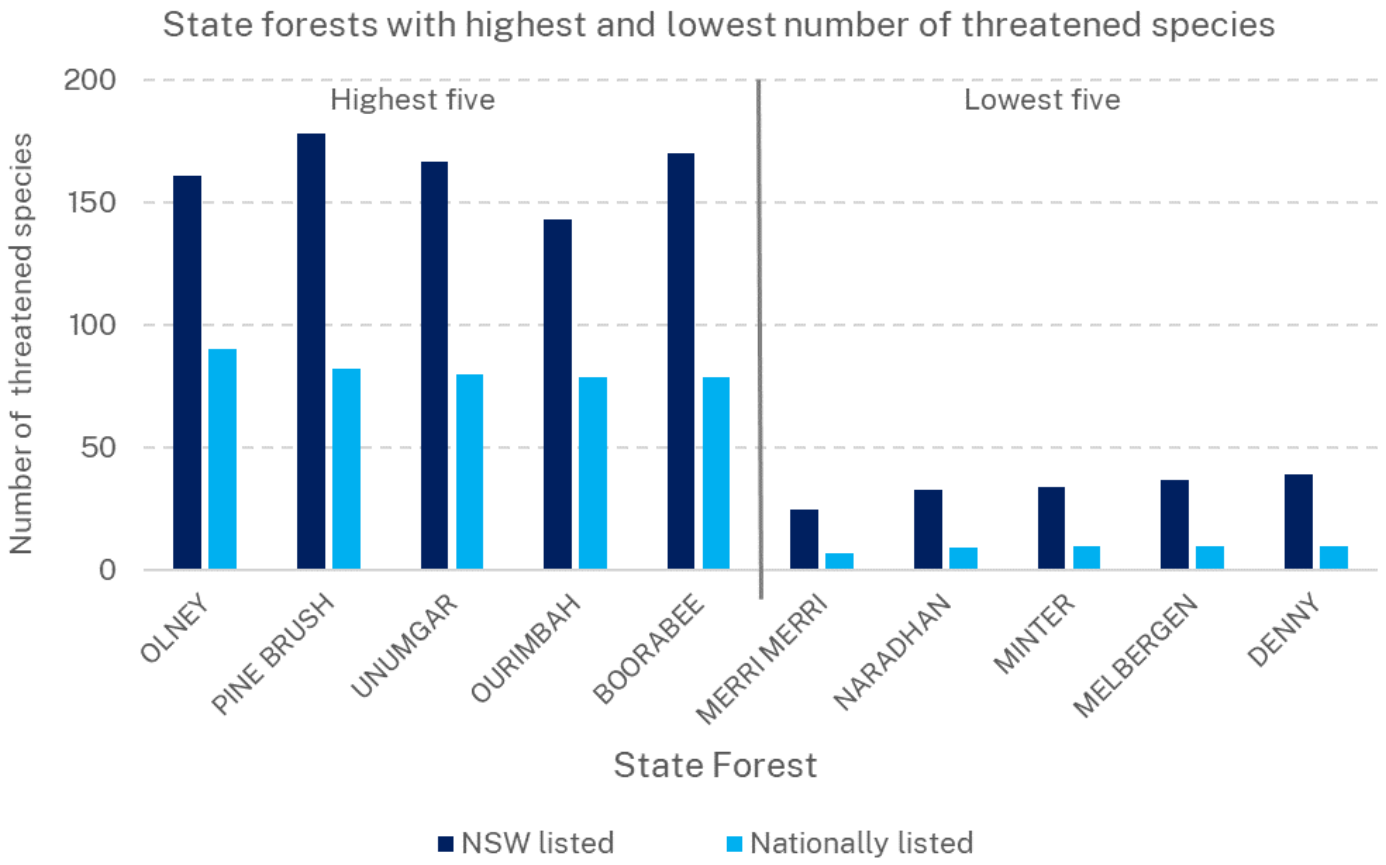
- This approach relies on **certainty and stability** which is **incompatible** with the reality of managing **diverse landscapes**, with unavoidable uncertainties and disturbances continually demanding responses. In reality, forested landscapes are **complex dynamic systems** and should be managed through adaptive decision making.[12]

- There are **opportunities to simplify IFOAs**, and further **shift to a more outcomes focussed** and **risk-based model**. For instance, this could include clear triggers for mega-disturbance events, supported by best practice compliance monitoring and enforcement including transparent, collaborative and risk-based compliance.

Environmental and cultural values of forests including threatened species

Many threatened species are found on state forests

- Over **1,100 species** are listed as threatened or critically endangered in NSW[13]
- The figure shows five state forests containing the highest and lowest number of threatened species based on observations (listed as vulnerable, endangered or critically endangered)
- **Forestry rules** contain **species-specific conditions** to manage many threatened bird, mammal, frog and flora species.
- Some species – such as the southern brown bandicoot have – have dedicated species management plans



Data source – NSW BioNet;

Fauna response to forestry is variable, with more impacts from intensive and large scale harvesting

- There are a significant number of threatened flora and fauna for which there is **very limited information available.** More knowledge is needed.
- Evidence from a major baseline study suggests **different species' response to forestry operations can be highly variable** – either negative, neutral, or positive[14]
- Importantly, each species **responds differently to harvesting disturbances**; some must be monitored carefully, while others are more robust
- Harvesting impacts need to be considered along with threats and other disturbances, such as fire, and cumulative impacts. Landscape scale, cross tenure management and long term monitoring is therefore critical
- The Coastal IFOA Monitoring Program has established 300 monitoring sites to estimate occupancy and trends over time for a variety of species

'The combined effects of climate change and fire represent the most significant threat to the biodiversity of eastern NSW forests'

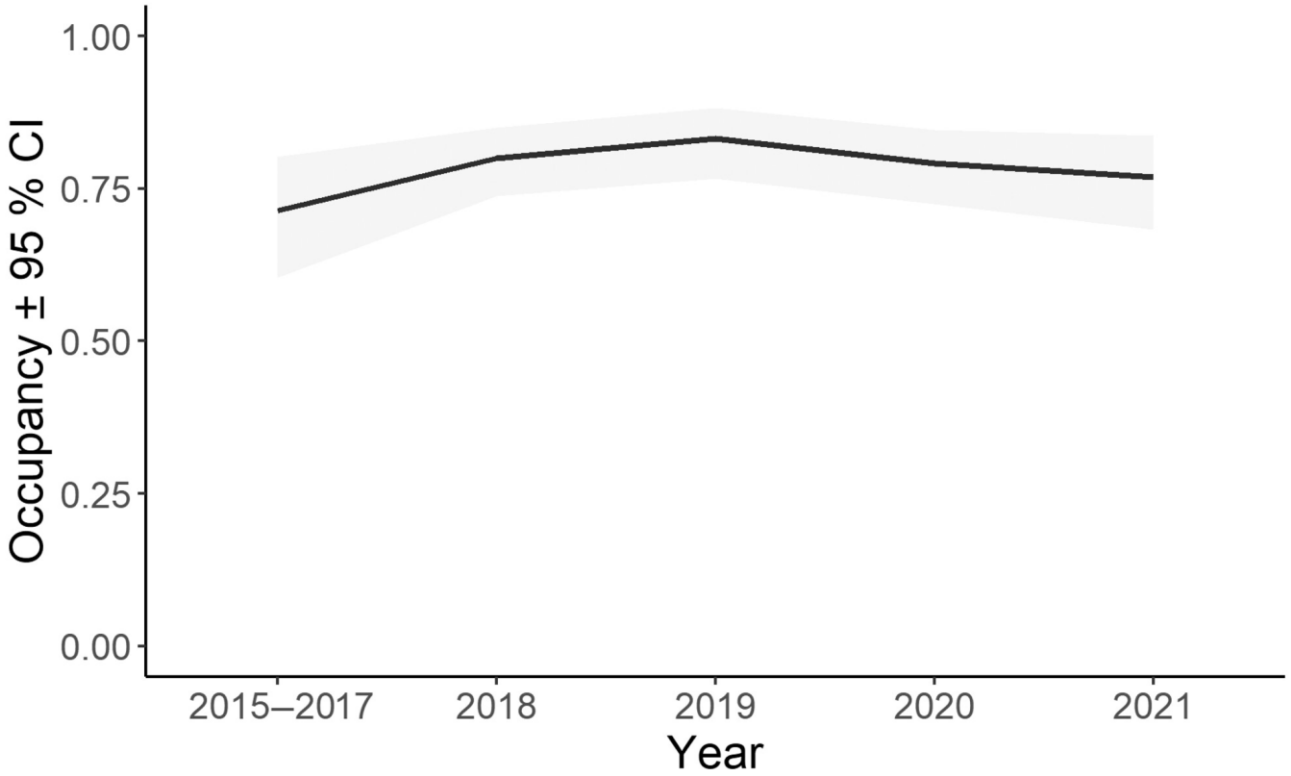
Kavanagh, R. et. al. (2022)[15]

"...fauna baselines established by scientists on state forests and other tenures are the largest and most significant analyses of this type in the history of forest management in NSW."

Prof. Phil Gibbons ANU[16]

Koala occupancy has remained stable on the north coast

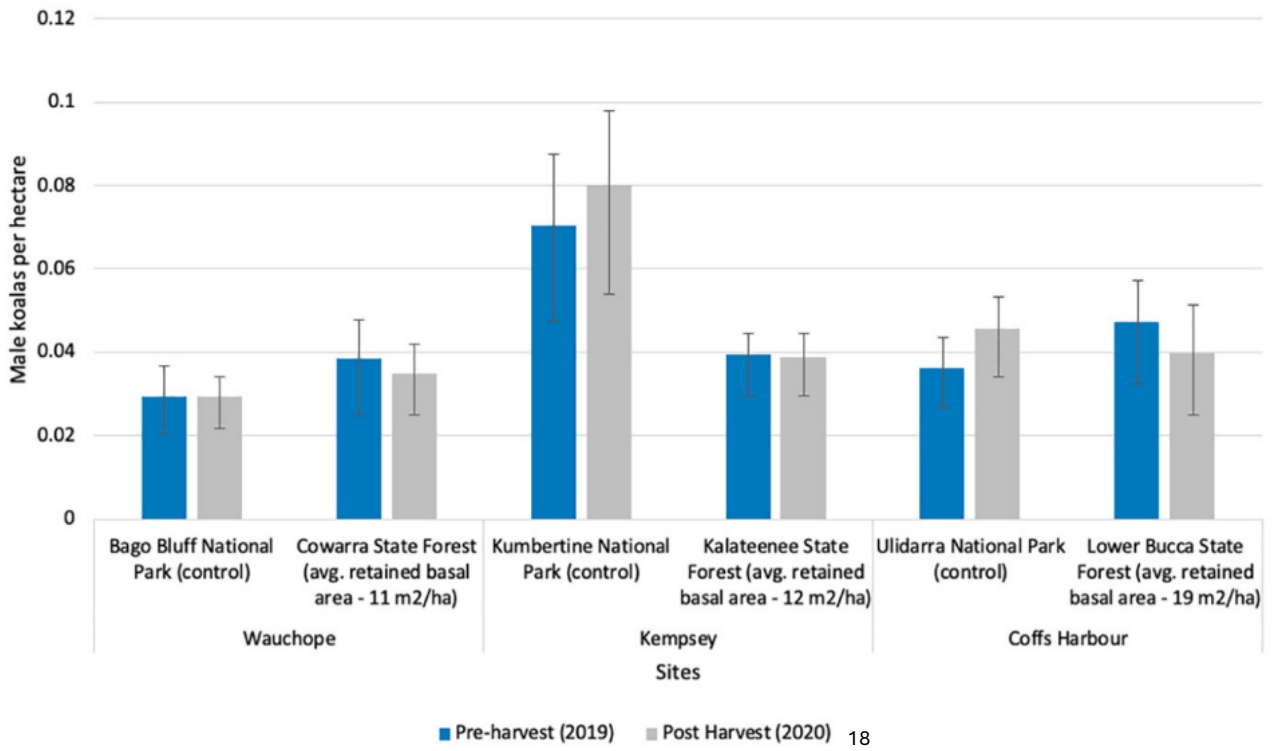
- Over seven years from 2015, 224 sites were monitored using passive acoustic recorders in both state forest and national parks, including recently harvested and unharvested areas.
- The study found that **koala occupancy was high and stable** even through severe drought and the extensive fires of 2019-20.
- In addition, the study found that **neither timber harvesting nor low-severity fire influenced koala occupancy** or bellow rates
- However, high severity fire was found to reduce site scale koala density
- Increasing **fire frequency and severity** associated with climate change will be a **major threat to koalas** across all tenures[17]



A stable trend in regional koala occupancy after accounting for imperfect detection and the environment at monitoring sites. Estimates for each year assume median values; i.e. an elevation of 231 m ASL, NDVI score of 0.8530 and selective harvesting (16–30 years age class) over 8% of a 1 km site buffer.

Selective harvesting did not impact koala density or habitat

- Recent research commissioned by the NRC found that **koala density was not reduced by selective harvesting** at north coast research sites. [18]
- Koala density was **mostly similar between state forest and national park sites** that had similar forest types, and a mix of old growth and regrowth from historical harvesting
- **Tree species composition** – not tree size – is the **key determinant of habitat** nutritional quality for koalas and, therefore, the density of koalas that can be supported
- Selective harvesting **did not significantly change** canopy tree species composition at the treatment sites, so is not expected to impact on the nutritional quality of koala habitat
- Research continues including analysing DNA to assess male/female koala ratios to account for male only bellows[19]



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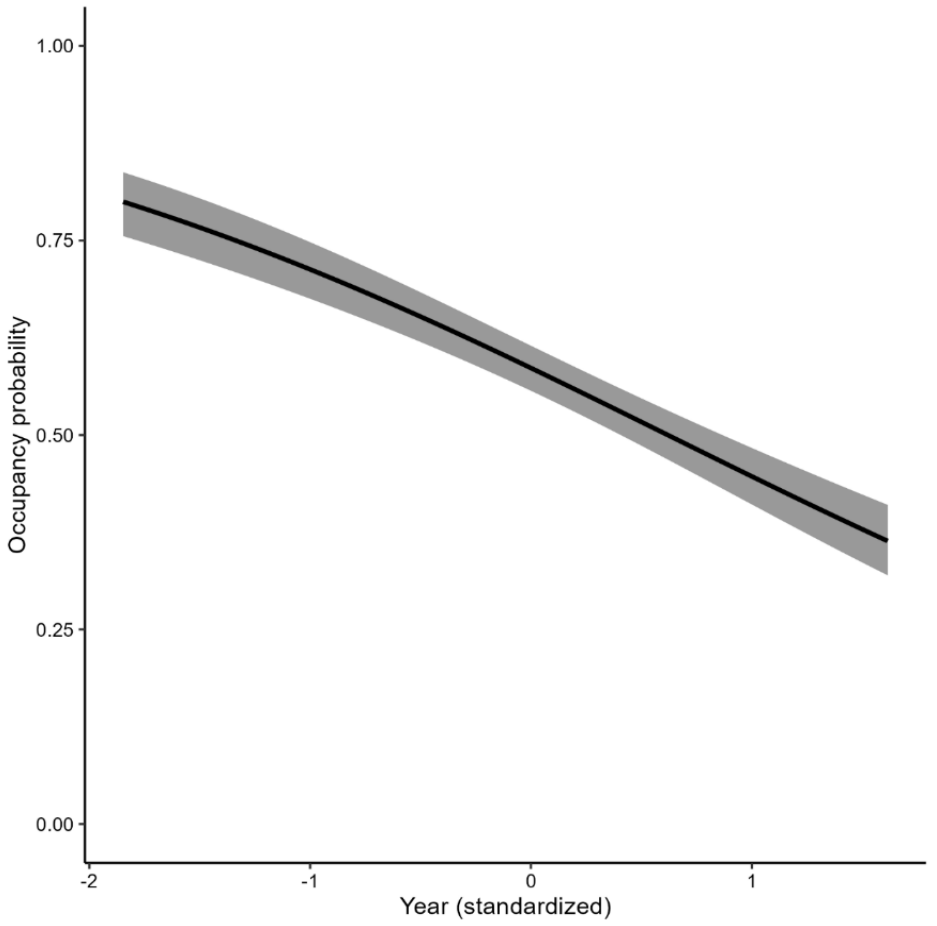
Greater glider occupancy has declined

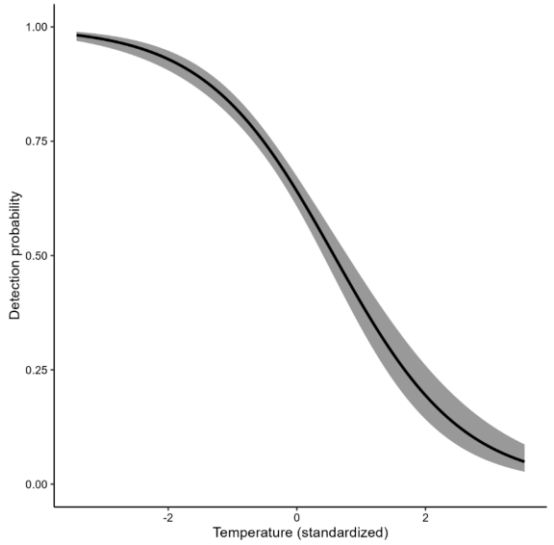
- Southern and central **greater glider populations** in NSW **have declined** with the **cause unresolved.**[20] Researchers have suggested **multiple factors** including land-use change, land management, inappropriate fire regimes, hyper-predation by owls and climate change.[21]
- Research has shown the **cumulative impacts of wildfire and timber harvesting** are linked to a decline in the abundance of greater glider. The negative impact of high-intensity harvesting on greater glider is well known.[22] Greater gliders can persist in areas with lower intensity selective harvesting silviculture. The amount of harvest exclusions within a coupe can promote greater glider persistence.[23]
- The density of greater gliders has been shown to decrease with more frequent wildfire and more intensive harvesting [24]
- Other studies found the amount of harvesting around greater glider sites was not found to have a significant effect on greater glider occurrence.[25] Other studies found greater glider populations were impacted at the compartment scale, but not at a broader landscape scale.[26]



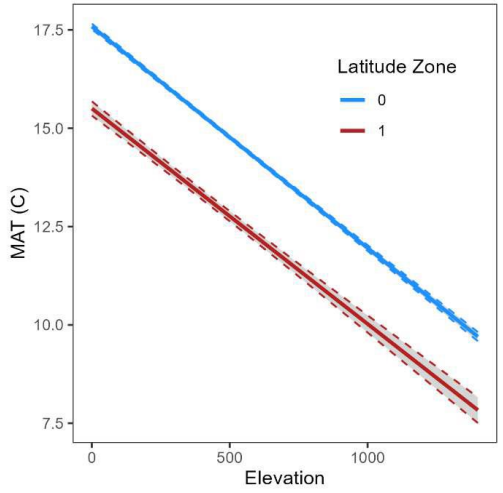
Trend in Occupancy over time in the Coastal IFOA region (1997 – 2024).[27]

Emerging evidence suggests temperature and fire are key drivers impacting greater glider populations

- A study investigating fauna occupancy baseline and trends across tenures in the Coastal IFOA region, found that between 1988 and 2011 in the forests south of Eden the **greater glider declined significantly** and did not recover in the survey period.[28]
- Greater glider declines appear related to fire severity with larger declines associated with higher severity fire, and larger impacts predicted in southern NSW.
- New and emerging evidence suggests a **strong relationship** between declining occupancy and mean **annual temperature** and **fire frequency**. The negative effect of harvesting at the Coastal IFOA scale was weak, but more field data is required to increase confidence levels. [29]
- Enhanced Coastal IFOA prescriptions (including surveying) are now in place to promote the persistence of greater gliders on state forests. The NRC is overseeing a new monitoring plan for greater gliders on state forests.

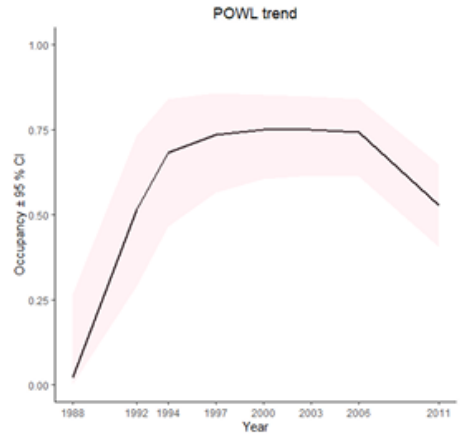
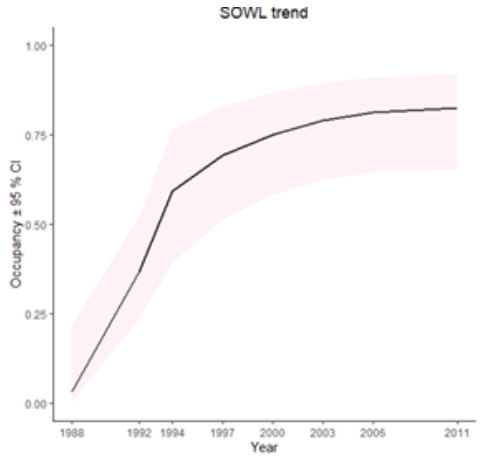
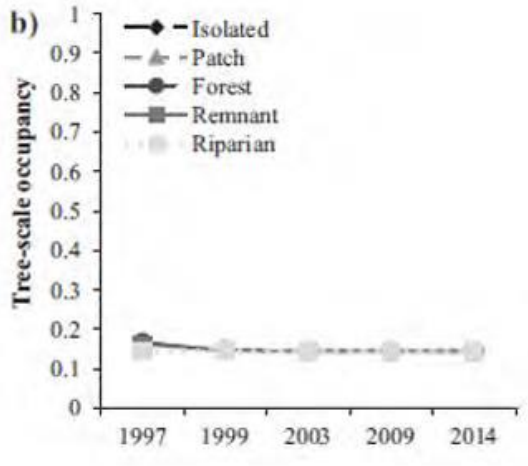


Relationship between detection and temperature recorded at time of survey: 50% detection probability occurs at 18.7°C, 90% detection probability at 11.1°C, and 10%, detection probability at 26.3°C.

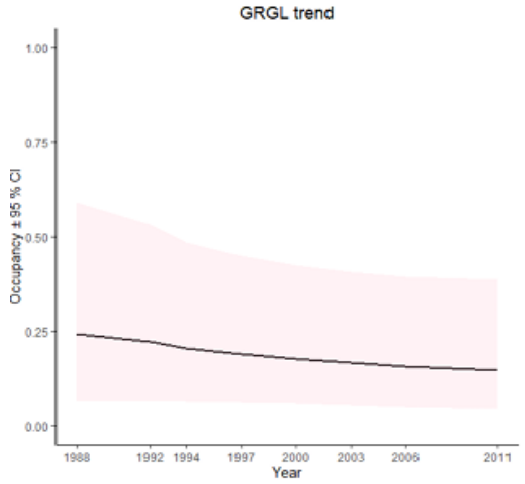
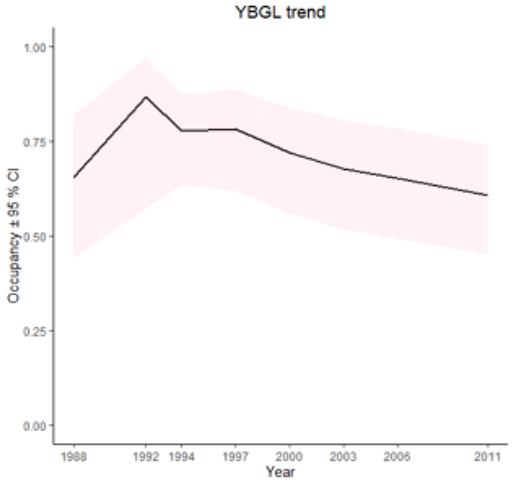
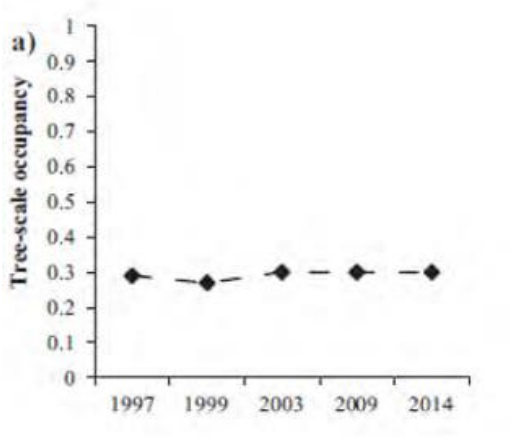


Relationship between elevation and temperature by latitude zone: 0 = north (> -34°S) and 1 = south (< -34°S). Both models were significant (P < 0.001) with the north (i.e., Latitude Zone 0) model explaining 83% of the variation and the south (i.e., Latitude Zone 1) model explaining 74% of the variation in the relationship between elevation and mean annual temperature [30]

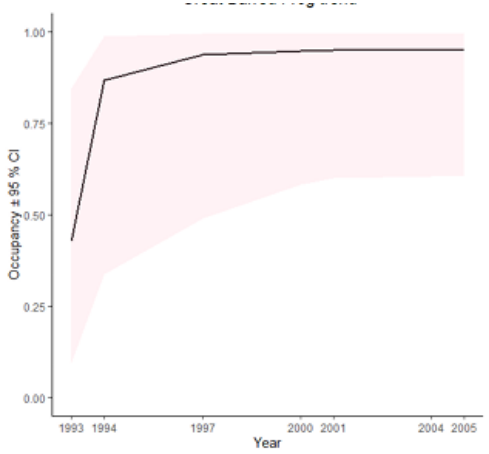
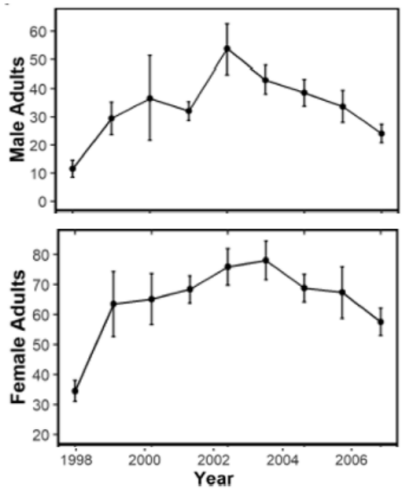
Snapshot – species occupancy

Species	Powerful owl	Sooty owl	Tawny frogmouth
Modelled occupancy			
Trend	Variable; increasing then decline	Positive	Stable
Region	Eden	Eden	Northern NSW plantations
Data period	1988-2011	1988-2011	1997-2014

Snapshot – species occupancy

Species	Greater glider	Yellow-bellied glider	Sugar and squirrel glider
Modelled occupancy			
Trend	Steady decline	Stable, then decline	Stable
Region	Eden	Eden	Northern NSW plantations
Data period	1988-2011	1988-2011	1997-2014

Snapshot – species occupancy

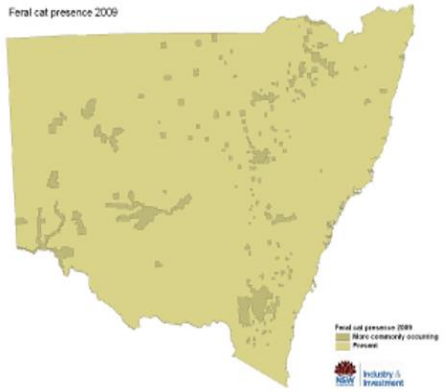
Species	Great barred frog	Large-footed myotis	Eastern horseshoe bat
Modelled occupancy & abundance			
Trend	Positive	Fluctuating, declining	Fluctuating
Region	Chaelundi	Upsalls Creek	Ourimbah
Data period	1993-2005	1998-2006	1999-2019

Invasive species remain a key threat in NSW forests

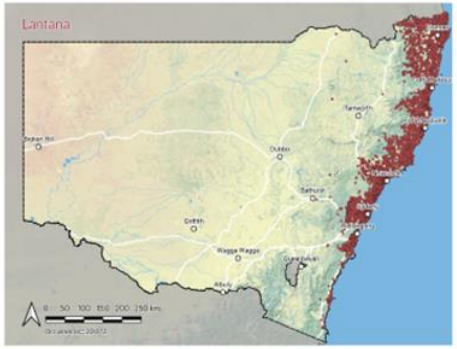
- Invasives species remain a key threat to threatened fauna and flora, and overall forest ecosystem health.
- The red fox and feral cat remain widespread in northern and southern NSW forests.
- A study reported both these invasive species were estimated to occur at every second camera trap location in southern NSW. Introduced predators were more common and widespread than many native species.[34]
- Aggressive weed species have the capacity to divert or arrest forest succession and threaten sensitive flora and fauna. Lantana and Blackberry are two widespread species in eastern NSW forests.[34]
- In 2022/23, NPWS invested $47 million on invasive species management, while FCNSW invested $3 million.[35]

Fox occurrence

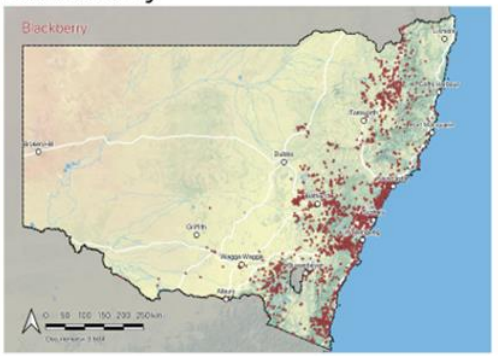
Feral cat



Lantana



Blackberry



Source: NRC (2024) Preliminary report – NSW Invasive species management review

Perpetuating hollow bearing trees on state forests is critical

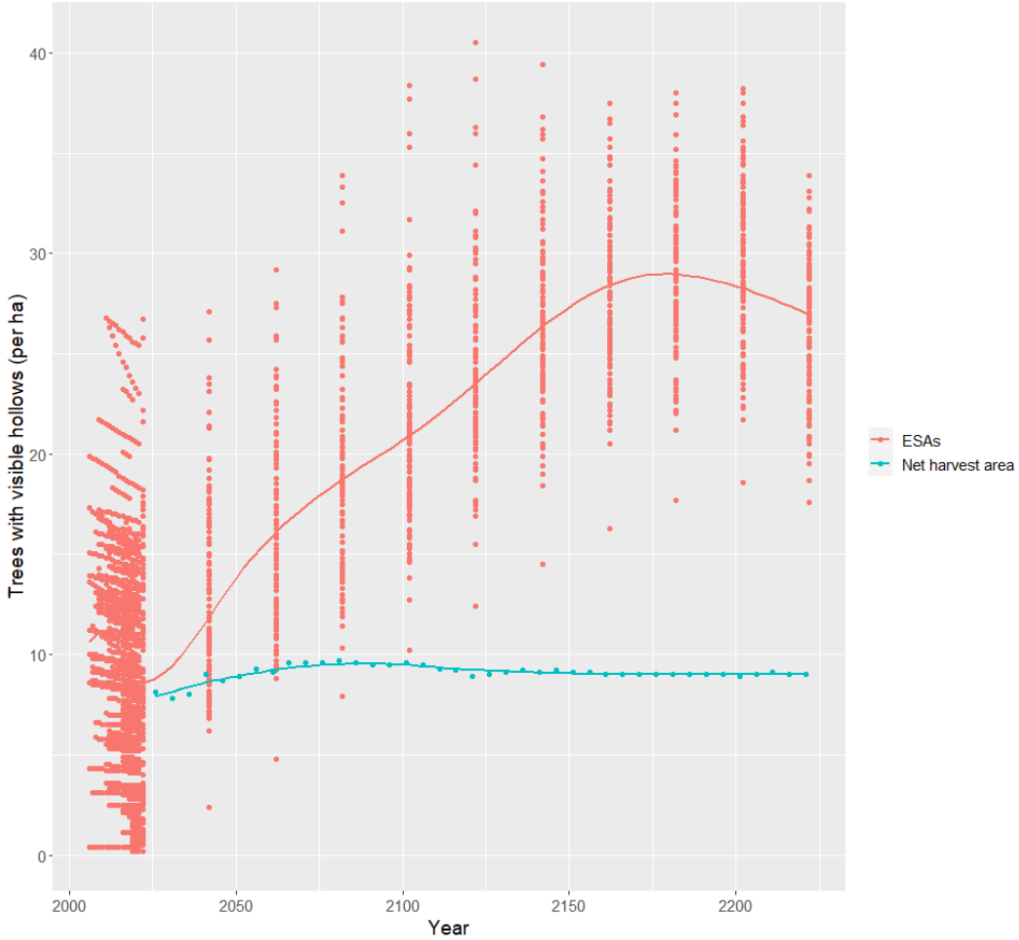
- **Hollow bearing trees** have high ecological value for native fauna. Some mammals and birds are particularly dependent because with few exceptions, they do not use alternative sites. **Gliders are relatively more dependent** because they use hollows year-round.[36]
- In relation to the number of trees required by different species the **literature is inconclusive**. Many studies have been relatively short-term so their evaluation may be incomplete, and many have occurred where there is a high density of hollow-bearing trees so animals may simply use more trees because many are available.[37]
- Recent research found **less than 50 percent of hollow-bearing** trees are **typically occupied by vertebrate hollow-dependent fauna**; as such, methods that use tree diameter and tree species alone to predict how many hollow-bearing trees occur will over-estimate the number of hollow-bearing trees suitable for vertebrate species.[38]

Species	DBH	Entrance diameter	% dead trees	Den spacing	Home range (ha)	[1]Dens per ha
Greater glider	58–128 (2)	18 (1)	7–16 (5)	20–150 (2)	1–3 (4)	1 (2)
Yellow-bellied glider	73–160 (3)	11 (1)	0–2 (4)	50–500 (3)	30–65 (3)	0.1 (3)
Squirrel glider	41–93 (5)	<5 (3)	8–54 (6)	20–300 (2)	5–15 (3)	0.4–0.6 (3)
Sugar glider	NA	<5 (3)*	NA	20–50 (3)*	4–5 (2)	0.4 (3)
Feathertail glider	66 (1)	<3 (4)*	NA	20–100 (4)	[a]0.2–2.1 (2)	NA
Brushtail possums	>70 (3)	10–20 (2)*	NA	20–100 (2)	2–6 (2)	1 (2)
Brush-tailed phascogale	>40 (3)	2.5–4.5 (3)*	5–35 (3)	10–400 (2)	15–120 (1)	0.1 (3)
Eastern pygmy-possum	57 (1)	<3 (4)*	20 (1)	10–200 (2)	3–4 (1)	0.3

Den and tree hollow attributes used by focal species. Values are the range in mean values. (cm). Numbers in brackets show the number of studies contributing to those values. NA= not available; *includes nest box studies; a short-term areas only. Dens per ha is based on the number of primary dens per home range area.1Studies contributing to these values have this superscript in the text describing home ranges and den trees. [39]

Hollow bearing tree are predicted to perpetuate in line with rule sets

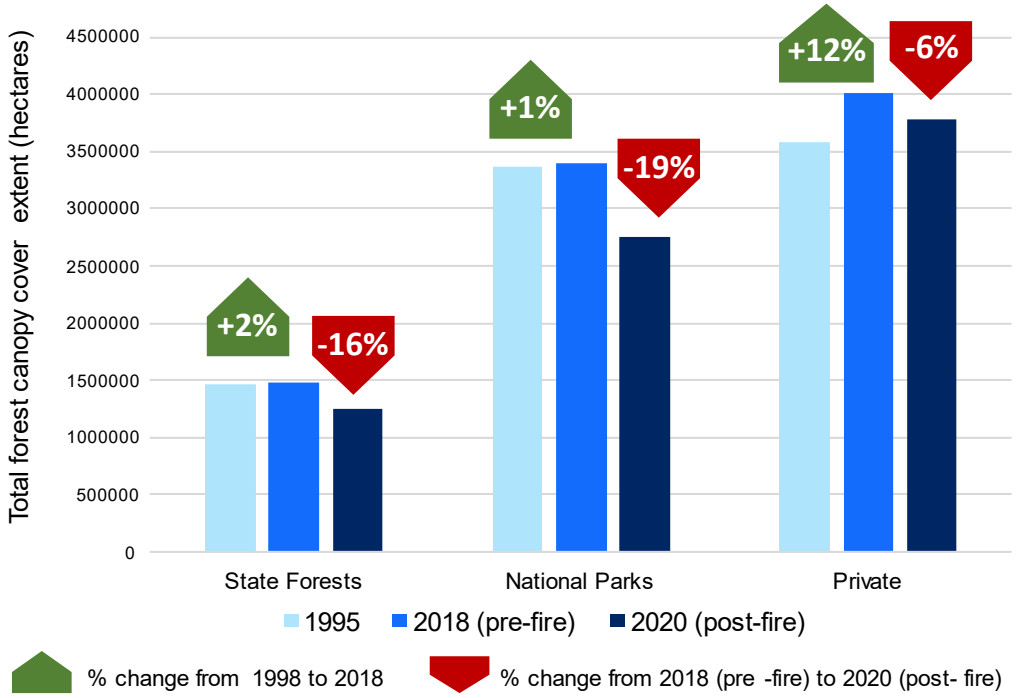
- Modelled simulations over a 200-year period showed the Coastal IFOA conditions **maintain a stable 8-10 trees per hectare** with visible hollows in the net harvest area, and 2-3 trees per hectare with hollows suitable for occupancy by vertebrate fauna. Hollow bearing trees are **predicted to increase** in areas permanently excluded from harvesting in state forests.[40]
- Under enhanced Coastal IFOA prescriptions for greater gliders, significant areas of the state forests must retain up 14 hollow bearing trees per hectare in the net harvest area
- **Fire** can have **positive and negative impacts** on hollow bearing trees. Increased fire frequency can decrease the number of hollow-bearing trees available and the proportion of large trees with potential to form hollows. [41]
- Conversely, the number of past fires increases the probability of a tree having a hollow, and the likelihood of hollow formation is higher in larger fire-affected trees.[42] Mature trees that survived the 2019-20 wildfires have the potential to form new hollows faster compared to undisturbed mature trees.[43]
- The NRC is overseeing further work to improve data collection and modelling for hollow bearing trees on state forests.



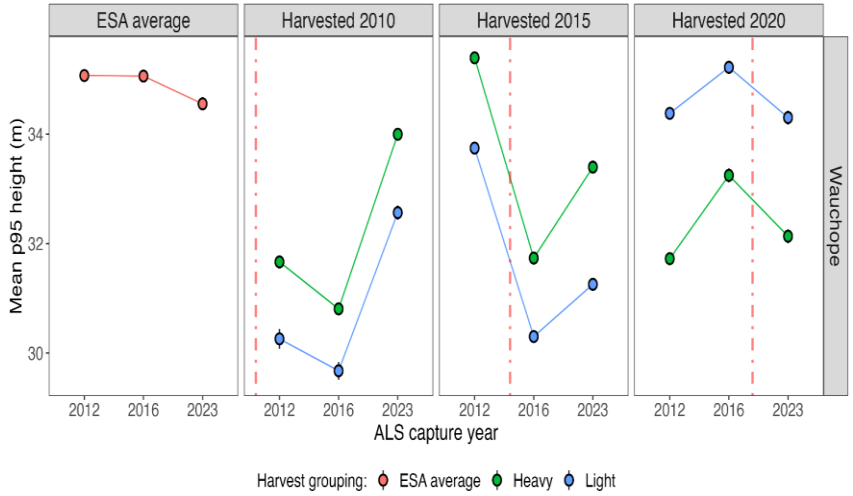
Predicted numbers of trees with visible hollows under scenarios of no further harvesting (ESAs) and ongoing harvesting (net harvest area) for the Coffs Harbour Timber Zone. Predictions are as simulated in FRAMES (v12.01). Trend lines are fitted with a loess smoother.[44]

Forest cover increased prior to 2019-20 wildfires

- Prior to the 2019-20 fires, **forest canopy** cover extent showed a gradually **increasing trend** since 1995
- By 2018, forest canopy cover extent in the RFA regions had **increased by around 5%** compared to 1995 figures. Forest canopy cover extent in state forests during this time remained **largely stable**[45]
- The 2019/20 wildfire had a significant impact on forest cover extent
- Recent research using LiDAR data found that **harvesting influences** vertical and horizontal biomass distribution, which then **returns to pre-harvest levels** within 10 years
- Similarities were found in canopy structure between areas managed for timber production and areas managed for conservation[46]



Change in forest canopy cover extent across NSW Regional Forest Agreement regions [45]



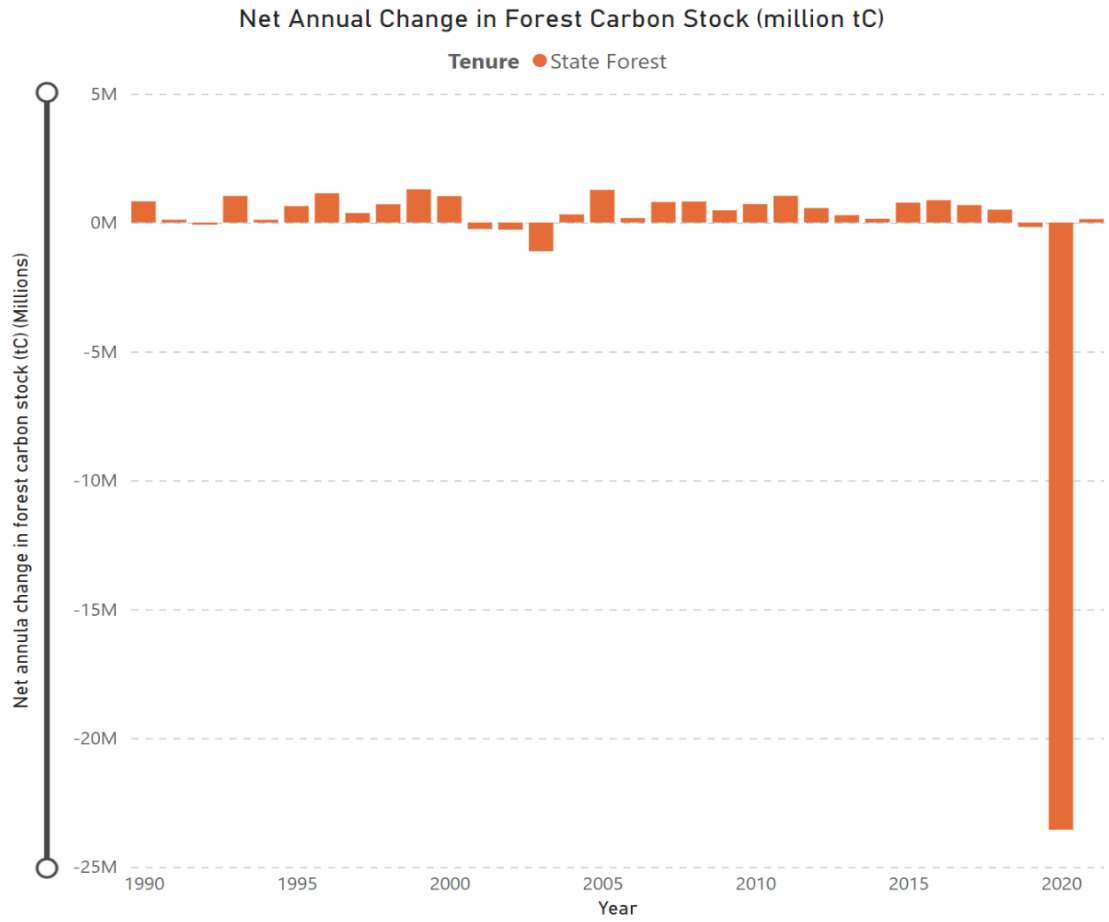
Change in mean canopy height for areas harvested in 2010, 2015 and 2020 on state forests Wauchope area. Vertical red dashed line is a visual guide of the approximate timepoint of silvicultural disturbance. [46]

Harvesting and fire combined caused more tree compositional change than either harvesting or fire alone

- **Effects of disturbance** on tree species composition is s**pecies-specific** and varies by intensity of disturbance, region and time since disturbance
- **Fire affected** tree species composition **more than harvesting** on north coast, but had less effect in south coast and tablelands forests (NB more data is available for north coast forests)
- **Multiple disturbances** by harvesting and fire caused **more compositional change** than either harvesting or fire alone
- For most tree species, composition **returned to pre-harvest levels within 10 years**, but was slower for some species in cooler tablelands forests and intensively harvested forests
- Harvesting and fire disturbance **have minor and short-term effects** on tree species composition and the basal area (and abundance) of many key **habitat tree species** that provide browse or sap for fauna

State forests had a net positive carbon balance prior to the wildfires

- Native forests and plantations in state forests within the NSW RFA regions had a **net positive carbon balance** from 1990 (including harvested wood products), and before the 2019/20 wildfires.
- In a typical year, carbon sequestered and stored in forests and wood products **far outweighs** that emitted through fire (planned and unplanned) and harvesting operations.
- However, widespread **unplanned fires** can lead to **substantial emissions** that are dramatically larger than both the emissions from forestry operations and the sequestration from forest growth.
- Carbon flux from harvesting is less than clearing and wildfires [48]

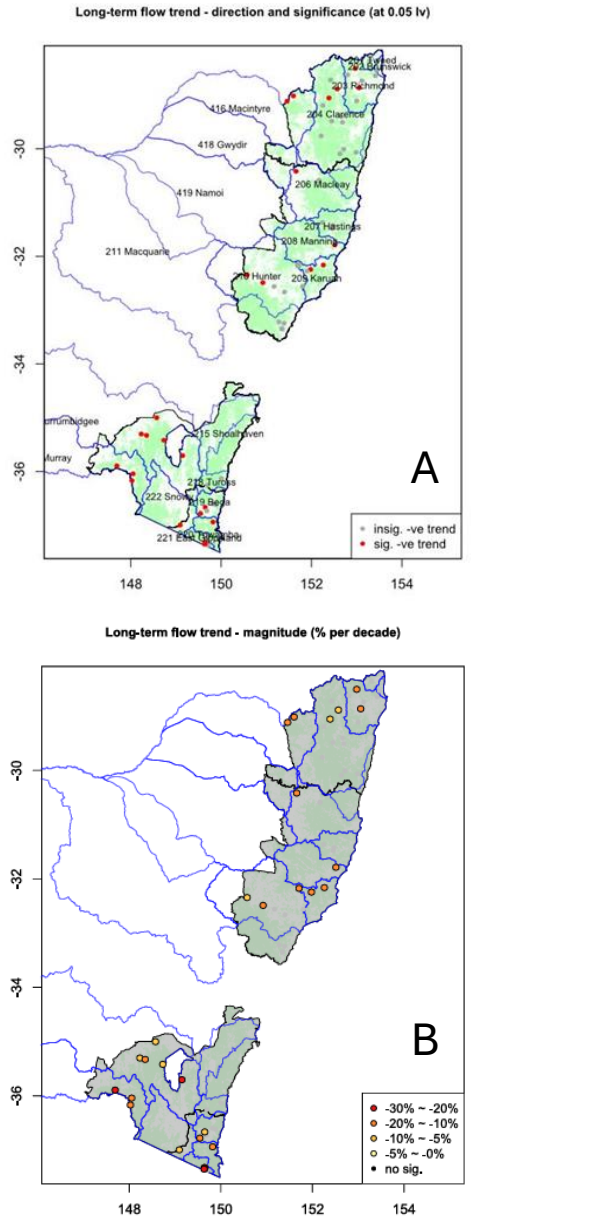


Net annual change in forest carbon on state forests in the NSW RFA regions

Data generated from Interactive charts (1990 to 2021)

Water flows are decreasing in coastal forest catchments

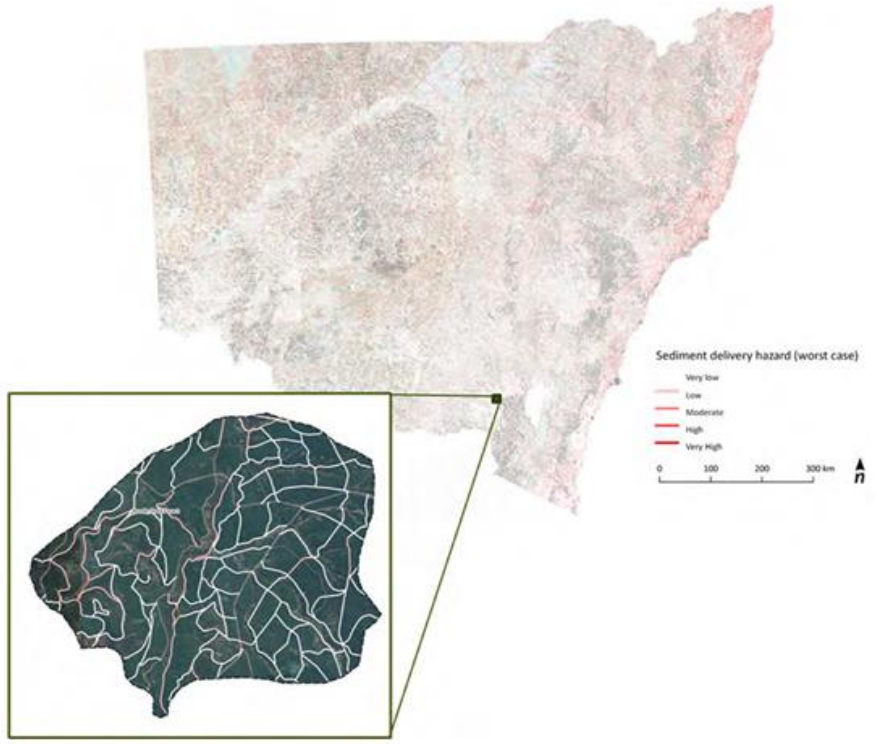
- **Annual flows have decreased** in coastal forested catchments over the last 35 years, with most **significant decreases in south coast forests.**[49]
- One third of coastal forest catchments had **10% to 20% flow decrease relative to the long-term average**, with similar findings for almost half of the catchments outside of NSW coastal areas.
- In Regional Forest Agreement regions, flow reductions were generally smaller for catchments with a **higher mean annual flow**, **greater area of national park**, **greater accumulated area harvested**, or **greater accumulated area burnt**.
- At the catchment scale, **historical changes in flow** are generally **more heavily affected by hydro-climatic drivers** than fire events, although some impacts on streamflow due to fire events were observed.[50]
- Change in water quality indicators is challenging to determine due to lack of reliable data.



The A) direction and significance and B) magnitude of long-term trends in mean annual flow across forested catchments within the NSW Regional Forest Agreement regions. All trend magnitudes are in % change per decade, relative to the long-term averages of individual sites.[49]

Harvested native forests yield less water; forest roads remain the key risk for water quality

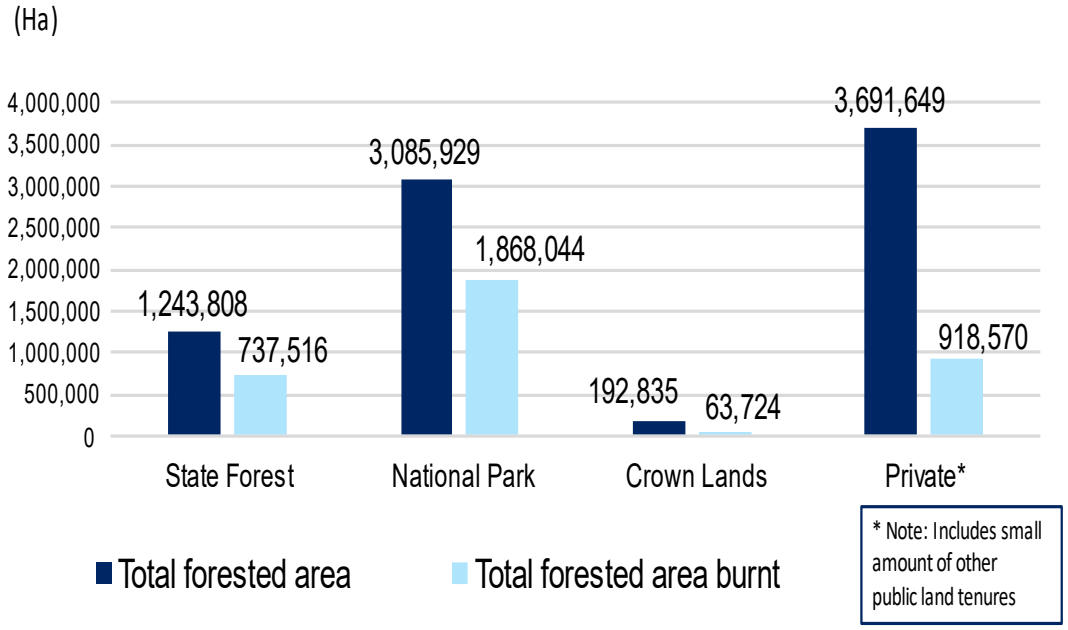
- Immediately **following harvesting** there is an **increase in downstream water** yield, and then a **substantial decrease** as the **forests regenerate a**nd retain more water until the trees reach maturity. [51]
- CIFOA regulations **reflect best practice** for and run off from harvesting operations. [52]
- The **extensive road network** across the state forest estate remains a **significant risk** to water quality.[53]



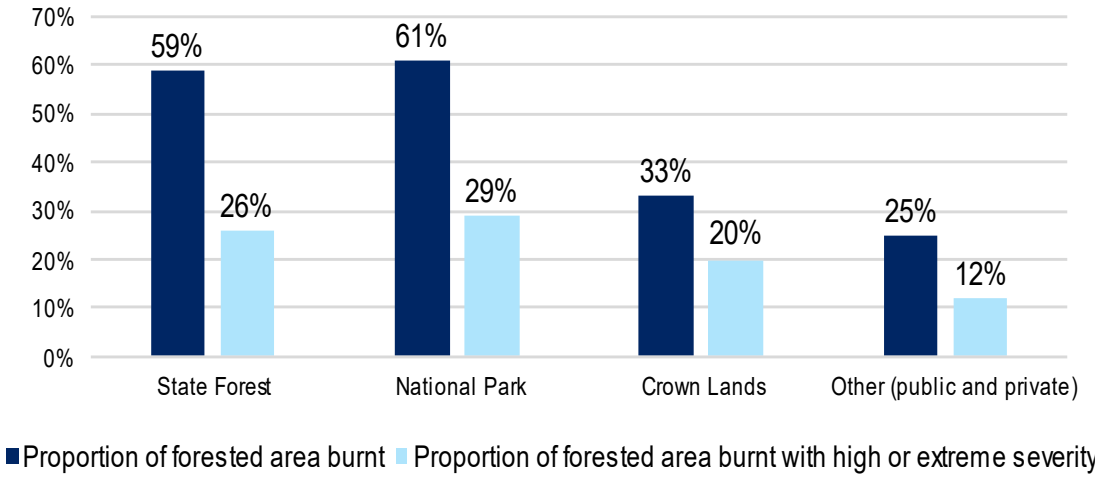
Forest roads with sediment delivery potential [xx]

The 2019/20 wildfire was unprecedented

- In the 2019-20 fire season, **wildfires burnt 4.8 million hectares** of land in NSW. They were unprecedented in their scale, severity, and duration and led to significant impacts on forest ecosystems and socio-economic values. [54]
- Within the Coastal IFOA area, the fires burnt **59 percent of the 1.2 million hectares** of forested State Forest, along with 57 percent of the 3.2 million hectares of forested National Park. On these tenures, almost half the burnt area was burnt at high or extreme severity.
- Some species and populations had m**ore than 80 percent of their habitat impacted** by the 2019/20 wildfires.[55]
- Research suggests that a **long drought** preceding the 2019/20 wildfires, coupled along with **strong and hot westerly winds** and topography were **the primary drivers** for the scale and severity of the fire event. Previous fires and management had a very low effect. [56]



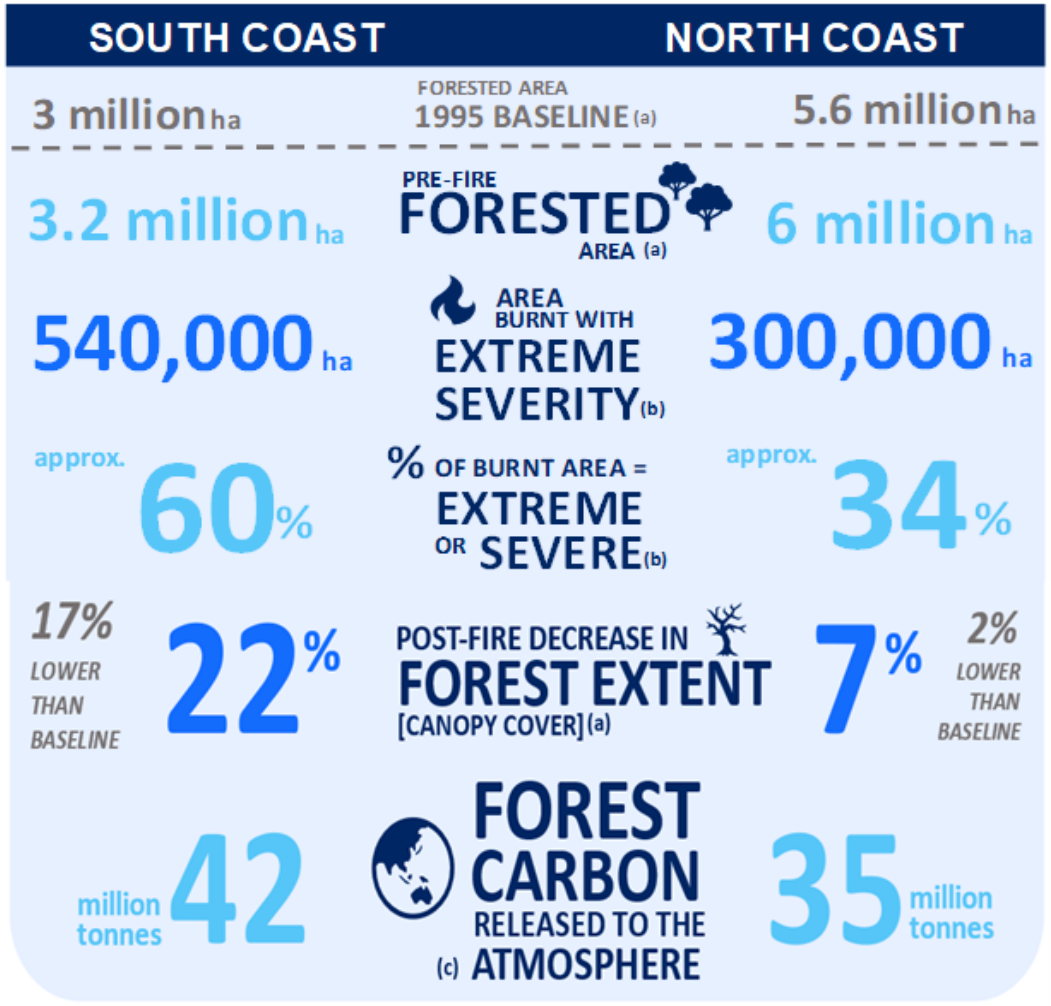
Fire extent for the 2019-20 fire season [57]



Fire severity for the 2019-20 fire season [57]

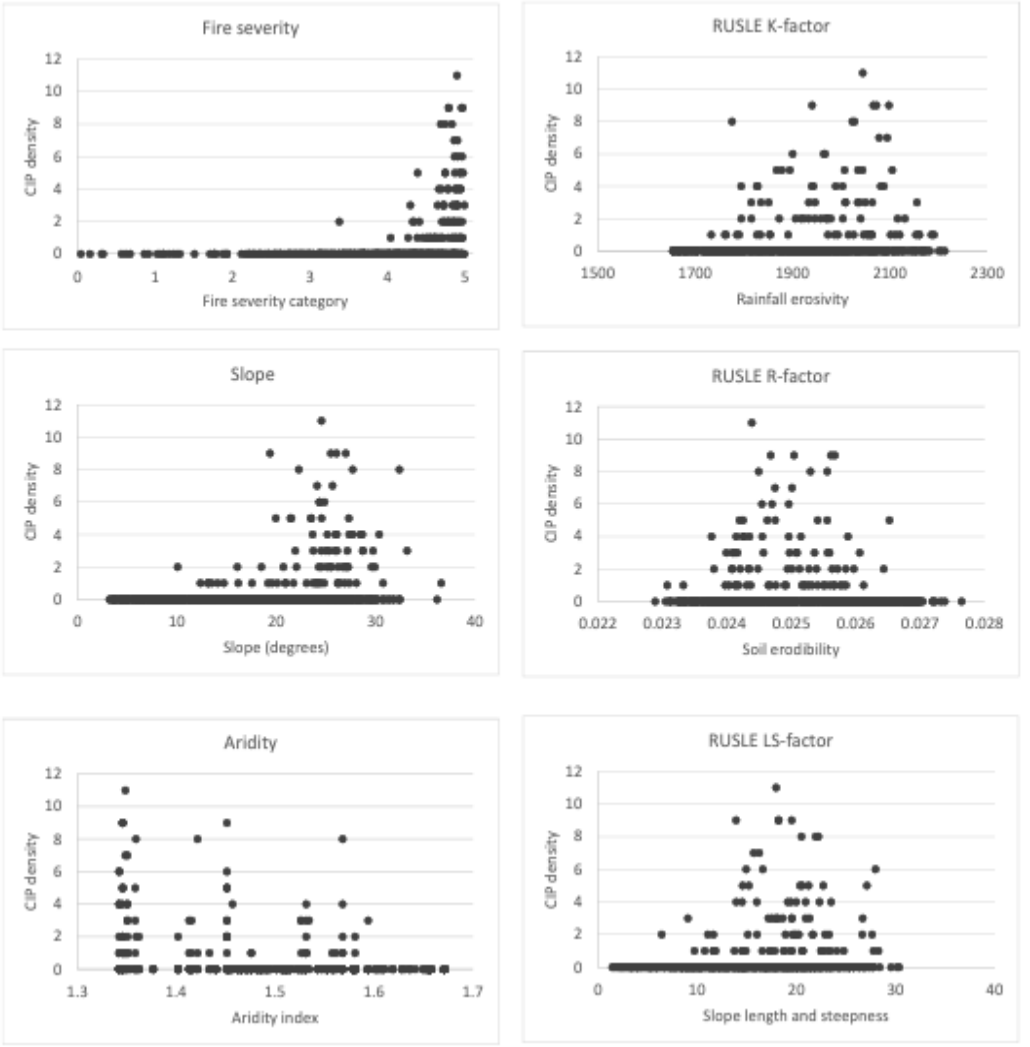
2019/20 wildfires were more intense in southern coastal NSW

- The **fires** were **more intense in southern coastal NSW** than in northern coastal NSW, reducing the overall forest canopy cover extent in the south to well below 1995 baseline levels.[58]
- South coast forests support a range of biodiversity, cultural, social and economic values. For example, this region includes key habitat areas such as the Murrah Koala Flora Reserves, which provide habitat for the last significant koala population on the NSW south coast.
- Over **40 percent of the South East Corner bioregion** is dedicated to the **reserve system**.
- The **south coast forests** are considered particularly **vulnerable to subsequent disturbances** and impacts in the short-term during the post-fire recovery period.[58]



Fire, and its severity is linked to waterway health

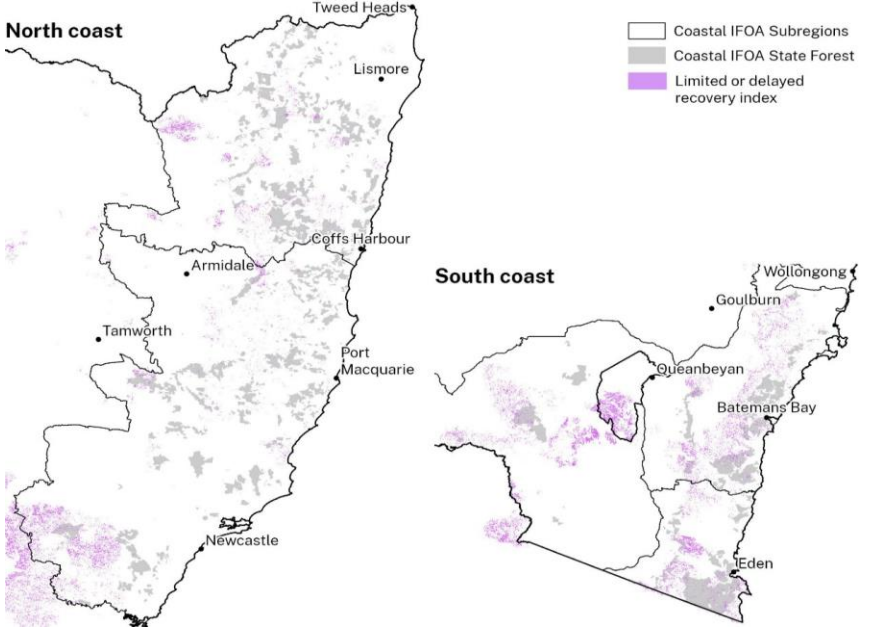
- Recent research found **fire severity** and slope were key variables **driving the amount of sediment** delivered to waterways after the 2019/20 wildfires.[59]
- The frequency of debris flows **increases markedly** when a bushfire results in **crown scorch and crown burn**.
- Dry forests have much higher frequency of debris flow than wetter forest types.
- Areas within the study area classified as softwood plantations or agricultural land **did not have higher debris flow frequency** than native forest.



Association between landscape attributes and CIP density in the Tuross study area. As skewed distribution in the datapoints indicates a relationship between density and a landscape attribute. Fire severity is an important control as shown in the chart.[59]

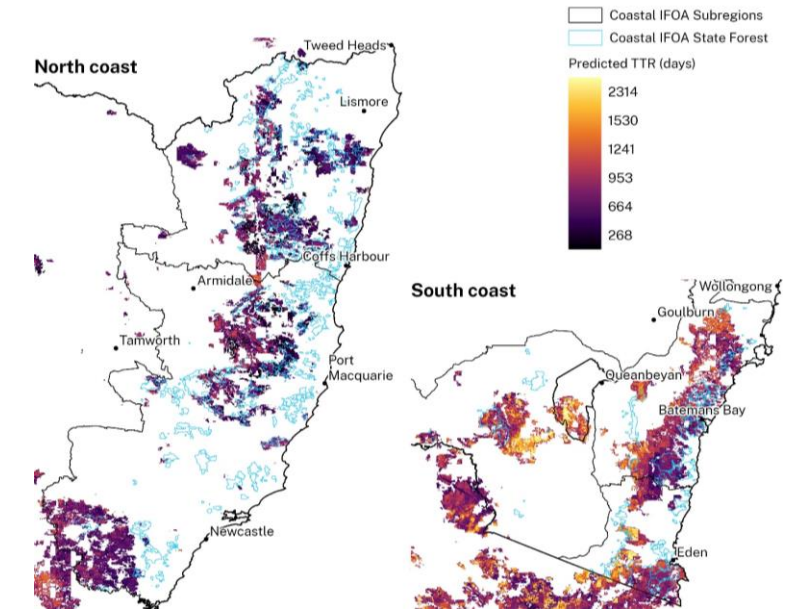
Recovery is underway after the 2019/20 wildfires

- Since the 2019-20 wildfires, **NSW's coastal forests** have **shown signs of recovery** following the impacts of the fires, with recent studies providing spectral and field-based evidence of forest and canopy regeneration.[60]
- It is likely the **widespread regeneration** observed across the firegrounds has been driven by above **average rainfall** in coastal NSW in the years following the fire. [60]
- A range of studies in the Coastal IFOA region have found variable environmental responses to fires. For example:
  - southern brown and long-nosed bandicoot populations increased substantially in the Eden region after a sharp reduction immediately after the fires (unpublished) [61]
  - monitoring on state forests showed long-nosed potoroo occupancy was in decline for several years during drought conditions prior to the fires, reaching a low point immediately post-fire followed by gradual recovery in subsequent years; studies in national park areas show that by 2023 long-nosed potoroos had recovered to levels approximating pre-fire estimates(unpublished) [62]
- **Around four percent of forest cover in the Coastal IFOA region is showing limited or delayed recovery**. The Australian Alps bioregion (the Alps) in NSW has been highlighted as an area of concern based on an analysis of post-fire vegetation recovery.[63]
- Recent research found that for most forests within the Coastal IFOA area, the average time to recovery for canopy leaf area ranged from less than two years to up to five years. This **recovery rate was on average 15 percent** longer for the 2019-20 fires than previous fires but less than expected due to the extent and severity of the fires, likely due to the high rainfall in 2020.[64]



Limited or delayed recovery index

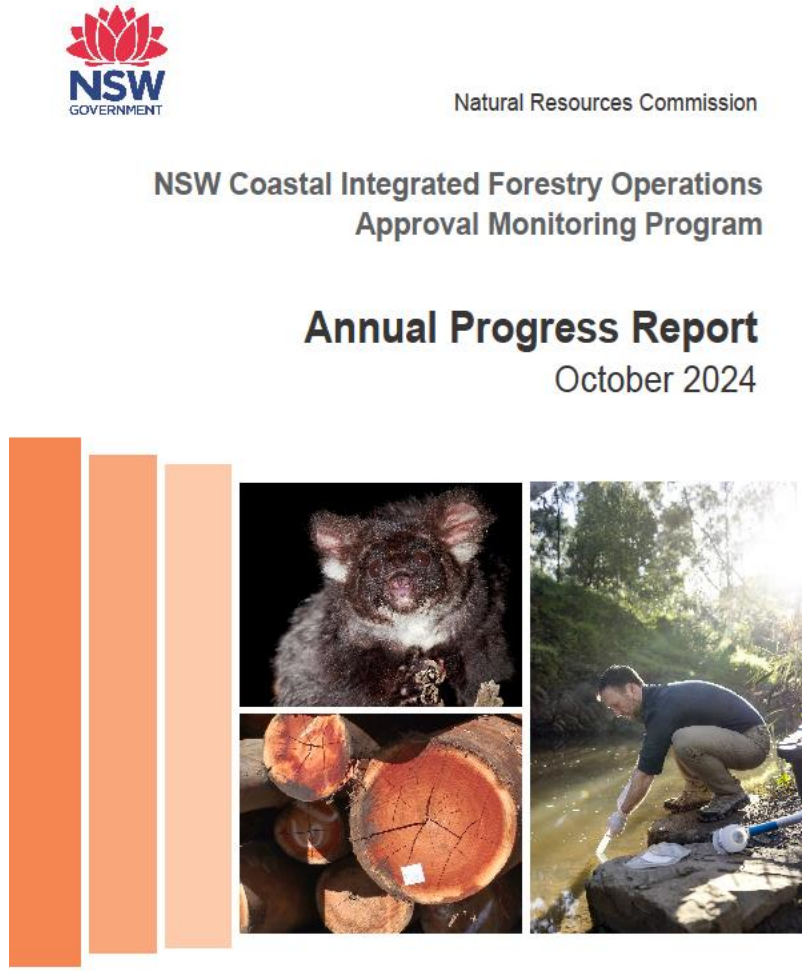
(Data source: NSW DCCEEW)



Predicted time-to-recover for forests in eastern NSW after the 2019-20 fires [59]

Continued monitoring to inform sound decision making is essential

- Previous reviews of NSW forest agreements demonstrated there is **strong community interest** in tracking long term the maintenance of forest values, including cultural, environmental, social and economic values. [65] There is **consensus and demand for reliable and transparent information** to make better decisions about forest management in NSW.
- In response, the Premier asked the NRC to oversee a cross-tenure forest monitoring program in 2019. Funding for the program ceased in 2022.
- The Commission still oversees a program to monitor outcomes for production forests on state forests and private land in collaboration with agencies and independent experts. In 2023, the NSW Government committed up to $1m p.a. over 20 years for the Coastal IFOA monitoring program.
- Independent cross tenure monitoring is needed to ensure comparable data is generated to track ecosystem health and inform management performance. It's vital also that such data is **analysed and transparently shared with the wider community** in a timely fashion.



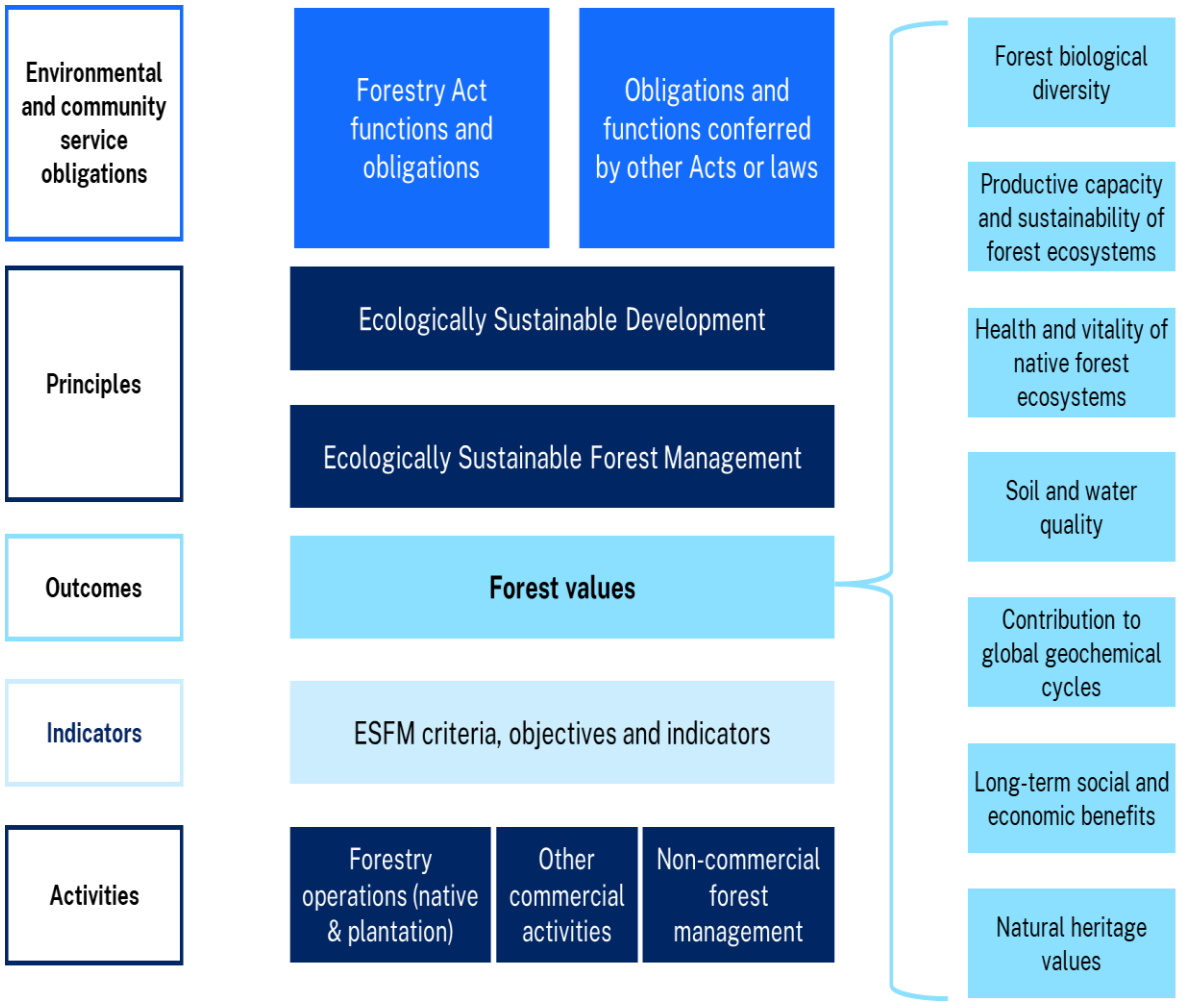
The role of state forests in maximising the delivery of environmental, economic and social outcomes

Community expects values on all public tenures to be protected and managed for the long-term benefit of all

- The **first forestry reserves in NSW** were created in 1871 and by the early 1900s covered more than 3 million hectares. Their purpose was to **retain public forestry resources** at a time of extensive land clearing for cultivation and grazing, and timber harvesting for development.
- In 1912 the first state government pine plantations were established, followed by eucalyptus plantations around 1940.
- Since the 1990s, changes in state government policy and reassessment of forest values have led to a **significant proportion of State forest areas being converted to protected areas.**
- Although each type of public land in NSW has a different history, a common feature is that the reasons for land designations and management have changed over time. The complex history of public land means that **all tenures have the capacity to support multiple values and activities in line with their respective objectives.**
- Public and community perspectives on public land use are **shaped by a complex and changing mix of environmental, economic and social preferences and values**. Over the past 30 years, these perspectives have been significantly influenced by the paradigm of ecologically sustainable development. As a result, much natural resources and environmental management today aims to take better **account of economic, environmental, cultural and social values.**
- The contest between these values is clearly illustrated in the history of native forestry and protected areas in NSW.

State forests are multifunction forests and must be managed sustainably

- The *Forestry Act 2012* (Forestry Act) establishes Forestry Corporation of NSW (FCNSW) to be, amongst other objectives, **an efficient and environmentally sustainable supplier of timber.**
- FCNSW must undertake this role in accordance with the principles of **ecologically sustainable development** and **ecologically sustainable forest management** (ESFM).
- In addition, the Forestry Act appoints FCNSW as the land manager of forestry areas and confers or imposes on its obligations under other Acts, laws or commitments.



Lessons can be learnt from overseas

Across the literature and reports on various models, the Commission is seeing:

1. Heightened **commitments to biodiversity conservation** frameworks and improving forest resilience (e.g. 30% of land and waters protected by 2030 target);

2. Increasing **focus on mitigating climate change risks**, including through **adaptive management** regimes;

3. Increasing **attention to the recognition of First Nations rights,** responsibilities, opportunities and outcomes;

4. Exploration of **more inclusive and effective forms of community forest management models**

- In Europe, there is a **transition in many regions** towards a more **multifunctional forest management** approach to improve the conservation values and climate resilience of managed forests.
- Bayerische Staatsforsten in Bavaria, Germany has shifted from state-owned enterprise with a **revised charter from maximising profit** (while maintaining ESFM) to **maximising public good benefits** (with economic outcomes)
- Functional examples of **community forest management** and **First Nations-led management** are most prominent in British Columbia, which has developed treaties with First Nations, provided exclusive rights and Traditional Owners are voluntarily partnering with industry and communities.

Region	Entity	Type	Land management & stewardship	Commercial remit
British Columbia (Canada)	Ministry of Forests	Provincial Government Ministry, with multiple programs	The Ministry is responsible for the stewardship of provincial Crown land and ensuring the sustainable forest management. The Ministry also issues various types of area-based licenses for timber harvesting.	• **Supporting a sustainable and competitive future for B.C.'s forest sector** • Appointment of a Chief Forester, who is an independent statutory decision-maker, and responsible for calculating the AAC from public forest lands. • BC Timber Sales (BCTS) is a self-financing program within the Ministry. • Adopts a divested license-based system on public lands to commercial and community interests. • Treaties with First Nations and exclusive rights for some First Nations for land management, including timber production. • Community Forestry program, with community-led forest management, which is small and highly dispersed, but nonetheless, currently involving 60+ communities
Oregon (United States)	Oregon Department of Forestry	Government Department	Protecting, managing, and promoting stewardship of Oregon's State forests (~300,000 ha) to enhance environmental, economic, and community sustainability.	• To serve the people of Oregon by **promoting stewardship of Oregon's State forests** to enhance environmental, **economic**, and community sustainability • Cross tenure stewardship arrangements in place. • Strong focus on wildfire preparedness and landscape resilience.
Bavaria (Germany)	Bayerische Staatsforsten	State Government Enterprise / Institution, established under public law in July 2005	Sustainable management of the Bavarian state forest, across ~800,000 ha, according to the principle of near-natural, integrative forestry over the entire area.	• BaySF has been **harvesting around 5 million m^3 of wood per year**. • BaySF is legally obligated to exemplary forest management and to deliver on public goods, providing a broad array of ecosystem services like e.g., soil, water, air or avalanche protection, reducing harvest levels. Relaxed commercial imperative.

Significant opportunities exist to increase Aboriginal participation in decision making & management

- Recent case studies highlight **significant knowledge gaps** around Aboriginal cultural values across all tenures particularly where **Aboriginal people lacked access or involvement** in the management and custodianship of the area.[66]
- Except for Aboriginal managed lands, **Aboriginal people are not adequately involved in land management and decision making**, including the identification, management, and monitoring of cultural values – and this **can lead to poor** environmental, cultural, and socioeconomic outcomes.[67]
- **Increasing Aboriginal involvement** in public land management, particularly through Aboriginal-owned and managed land tenures, and whole-of-Country planning and management approaches **will improve outcomes** for Aboriginal peoples. [67]
- Banbai Rangers recently demonstrated **whole-of-Country planning** is possible. The initiative showcased how Aboriginal knowledge and practice can be used as a **critical input to support decision making for policy and improved natural resource management outcomes**. [68]
- There are significant opportunities for NSW to scale up whole-of-country planning and Aboriginal management on public lands.[69]

"The Banbai Whole of Country Plan is about connection to culture and making a sustainable future for our kids. We have a past to look back on, when our Elders worked hard to get our Country back. We want this plan to help us to look forward so that our kids know what we want for them. We are building on our past and this helps us to guide our future".

Kane Patterson, Banbai Ranger (September 2023)[68]

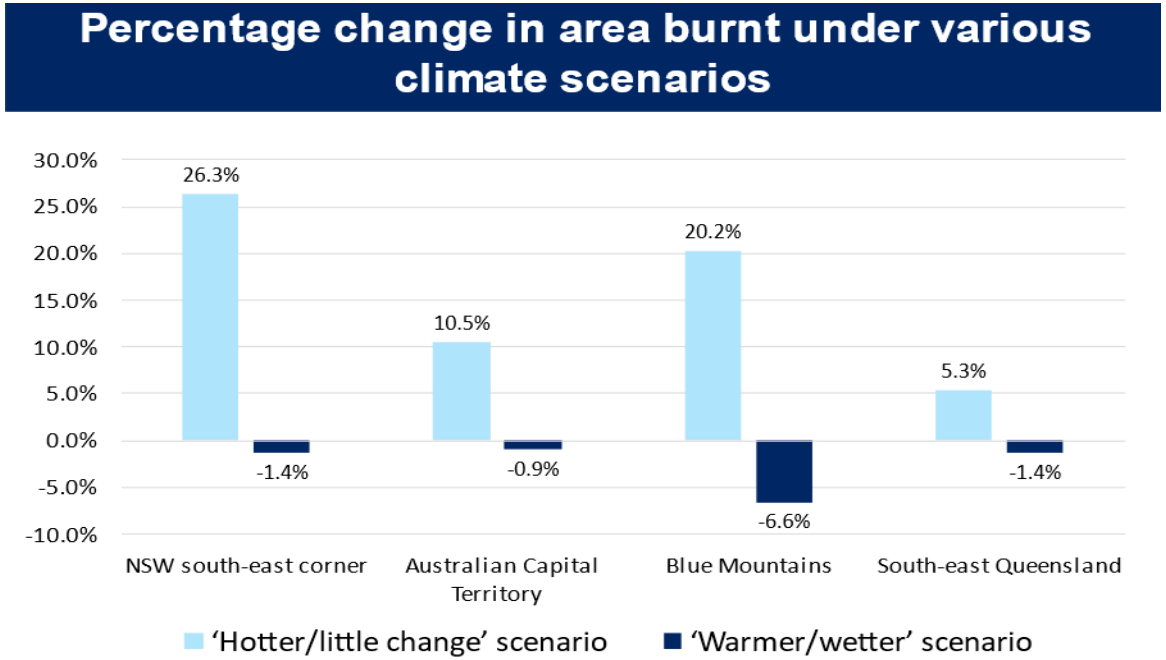
"The On-Country Planning Pilot, led by the Banbai Rangers and commissioned by the Natural Resources Commission, represents a groundbreaking initiative aimed at integrating Aboriginal knowledge and values into natural resource management".

Trudgett, C. et al (2024)[69]

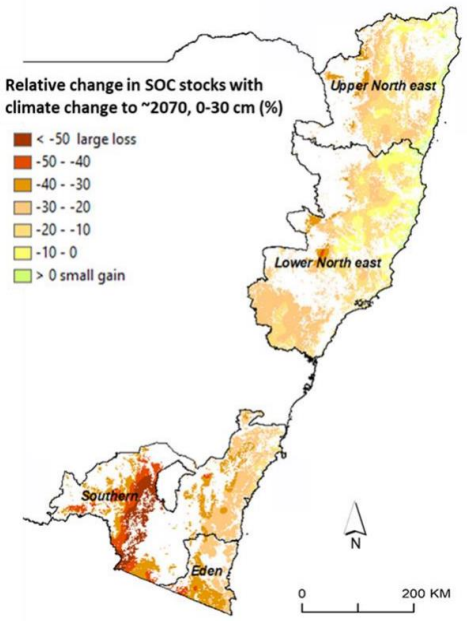
Greenhouse gas emission impacts of different uses of forests and assessment of climate change risks to forests

Recent natural disasters indicate a challenging future for NSW forests

- **Climate and climate-driven** disturbances are expected to continue to lead to **future changes in NSW forests**. Climate across NSW is predicted to become **more variable** in the future, with periods of drought and intense rainfall both increasing, bringing heightened fire and flood risk.
- For example:
  - **Higher temperatures**, **more hot days** and increased evapotranspiration are forecast for the north and south coast in the near future (2020-39), with these trends strengthening in the far future (2060-79) [70]
  - Despite an expected decrease in total annual rainfall in the near future, **intense rainfall events** are expected to increase under climate change. More **short-duration intense rainfall** events are likely due to increased convection and thunderstorms, with hourly rainfall intensities predicted to increase by around 20 percent for every degree of warming [71]
  - Potential occupancy of 54 of 78 **threatened fauna species** will decline by 2070, with **seven species particularly impacted** [72]
  - Further **decline in soil organic carbon** over most forested areas in coastal NSW. [73]
- The 2019-20 fire season and following floods provides an example of the kind of disturbance expected **more frequently in future with a changing climate**



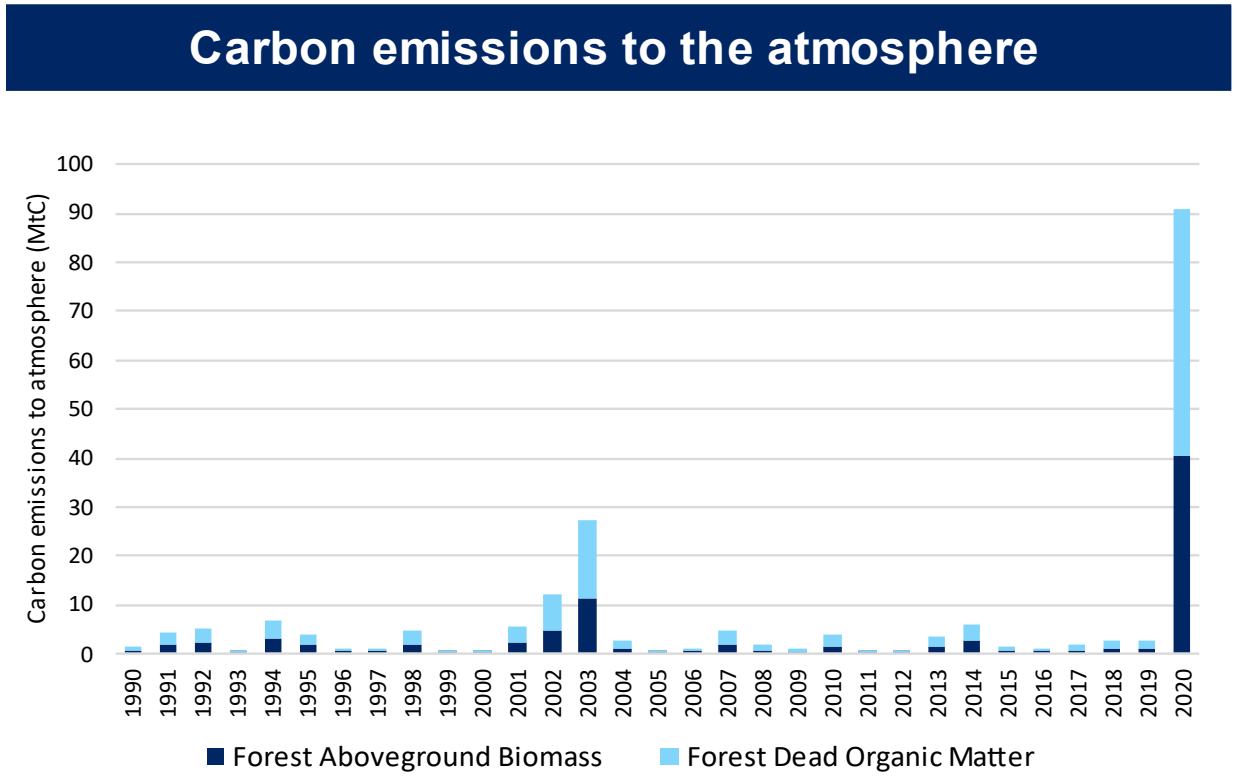
Simulated change in expected annual area burned by wildfire (approximate average) for selected landscapes under two far future climate scenarios (2060-2079) [70]



Predicted relative change (%) in surface soil organic carbon (SOC) concentrations with projected climate change to approx. 2070 [73]

The 2019/20 wildfires significantly impacted NSW's forest carbon budget

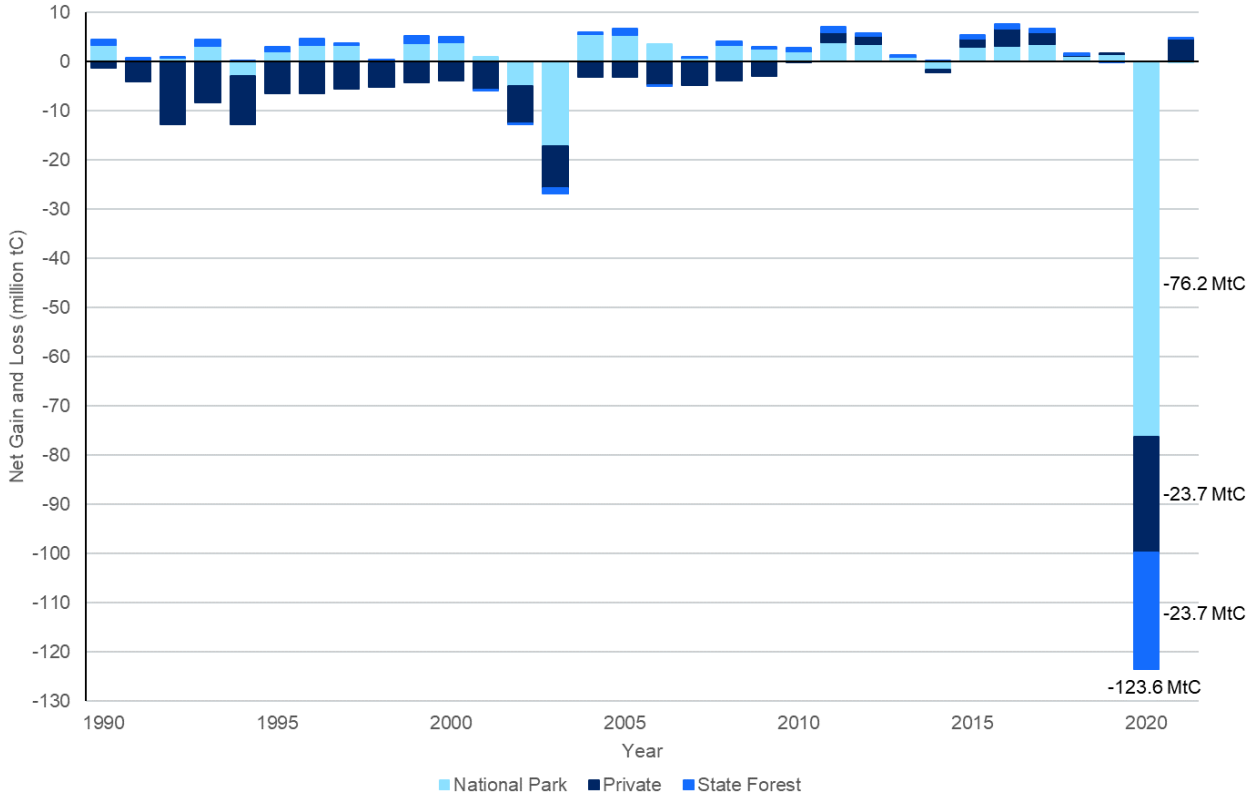
- Recent research found there was a general **decline in forest carbon stocks** from 1990 through to the mid-2000s, after which **stocks increased** through to 2019, prior to the fires.
- The **total carbon stock** of NSW forests at the end of the assessment period (in 2021) was calculated to be 2.1 billion tonnes of carbon (tC), which is 165 million tonnes of carbon (tC) **less than** the calculated balance in 1990 at the start of the assessment period.[74]



Movements of carbon from forest aboveground biomass and dead organic matter to the atmosphere due to fire [74]

Fire and land clearing drive carbon flux in NSW forests

- The most **significant impacts on NSW forest carbon stocks** during the assessment period were from **large wildfire events,** particularly in 2020 (122 million tC loss) but also in 2003 (35 million tC loss) and 2002 (15 million tC loss).[75]
- During the assessment period, **fires also accounted for 69 percent of carbon released** to the atmosphere from live biomass and dead organic matter.
- **Clearing of forest on private land** was the next largest factor driving change in carbon stocks, particularly between 1990 and 2007 when fluxes from live biomass to dead organic matter ranged from 5.75 million tC to a high of over 33 million tC. Trends in the annual change in carbon stocks due to forest clearing on private land decreased after 2009.
- Compared with fire and forest clearing on private land, **movements of carbon associated with timber harvesting are relatively low**. Timber harvesting moves carbon from the live biomass pool to the harvested wood products in use pool and to the dead organic matter pool.
- From here, carbon is slowly released to the atmosphere through decomposition as wood products come to the end of their usable life. At the same time, harvested forests regrow and contribute to net primary productivity.

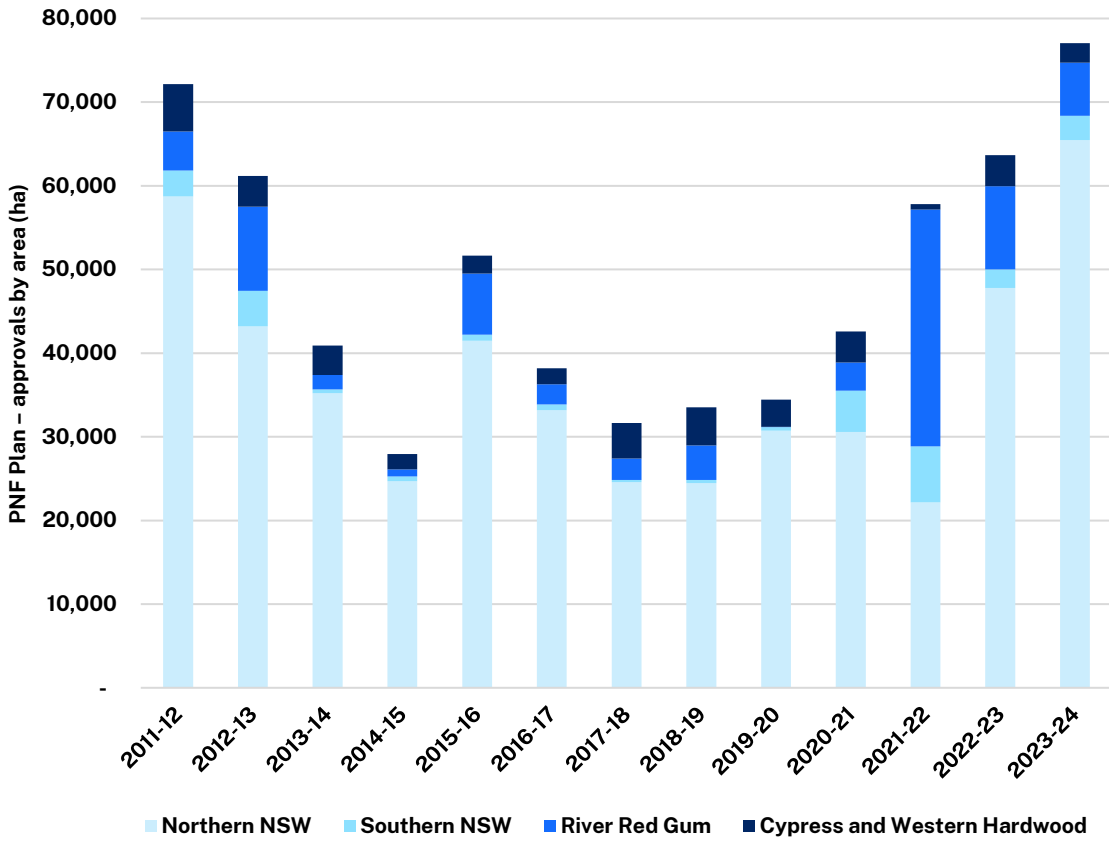


Net gain and loss of carbon from NSW forests by tenure [70]

The future of softwood and hardwood plantations and the continuation of Private Native Forestry in helping meet timber supply

Timber from private native forests is important but cannot substitute supply from state forests

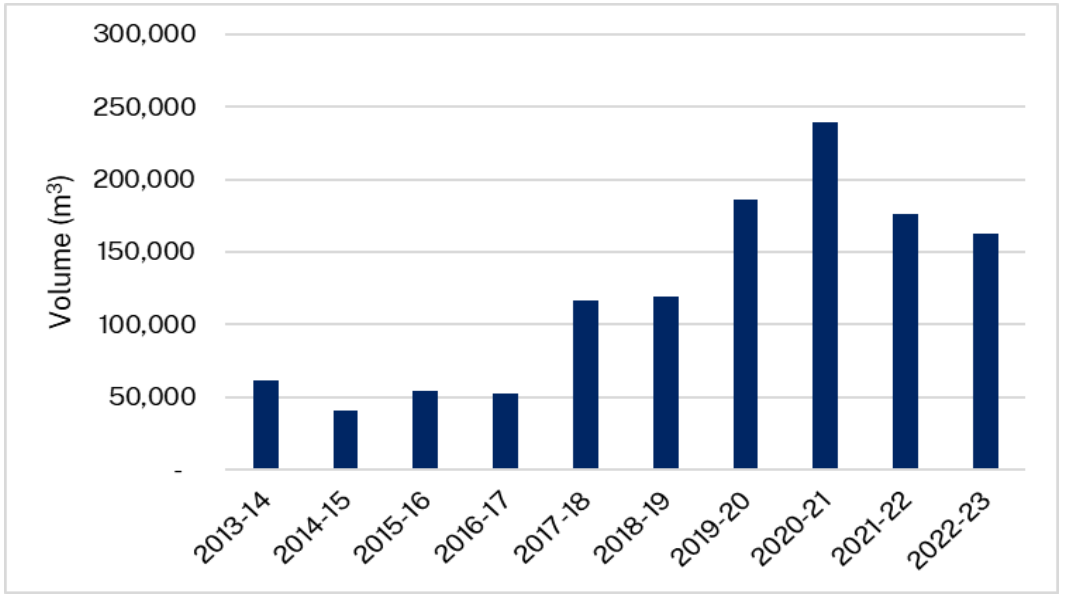
- **More than 640,000 hectares of private native forestry approvals** were issued in the 13-year period from 2011-12 to 2023-24, and the area of approvals has been increasing year on year since 2017-18. In 2023-24, landholders reported harvesting over 207,000 m^3 and 7,800 hectares, up from 105,000 m^3 and 5,850 hectares reported in the previous year.
- **Sustainable yield modelling** in private native forests **has not been undertaken in NSW**. However, estimates of potential yields for north coast private native forests are available, and work is underway to estimate sustainable yields from Riverina red gum forests, and cypress and western hardwoods forests.
- Under current levels of PNF approvals, **PNF will contribute to but will not meet timber supply needs.** It is unlikely that expansion of PNF will meet timber supply needs (based on current demand for timber products, the trade deficit and the closure of other public native forestry in Victoria and Western Australia)
- There are **barriers for landholders entering PNF**, including knowledge and capacity, concerns over engaging contractors, lack of transparent and easily accessible timber price information, or the potential for significant fines for compliance breaches.
- While landholders may hold a PNF approval, they may not use it or may only use it when other elements of their farm business are not performing well. Further, **PNF approval holders have flexibility to only harvest and sell wood when market rates are high.**



PNF plan approvals from 2011-12 to 2023-24 (Data source: LLS)

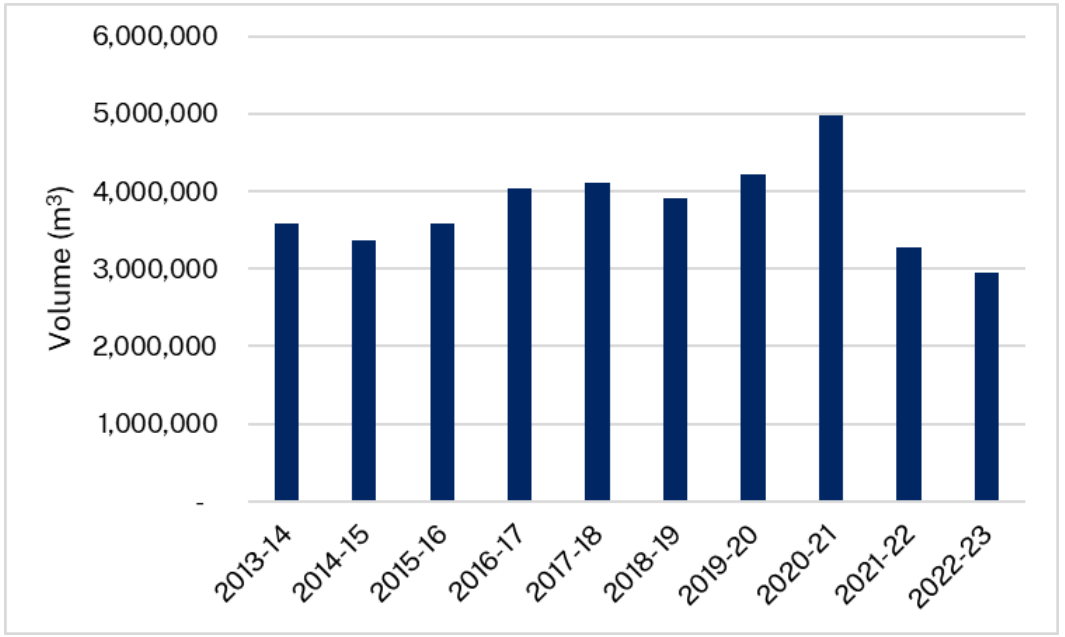
Plantation area & harvest have increased over time but cannot satisfy demand

- FCNSW manages around 75 percent of plantations in NSW
- Plantation area managed by FCNSW has increased since 2013-14 by around 13% (4,000 ha) for hardwoods and 19% (34,000 ha) for softwoods
- Plantation volumes and areas harvested by FCNSW have increased since 2013-14 for both hardwood and softwood plantations
- Following the 2019-20 wildfires, harvest volumes significantly increased due to plantation salvage operations or to supplement native forest wood supply
- Current plantations cannot satisfy all timber demands or increasing demands (in 2022-23 the forest and wood products trade deficit for Australia was over $4 billion) [76]
- Plantations take considerable time to establish, set up costs for new plantations are prohibitive (high land costs for productive land) and involve land use change and potential conflict. A new plantation will not provide timber for 20-50 years depending on the species
- Established plantations are subject to yield impacts from invasive species, pathogens, diseases and drought, or destruction from fire, flood or storm



Hardwood plantation volume harvested

Data source – FCNSW



Softwood plantation volume harvested

Data source – FCNSW

Opportunities to realise carbon and biodiversity benefits and support carbon and biodiversity market, and mitigate and adapt to climate change risks

NSW’s net zero targets are at risk

- **NSW forests are a significant carbon resource** contributing to the global carbon cycle, with the potential to either deliver beneficial carbon capture or contribute to carbon emissions, principally from wildfire. Without strategic intervention, NSW forests may **shift from a net carbon sink to a net carbon emitter** in the coming decades, undermining key Government carbon emission commitments.[77]

- There is a significant risk that climate change and changing disturbance regimes may **undermine the ability of affected areas to recover**, leading to a commensurate increase in carbon emissions and **jeopardising Government’s ability to meet its stated emissions targets**.

- Accordingly, **forest recovery needs to be monitored** to determine whether the rate of recovery (and thus carbon capture) is meeting expectations, with the **capacity to trigger active interventions to improve regeneration** outcomes as needed.

Significant opportunities to leverage private investment in natural capital

- The NSW Government is increasingly recognising the value of natural capital following global trends.
- The new **NSW Plan for Nature** commits to establishing a **natural capital accounting framework**. The plan intends to ensure NSW as the first Australian jurisdiction to develop and implement local and statewide natural capital accounting frameworks.
- The accounts will inform **nature-based markets**. Globally, the private sector is already seeking to invest in **natural capital products** and services as a means of improving their environmental credibility and reducing financial risk.
- FCNSW are working with CSIRO developing first draft natural capital accounts and nature and climate financial disclosures for state forests based on CSIRO Natural Capital Handbook.[78] Other examples for natural capital accounting including Forestry England[79] and Tasmanian Forest Trust. [80]
- **Research in different jurisdictions** have shown **varying results** with ecosystem services delivered by multi-purpose state forests and national parks. A recent study found that state forests managed for multiple uses in south-east Queensland delivered additional benefits and social outcomes over the long term compared with benefits provided by reserves. [81] Whereas research in the Central Highlands, Victoria found the economic benefits from forestry was small compared to other industries and provisioning services. [82]

Accelerate adaptive learning for climate smart forests

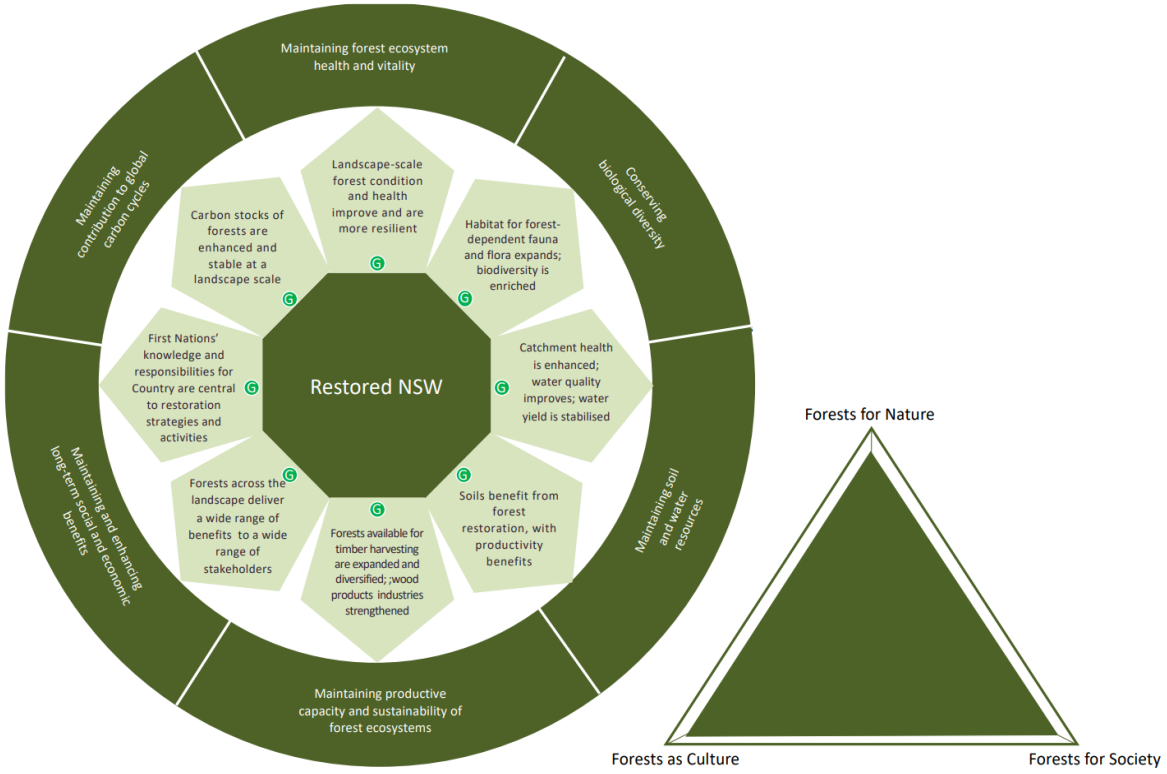
- NSW will need to **identify and apply interventions to increase forest resilience** and maintain carbon balances, many of which may be new approaches that involve a **shift away from some long-accepted forest management practices**.
- It is essential that we make informed decisions about how these areas are managed to try to maintain the values of these forests, based on best available knowledge and evidence.
- **Existing knowledge is not necessarily a good predictor of the future**. Decision makers will increasingly need to draw on new research and monitoring, scenarios, data and modelling approaches to provide assurance of current management and predict what future forests will look like under various climate change and management scenarios.
- Drawing on international examples, NSW should **trial large scale research-based interventions** across tenures to reduce vulnerability to wildfires, including use of Indigenous burning practices
- This will help identify key risks, priority areas for investment and appropriate land management actions and policy. **Government will also need evidence to be able to predict and measure** the effectiveness of various intervention options in different contexts.

Elliott State Research Forest – USA

- The Elliott State Forest was established northeast of Coos Bay in 1930 as Oregon's first state forest. The Hanis (Coos) and Quuicich (Lower Umpqua) people are the original people and stewards of the land. Around 33,500 hectares of land is overseen by the State Land Board and managed by the Department of State Lands.
- The Department is advancing a collaborative effort to establish the Elliott State Research Forest, a centre for forest science and management that also contributes to conservation, education, recreation, Indigenous culture and local economies in Oregon.

More positive futures are possible with increased recognition in the values forests provide across tenures

- Forest stewards need to **wisely and proactively invest in improving the health and resilience of forest ecosystems**, and addressing anticipated future threats and risks, to avoid major shocks and maintain forest values into the future.
- Adopting a **future-focused approach** can prompt further exploration of the implications of alternative policy and forest management decisions.[84]
- These decisions should be informed by a **risk assessment** process to identify and target at-risk regions, forest ecosystems, species and/or production systems for **proactive management.**
- Priority areas could include areas that are likely to be subject to increased natural disturbances due to climate change, or ecosystems and species that are on a declining trajectory due to ongoing pressures and threats.
- These approaches align with the **NSW Government's *Plan for Nature***, that expresses the Government's broader ambition to **protect, restore and improve ecosystems** across all NSW while modernising commitments to *ecologically sustainable development*



The large-scale restoration envisaged here is inspired by the UN Decade of Ecosystem Restoration, the global Forest and Landscape Restoration agenda and Trillion Trees initiative, and both established and new Australian programs. The scenario envisages major expansion of forested areas, a consequence of transition in land uses to more integrated farming and forests, and widespread restoration efforts. The diverse values of forests are valued economically, environmentally and socially in NSW. NSW public agencies, landowners and CBOs engage, with First Nations Peoples, in a Restore Australia agenda across the landscape.

This is one of eight scenarios developed. This scenario goes beyond the *Beautifully Aligned scenario* in scope and scale. [79]

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