Guidance on Key Method Components of the Proposed Improved Native Forest Management ACCU Method: Comments and Analysis

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Introduction

This submission responds to the 'Guidance on key method components' of the proposal by the NSW Government to develop an 'Improved Native Forest Management'(INFM) method for generating Australian Carbon Credit Units (ACCUs) from two activities: ceasing harvesting and deferring harvesting. Our submission is in two parts.

In Section A we consider key overarching considerations relevant to assessing whether the method is fit for the purpose of delivering robust, low risk, climate mitigation outcomes in native forests and identify changes needed to policy and rules to help address the entwined climate and biodiversity crises we face. In this section we consider:

- Net Zero and the role of offsets and changes needed to guide the future development and use of ACCUs;
- The importance of protecting and restoring biodiversity and forest ecosystem integrity for climate mitigation and adaptation;
- The need for forest management to reflect new knowledge on the linkages between logging and threats that are increasing with climate change;
- The implications of Australia's international policy commitments on climate and biodiversity for forest management; and
- The need to modify current approaches to forest carbon accounting.

In Section B we examine the technical parameters of the proposed method in light of the above considerations. We provide detailed comments on issues related to:

- The proposed baseline and related challenges for ensuring 'additionality";
- The adequacy of proposals aimed at preventing 'Leakage';
- The assumptions underpinning the approach taken to address 'Permanence'.

Comments are also provided on some of the technical challenges associated with the proposed method as well as limitations created by current Land Use Land Use Change and Forestry (LULUCF) accounting rules.

A summary of key points from Sections A and B is first presented on pages 2-7, followed by our detailed comments on both these sections.

Summary of Key Points

SECTION A: Overarching Climate and Biodiversity Issues

1. Net zero and the role of offsets

The assumption that fossil fuel emissions can be neutralized by sequestration in land and forests is, as the 'Guidance on key method components' recognizes, incorrect. As noted by Becken et al. (2024) (*1*):

Net Zero Emissions (NZE is achieved when all anthropogenic (i.e., human caused) CO_2 emissions (as well as other greenhouse gases) are reduced to the rate at which they can be removed and permanently stored by the natural sinks, i.e., the world's ecosystems and oceans".

As we are now approaching the 1.5 degree global warming threshold and on track to around 3 degrees of warming (*2*), it is critical that use of offsets does not delay the rapid transition away from fossil fuels to non-carbon renewable energy sources. Limiting warming to as close as possible to 1.5 degrees requires not only a rapid exit from fossil fuels(*3*), but also the protection and recovery of carbon dense natural ecosystems, especially native forests.

Protecting native forests would make a significant contribution to reducing emissions from logging and increasing the removal of carbon dioxide from the atmosphere (see Appendix 1), provided those benefits are assessed at a landscape scale, and are not negated by deferring reductions in fossil fuel emissions, deferring emissions from logging, or hidden by gross GHG accounting(*4*).

The current policy approach to generating and trading in ACCUs should be strengthened to ensure offsets are only a temporary measure that help reduce reliance on fossil fuels. All purchasers of ACCUs should be required to have a clear and transparent transition plan that demonstrates that the strategy of the mitigation hierarchy has been followed and that offsets are being used only as a last resort to address residual emissions. Adopting a "cap and trade" system that rapidly (e.g., on an annual basis) ratchets down the permitted use of offsets would help ensure offsets cannot be used to delay reductions in fossil fuel emissions. Developing separate goals and targets for: (i) emissions reduction from all anthropogenic sources and (ii) CO_2 removals by native ecosystems that would be a useful complementary mitigation policy.

2. Reducing the risks to forest ecosystem carbon reservoirs

Protecting and restoring forest ecosystem integrity and all the elements of biodiversity that underpin their integrity, is essential for reducing the risk of releasing stored carbon in forests to the atmosphere and stopping reaching thresholds that impede forest ecosystem function(*5*). Forests are at increasing risk of releasing stored carbon to the atmosphere as a result of the interaction between logging and threats from severe drought and fire that are increasing with climate change. The science is clear that logging increases the severity of fire in native forests. Prevailing approaches to sustainable forest management are now out-dated and obscure the urgency of protecting and recovering the integrity of forest ecosystems for both the survival of native species and retaining their climate mitigation value (*5*).

3. Existing policy commitments

Meeting existing policy commitments under the UNFCCC Global Stocktake decision at COP 28 (CMA5 para33) (*6*) and the CBD at COP 16 (Kunming-Montreal Global Biodiversity Framework (K-M GBF) (*7*), and Australia's domestic commitments to reverse our trajectory on species loss and decline, requires substantial additional protection and recovery action in those native forests currently available for logging. Providing the additional protection and recovery action needed to restore viable populations of native wildlife across their natural range should not be dependent upon, nor governed by, the ability to generate ACCUs.

4. Carbon accounting rules

Current carbon accounting rules are inappropriate for complex, bio-diverse natural ecosystems including native forests. Greenhouse Gas (GHG) Accounting rules for land and forests have failed to keep pace with changes in the international policy arena and should be supplemented to reflect the superior provision of ecosystem services (including long-term carbon retention) by forests that are not logged and have lower risk of loss (*5*).

The ecosystem accounting framework developed by the UN Statistical Commission, the System of Environmental Economic Accounting Ecosystem Accounting (UN SEEA-EA) (*8*) and adopted by the Australian Government in their commitment to ongoing reporting of the National Ecosystem Accounts (*9*), should be applied for assessing ecosystem carbon stocks and changes. This framework is applicable at regional and state scales as well as the national scale and integrates climate and biodiversity considerations based on the principle of evaluating ecosystem integrity. It enables governments to reflect the economic benefits of protecting and restoring natural ecosystems utilizing a reference level (or baseline) of the natural ecosystem at carbon carrying capacity.

SECTION B: Assessing the proposed INFM method

Introductory comments

The Carbon Farming Initiative Act (CFI) aims to ensure that projects 'result in carbon abatement that is unlikely to occur in the ordinary course of events'. By including deferral of harvesting and ceasing of harvesting in the same method, satisfying this fundamental requirement becomes doubtful. So too does the proposal to adopt a historical baseline that excludes the impacts of wildfire until the first 5 yearly review.

The mitigation benefit of ending logging is much greater than the mitigation benefit from deferring logging which is short term, higher risk, and far more complex to assess, regulate and monitor. The difference in mitigation benefit between ceasing harvesting and deferring harvesting is so great they should be considered as different methods (*10*, *11*). The differences include both theoretical and technical challenges of developing a methodology.

Ceasing logging enhances natural ecological processes and the quantum and stability of carbon storage (*11*) , as well as reducing the risk of emissions due to disturbances, particularly fire, but also tree decline and mortality from drought and pests. Differences in the risks of emissions from carbon stocks in the different scenarios have not been included in the method.

A method crediting the abatement from ceasing native forest logging for an entire State or agency would overcome many of the problems regarding adequacy of data, predictions of sustainable yield and potential future harvesting. Ending native forest logging nationally would annually avoid 7-11 Mt CO_2e emissions and enable ongoing removals of 2 Mt CO_2e which are otherwise forgone This would make a significant contribution to meeting Australia's Paris COP Agreement commitment of a 43% reduction in 2005-level carbon emissions and helping close the current annual gap of around 85 Mt CO_2e (see Appendix 1).

1. Baseline issues and additionality

An historical baseline is not scientifically credible

Action is urgently needed to halt and reverse the extinction trajectory of key forest species. It is not scientifically tenable to conclude that in the absence of ACCUs no further action would be taken to conserve and restore endangered species habitat for the 15-year crediting period of the project, which is the counterfactual assumption in the method.

At a minimum, we recommend that a credible baseline must be informed by independent assessments of: (i) management changes needed to reverse the decline of threatened and endangered species, including core areas requiring protection and those areas required to enable species movement and recovery; and (ii) if the decision is made by the government for native forest logging to continue, what areas could still be available for logging and what products are feasible to produce, once the protection, connectivity and recovery needs of wildlife are addressed.

Weaknesses in the approach to developing modified sustained yield

The proposal to modify sustained yield to improve the correlation between the estimate of sustained yield as published prior to 1 July, 2024 and log production would need to be independently reviewed to ensure significant errors regarding the overestimation of log volumes in years 2022-2024 reported by the Forestry Corporation of NSW (FCNSW) in October 2024 (*12*), and by news outlets (*13*), are accurately reflected in modified sustained yield. Questions about how far back these significant errors go must also be answered.

The proposal to exclude the financial year and two subsequent years from the calculation of modified sustained yield if 25% or more of "the net harvestable area is affected by wildfire", on the basis that they are not representative of normal operating conditions, ignores the reality that increases in the prevalence of winter droughts and dangerous fire weather conditions are resulting from climate change (*14*).

Impacts of the 2019/20 fires on native forest structure and function will be evident for many decades (*15*) and should be reflected in the calculated modified sustained yield. Legacy impacts of past major disturbance events will interact with, and likely amplify, the impacts of future major disturbance events (*16*). Waiting until the next major disturbance event to modify sustained yield would create a major flaw in the baseline. The increasing risk of losing forest carbon to the atmosphere and differentiating those risks based on forest age classes and protection status should be incorporated in the baseline.

Accounting for emissions from wildfire

The proposed accounting treatment of wildfire in the method requires expert knowledge of Australia's approach to reporting and accounting for emissions from 'non-anthropogenic fire'.

While improvements are being made in the National Greenhouse Gas Inventory (NGGI) to reflect the increasing role that human-induced climate change is playing in severe to catastrophic fires, much more needs to be done to reflect the role of fragmentation, logging and other forms of degradation on increasing fire severity and thus emissions (*17*). Additionally, there is an escalating risk of future emissions if forest ecosystem integrity continues to decline as we head beyond 1.5 degrees of global warming. The credibility is waning of accounting approaches that fail to take into account the full range of anthropogenic factors that increase fire extent and severity and their interaction with threats that are increasing with climate change.

A superior baseline is needed

A baseline that provides an incentive to recover forest ecosystem integrity and lost carbon stocks is needed and the appropriate science-based one is the natural carbon carrying capacity of native forests at a landscape scale (*18*). Such a baseline can be empirically estimated from old growth forests and forests minimally disturbed by logging, which are stable, within the bounds of an ecological dynamic equilibrium, and not subject to oversimplifying assumptions. Management actions that help recover lost forest carbon stocks would then focus on restoring forest ecosystem integrity and stability. This approach would maximize the climate mitigation value of native forests and minimize the risk of losing forest carbon to the atmosphere.

The assumptions underpinning the proposed baseline are highly likely to be incorrect given the ongoing loss and damage to hollow bearing trees and forest ecosystem integrity decline in forest ecosystem integrity under current management for commodity production (*19*), the need to rapidly address the entwined climate and biodiversity crises and policy commitments made under the Convention on Biological Diversity (CBD) Kunming-Montreal Global Biodiversity Framework (K-M GBF) (*7*) and the UN Climate Change Conference at COP 28 (*20*). It is not credible to assume that in the absence of ACCU's there would be no change in forest management to address these issues over the 15-year crediting period.

2. Eligible project Activities

Allowing activities of both cessation and deferral of logging in the same method and the same project area increases the complexity of establishing a baseline and assessing leakage. It means that decisions about which activity is used to claim ACCUs and which areas could produce the best carbon credit gain will be open to manipulation and blind to biodiversity and other ecosystem integrity issues. Choosing which areas are subject to which activity will not be based on conservation needs but on economic returns from ACCUs.

The hurdle requirement

"Projects are only eligible to receive ACCU's if both the levels of harvesting and the volumes of wood extracted from the project area are greater than or equal to 20% below the level in the baseline scenario". This requirement could be easily gamed. For example, the reduction could be achieved by ceasing logging in a portion of the project area and maintaining modified sustained yield levels within the rest of the project area - choosing to cease logging in low productivity sites to generate ACCU's and cross subsidize logging. Reducing logging and wood volumes by 20% is less than the periodic downwards revisions by FCNSW (see above) suggesting that if a hurdle requirement was implemented, this figure is too low.

Harvested wood products

All harvested wood products are relatively short term and make a negligible contribution to long-term carbon storage when compared to leaving forests *in situ* as the small percentage of wood classified as long lived has an average longevity of 35 years (*10*). The global estimated carbon sink in wood products between 2006-2019 was halved by the IPCC reflecting accounting changes (*21*).

The proposed percentages assigned to harvested wood products and logging slash of 20% slash, and 50% each for pulp and saw logs are highly contentious, and in some RFA regions will be grossly inaccurate. The proposed treatment of Harvested Wood Products (HWP) is highly likely to artificially inflate the carbon benefit of harvested wood products and be open to manipulation.

3. Ensuring permanence

Greenhouse gas emissions from the 2019/20 fires were greater than the total reported emissions from all sectors in Australia in 2018 (*22*). Climate trends and the interaction between logging and threats that are increasing with climate change, like severe fire, must inform mechanisms designed to promote permanence. Preventing logging in all native forests and fostering ecological recovery across the entire native forest estate would significantly reduce the risks to carbon storage from severe drought and fire (*23*, *24*). The proposed 5% risk of reversal buffer, taken from ACCU's issued over the 15-year crediting period, would be highly unlikely to cover either the risk of loss over the crediting period or the escalating risk of loss, over the permanence period.

4. Leakage

Dealing with leakage is a critically important challenge for the method. Without tight controls, leakage between states, RFA regions, and into private native forests will occur. The arguments presented about leakage between states do not stand up against recent experience and cross subsidisation of native forest logging within a project area is inevitable. Preventing leakage into private native forests seems highly unlikely given "the absences of sustained yield estimates for most private native forests". These problems are further compounded by "High levels of uncertainty in log production estimates and in how wildfire events affect harvesting activity and log production".

Preventing leakage relies on an unprecedented level of accuracy in data and regulatory and monitoring capacity and integrity over long periods of time. It is worth reflecting on the work done by community organisations in monitoring NSW forest management agencies and regulators for breaches to current regulatory arrangements (*13*, *25*, *26*).

5. Coverage of carbon pools

Soil organic carbon is excluded from the method. While it is acknowledged that estimation of soil carbon stocks and detecting change in stocks at landscape scales is challenging, the scientific evidence shows that logging depletes soil carbon stocks and thus omitting soil will underestimate the losses of carbon from harvesting (*27*).

6. Revisions needed to FullCAM

The proposed initial inventory of forest carbon stocks in the project area used to calibrate FullCAM should include old growth sites and other high integrity, long unlogged sites, to provide a reference condition that can be used to calibrate the carbon carrying capacity, and hence the potential carbon gain of regenerating forests (as recommended above). The likely impacts on forest productivity of increases in climate variability and extreme weather-related events should also be incorporated into the model. The increased risks of losing forest ecosystem carbon stocks to the atmosphere from keeping forests in a relatively young age class must also be factored into modelling.

The carbon storage potential of a forest region (i.e., the additional carbon that would be removed and stored in the ecosystem if logging ceases) should be considered at a landscape scale inclusive of the effects of natural disturbance regimes on the age distribution of the forest and rates of carbon gain and loss. The total carbon storage may vary over time within a range defined by the variability in response to the disturbance regime. However, the time-averaged storage of carbon remains; it is not temporary storage. Changes should be reported as gross changes in stocks, emissions and removals.

Conclusions

Our conclusions are based on the methodological limitations and issues noted above (and discussed with further evidence provided, in the following sections). We conclude that the proposed method will very likely not deliver robust climate mitigation outcomes nor deliver synergistic climate and biodiversity outcomes. Despite explicit mechanisms in the method that aim at minimising opportunities to manipulate data and game the system, we can find no convincing evidence that the necessary rigour and independence of data, monitoring and regulation would be achievable and cost-effective. Maintaining logging puts all forests at greater risk of losing carbon to the atmosphere. A lower risk approach to protecting and restoring forest carbon sequestration and storage that would still benefit NSW and Australia's GHG Accounts, would be to simply transition the timber industry out of native forests and incentivise the investments that would enable supply to be wholly sourced from plantations which currently provides 85% of logs harvested in NSW (*28*). The mitigation benefits to state and federal GHG accounts from protecting substantial areas of native forest have been demonstrated for Tasmania (*4*).

Detailed Comments

Section A: Overarching Considerations

1. Net zero and the role of offsets

Neither the UN Framework Convention on Climate Change nor the Paris Agreement refer to achieving Net Zero Emissions. Rather, they refer to achieving a balance of emissions and removals in the atmosphere and ensuring emissions reduction occurs in all sectors of the economy. Net zero emissions only makes scientific sense in the context of the global carbon cycle as CO_2 is taken up from the atmosphere by several distinct processes that have hugely different time constants. On an annual basis about 1/3 is taken up by ecosystems and another 1/3 dissolves in the ocean surface. About 60% is removed from the atmosphere on a time scale of 100 years but it takes a very long time to remove the remaining 40%. A 'pulse' or unit of fossil fuel CO_2 emitted to the atmosphere is only fully removed from the atmosphere so that it no longer interacts with the climate system when it has completely dissolved in the deep ocean through dissolution of carbonate from ocean sediments and enhanced weathering of silicate rocks. This means that 20–35% of the fossil fuel CO_2 emitted will still be in the atmosphere after 2–20 millennia (*29*).

Burning fossil fuels (geological carbon) and attempting to offset those immediate emissions through removals by the biosphere is inherently complex, high risk and from a science perspective inaccurate. The physical reality is that Net Zero Emissions (NZE) is achieved only when all anthropogenic (i.e., human caused) CO_2 emissions (as well as other greenhouse gases) are reduced to the rate at which they can be removed and permanently stored by the natural sinks, i.e., the world's ecosystems and oceans (*1*). Attempting to achieve "Net Zero Emissions" on an annual net flux basis through an unsustainable combination of fossil-fuel emissions and short-term removals is therefore ultimately pointless as carbon emissions and removals have only decadal time scales in which to achieve balance. We are concerned that a simplistic, short-term interpretation of "Net Zero" simply increases the demand for carbon offsets and dilutes the focus on reducing emissions from all sources.

Even ignoring the physical realities about the global carbon cycle noted above, a simplistic application of Net Zero thinking that allows a unit of fossil fuel CO_2 emissions to be offset by the purchase of a carbon credit yields a zero-sum outcome which means we are not reducing emissions but merely "treading water". Given that global warming is approaching the 1.5 degree threshold and current emissions are on a pathway that will lead to 3 degrees of warming (*2*), it is imperative that we prevent offsets delaying the much needed rapid exit from fossil fuels. Allowing offsets increases the risk that high emitting industries will delay or not make the structural changes required for permanent decarbonization. The report by the High-Level Expert Group on the Net Zero Commitments of Non-State Entities raised concern of the "undue reliance on the use of offsets and potential unrealistic dependence on removals (in lieu of concrete mitigation action) to reduce absolute emissions which is the priority this decade"(*30*). The Science-Based Targets initiative (Science Based Targets Initiative (SBTi), 2021) emphasises the need to maximise emissions reductions before any actions that aim to compensate for unabated emissions via removal credits (*1*, *31*).

To encourage companies to "do the right thing", many countries have set strict limits on offset use within their cap-and-trade systems. For example, the European Union initially capped offset use at 50% of emissions reductions. Two years later, in 2021, the EU phased them out completely. In China, offset use within cap-and-trade schemes is strictly capped at less than 10%, and is as low as 5% in Beijing and 1% in Shanghai. In contrast, in Australia it is estimated that by 2030, 60% to 80% of the emissions reductions achieved by the Safeguard Mechanism will have been delivered not via fossil fuel reductions, but via offsets. Australia's exceptionally high reliance on offsets is therefore of concern (*32*).

In this context, a strict mitigation hierarchy (i.e., avoid emissions, reduce emissions, and then compensate for any residual emissions) should be applied by Federal and State Governments before allowing the purchase of offsets by any organization. Furthermore, we recommend:

(a) Separate targets should be developed for (i) emissions reduction and (ii) emissions removals by forest growth; and
(b) Any carbon credits should be embedded within a cap-and-trade system that rapidly (e.g., annually) reduces the cap so that the use of offsets is ratcheted down.

2. Reducing the risks to forest ecosystem carbon reservoirs and sinks

The vulnerability of carbon storage in the land sector was recognised in the first report by the NSW Net Zero Commission in 2025 (*33*). This vulnerability warrants further explanation.

We face an unprecedented and entwined set of escalating risks as global warming and biodiversity loss escalate. These existential threats to human well-being can be prevented only if we tackle the climate and biodiversity challenges together. As the first ever joint workshop of the scientific advisory bodies to the Climate Convention (IPCC) and Biodiversity Convention (IPBES) noted in 2021, the climate and biodiversity crises amplify each other and urgent synergistic action to protect and restore carbon-dense and species-rich ecosystems is needed (*34*).

Ecosystem integrity refers to an ecosystem's capacity to maintain its characteristic composition, structure, functioning and self-organisation over time within a range of natural variability. It is underpinned by its natural patterns of biodiversity including diversity at the genetic, species and community levels. High-integrity ecosystems have greater stability, resilience, capacity to adapt, and provide higher quality ecosystem assets and services that contribute to human wellbeing – including the ability to sequester and store carbon over the long-term (*5*).

The functional roles in an ecosystem of biodiversity at all levels (genetic, species and community) is the product of natural selection that yields the characteristic species and community assemblages best suited to prevailing environmental conditions, including fluctuating resource inputs, extreme events, periods of stress and natural disturbances, and thus underpins ecosystem integrity. Ecosystem integrity is fundamental to maximising an ecosystem's capacity to adapt to change as well as retaining its most important climate mitigation value, namely, securing long-lived and relatively stable carbon stocks (reservoirs), together with improving the security of other important ecosystem services (*35*).

All ecosystems are dynamic and dependent on their full complement of native species for healthy functioning. In forests, soil biota, invertebrates and fungi break down litter and coarse woody debris on the forest floor, recycling nutrients, and increasing soil organic matter content and the retention of carbon in forest soils; pollinators and seed dispersers help maintain the natural vegetation composition which influences resistance to insects, disease, drought and fire; and many vertebrate species support and help determine forest composition and structure. In old growth and other natural forests undisturbed by modern industrial activities, natural species composition, patterns and structure of biodiversity, including the presence of big old trees, result in forests being more drought and fire resistant and resilient including through increasing forest moisture and reducing the flammability of biomass (*17*, *36*, *37*).

Loss of big old trees (which comprise 1-5% of trees globally but store 25-50% of the above ground carbon in forests (*38*) and other critical elements of biodiversity, combined with edge effects from roads and other impacts from logging disturbance, increase the vulnerability of forests to severe drought, heatwaves and fire as well as other human-induced threats such as insect predation and disease. All these threats are increasing with climate change and interact with logging to increase fire severity and the risk of forest ecosystems reaching tipping points in their functioning. Degraded forests are at much greater risk of losing carbon to the atmosphere than high integrity forests (*5*, *35*). This means that harvesting operations in unlogged and long unlogged forests (that have recovered old growth conditions) reduces the ecological integrity of forest ecosystems, resulting in otherwise avoidable CO_2 emissions, and an increase in their vulnerability to climate-related risks. Minimising industrial disturbance in forests is therefore critically important for sequestering, storing and retaining carbon over the long-term.

Even long-term rotations (100-150 years) can have significant negative impacts on forest ecosystem integrity and biodiversity. For example, large old trees that provide critical habitat for cavity-dependent wildlife often exceed 170 years old (*39*). The depletion of this critical habitat resource results in an increase in the risk of extinction for the dependent species (*40*). Forests logged for commodity production are managed to maintain stand age well below that required for cavity development as well as the age at which the ecosystem reaches its natural carbon carrying capacity (*41*). Long rotations also alter the composition of dominant tree species in forests (e.g., increasing dominance of fire-prone Silver-top Ash) that in turn lead to modified forest that becomes a poor quality nutritional landscapes for threatened species such as the Koala and Southern Greater Glider (*42*). Reducing the risk of losing forest carbon to the atmosphere, and of reaching forest ecosystem tipping points such as landscape as is happening in parts of the Central Highlands of Victoria (*43*), is therefore dependent on both reducing gross emissions from all sources (fossil fuel and logging) while allowing degraded forest ecosystems to recover their integrity and lost carbon stocks.

3. Meeting existing policy commitments

Bringing climate and biodiversity policy and practice together is now a policy imperative as emphasized by the decision taken at UNFCCC COP 28 which noted:

"…the importance of conserving, protecting and restoring nature and ecosystems towards achieving the Paris Agreement temperature goal, including through enhanced efforts towards halting and reversing deforestation and forest degradation by 2030, and other terrestrial and marine ecosystems acting as sinks and reservoirs of greenhouse gases and by conserving biodiversity, while ensuring social and environmental safeguards, in line with the Kunming-Montreal Global Biodiversity Framework; " (Para 33 from COP 28 CMA 5) (*20*).

An historic decision taken by the UNCBD at COP 16 in 2024 (decision 16/22) recognized that:

"... biodiversity and ecosystem integrity play an important role in combating climate change"; "protecting and restoring ecological integrity contributes to addressing both climate change and biodiversity loss, and its impacts"; and "the essential functional role of biodiversity in underpinning the integrity of ecosystems and ecosystem services. Governments agreed to "identify and maximize potential synergies between biodiversity and climate actions, including by prioritizing the protection, restoration and management of ecosystems and species important for the full carbon cycle and contributing to climate change adaptation".

Both the Climate Convention and Paris Agreement call for the conservation of ecosystem carbon reservoirs (Article 4.1 (d) and Article 5.1, respectively). The Paris Agreement also emphasizes the need to protect and restore biodiversity and ecosystem integrity. Since 2018, successive decisions by the UNFCCC have encouraged synergistic climate and biodiversity action. Implementing these actions requires understanding the complex relationships between the natural patterns and components of biodiversity and ecosystem integrity and why retaining and restoring ecological integrity is fundamentally important for minimizing the risks to ecosystem carbon reservoirs (stocks) from logging and other human activities.

Meeting existing policy commitments to protect and restore biodiversity and ecosystem integrity necessitates additional protection and recovery action in forests currently available for logging.

However, we can see no reason why providing the additional protection and recovery action needed to restore viable populations of native wildlife across their natural range should be dependent upon, nor governed by, the need to generate ACCUs. There are a range of more appropriate and cost-effective policy options available to both Federal and State governments.

4. Forests and climate policy and accounting rules

Climate policy and rules in Australia, including those governing the generation of ACCU's in land and forests, have not been revised to reflect the importance of synergistic climate and biodiversity action, nor the importance of protecting and restoring biodiversity and ecosystem integrity for long term, successful climate mitigation (*44*).

Australia's business-as-usual focus on accounting for net annual emissions - with rules designed to suit plantations, highly modified forests and planting more trees - is based on current Land Use Land Use Change and Forestry (LULUCF) rules which are blind to: (i) management actions that influence the stability and risks to ecosystem carbon stocks; (ii) the importance of ecosystem integrity for retaining carbon stocks over the long term; and (iii) the functional role of biodiversity in underpinning ecosystem integrity. Current frameworks for developing ACCUs therefore fail to factor in the importance of biodiversity and ecosystem integrity for achieving low risk, relatively stable long-term climate mitigation benefits. The well-established scientific understanding of the role of biodiversity in ecosystem integrity, and the significant role of ecosystems in the global carbon cycle, necessitates revising or at least supplementing current LULUCF accounting rules to include information on the longevity, stability and risks to ecosystem carbon stocks (i.e., reservoirs) as governed by the integrity of the ecosystem.

The importance of identifying differences in the ecological integrity of ecosystems (ecosystem integrity) is highlighted by the work of the UN Statistical Commission in the development and refinement of the new global statistical standard for the System of Environmental Economic Accounting - Ecosystem Accounts (SEEA-EA) that incorporates the measurement of condition of ecosystem assets (*8*). This framework includes an important definition of ecosystem integrity which provides the reference level of the natural ecosystem for evaluating indicators of ecosystem condition against which degraded or modified ecosystems can be compared. The condition of ecosystem assets is linked to the provision of ecosystem services, whereby ecosystems with a high level of integrity, as assessed by their condition indicators, are associated with the benefits of high levels of services such as the retention of large, stable carbon reservoirs. This framework allows assessment of ecosystem integrity to be included in national balance sheets (*8*).

Improving the capacity to monitor ecosystem integrity is essential to assess whether we are in fact achieving Global Biodiversity Framework objectives and UNFCCC goals. Existing frameworks are often not sufficiently accurate or precise to monitor progress towards CBD and UNFCCC Convention goals. Creating synergies between biodiversity and climate actions requires a common information base using a standardized framework, guidance and metrics that is provided by the SEEA-EA. Ecosystem accounts are being compiled and used for land management decision-making at local, regional, national and continental scales, with some 94 countries producing some national-level ecosystem accounts, including Australia (*45*). The data in these existing accounts, and their ongoing refinements, can be used for national reporting under the Paris Agreement and The Kunming-Montreal Global Biodiversity Framework (GBF).

The ability of ecosystems to retain carbon over the long term is one of their most important climate mitigation services (*29*, *46*). Climate policy and practice in the Land Sector and especially native forests, can be dramatically improved by prioritizing the protection and recovery of the natural patterns, distribution, abundance, composition, structure and genetic diversity of biodiversity to reduce the risks to ecosystem carbon stocks, retain and increase sequestration (i.e., their sink capacity) and improve their resilience and ability to adapt to climate change (*5*).

Native forests contain the largest terrestrial carbon stock in NSW and to date have not been managed in ways that recognize the role of ecosystem integrity in their stability (i.e., resistance and resilience). One consequence is that the average carbon stock in production native forests is well below levels found in unlogged forests; 30%-70% depending on forest type and past logging practices (*11*, *47*). Provided action is taken to protect and restore forest ecosystem integrity, native forests would have significant potential to recover lost carbon stocks. However, achieving this requires a sharp focus on improving the outlook for biodiversity at all levels. In particular, this requires the cessation of native forest logging that has significant effects on many elements of forest biodiversity (*48*).

Section B: The proposed INFM ACCU method

1. Establishing a credible baseline against which to assess 'Additionality'

Adopting an historical baseline assumes there would be no change to native forest protection for the 15-year crediting period in the absence of ACCUs. This assumption ignores: (i) the increasing climate and ecological constraints on logging; (ii) biodiversity policy commitments made by governments; and (iii) lacks any explicit scientific or economic justification. Recent market developments point to a further substantial drop in demand for native forest products as evidenced by recent statistics on harvested log volumes (*28*). A forward-looking baseline would be better suited to the 15-year project period and 100-year permanence period.

A baseline must take into account the science supporting the need for increased protection, connectivity and restoration of forests to help reverse biodiversity loss and protect threatened and endangered wildlife. An independent scientific assessment is needed of the cumulative impact of past logging and fire on the current ecological condition of the entire (i.e., state-wide) native forest estate.

A counterfactual baseline that is science-based and relevant for climate mitigation is to use estimates of the carbon stored in natural forest ecosystems, inclusive of impacts from natural disturbance regimes and minimally disturbed (or long-undisturbed) by logging or other human activities. Management actions that help recover lost forest carbon stocks in the shortest ecologically feasible timelines would then focus on recovering forest ecosystem integrity and stability. Such an approach would minimize the risk of losing forest carbon to the atmosphere.

Wildlife recovery needs

Approximately 50% of native forests and woodlands have been lost in NSW alone since European colonisation. A recent study found that 150 threatened species, listed under a regulatory system that is meant to improve the outlook for biodiversity in NSW, were found to be adversely affected by ongoing logging (*19*). The Federal Government made fresh commitments under the Kunming-Montreal Global Biodiversity Framework of the Convention on Biological Diversity (K-M GBF) at COP 15 to halt and reverse species loss by 2030. And in 2023 Australia committed, along with every other signatory to the UN Framework Convention on Climate Change, to prevent deforestation and forest degradation and align climate action in land and forests with the K-M GBF (COP 28 CMA 5, para 33.) Scientific studies, including those involving robust citizen science, can and have identified the significant additional protection needed for these commitments are to be achieved. Climate refuges, habitat connectivity pathways (*49*), and critically important core habitat for Greater Glider (*50*), Koala, and other threatened forest species in production native forests are among the protection and recovery issues that urgently need to be addressed.

The authors of this report were all involved in aspects of the Regional Forest Agreement (RFA) process and it was clear to us that a long-term problem for wildlife was created by the decision rule applied during the Regional Forest Agreement (RFA) process of choosing the "least cost to wood production" option for meeting reservation targets (*51*). High productivity sites for wood are also high productivity sites in terms of carbon retention and habitat provision for wildlife. Low productivity sites are the first to be relinquished for conservation by logging agencies but often support low quality habitat for wildlife (*52*). Endangered wildlife can be in direct competition with the best areas from which to obtain wood (*52*, *53*) The ability to protect core habitat for wildlife will be a key factor in determining the survival of these species in the wild and the viability of native forest logging.

Following the 2019/20 catastrophic bushfires, the Natural Resources Commission of NSW (NRC) recommended substantial cuts to the amount of logging over the following three years and that a rapid assessment be conducted *"of forestry industry size, viability, and resilience to changes in wood supply* *for south coast subregions in full consultation with industry*" (*54*). Damage to wildlife habitat from the 2019/20 fires is being amplified by ongoing logging in lightly burned and unburned areas that provide a refuge for wildlife. Providing wildlife with the best chance of recovery - which will take decades and, in some cases, more than a century, even if all native forest logging ceases - requires urgent protection of remaining lightly burned and unburned areas .

The inadequacy of the government response to logging after the fires was outlined to the NSW EPA in a report commissioned by the EPA from AUSTECO Environmental Consulting in 2020 (*55*). The Executive Summary and recommendations contained the following notable conclusions:

- Fauna populations surviving in fire refuges in state forests were at risk of elimination by timber harvesting under the normal Coastal Integrated Forestry Operation Approvals (CIFOA)…and that the post fire Site Specific Operating Conditions developed by the EPA with the Forestry Commission of NSW "are inadequate to mitigate fire and logging impacts, primarily because the time frame (12 months) is too short"
- An examination of case studies indicated that protection of unburnt and lightly burnt areas could mitigate logging impacts in burnt landscapes if it was made permanent (or longer than 20–120 years) and extended to protect 50% of the least burnt area of forest in each compartment across the entire landscape."
- New conditions are required that focus on permanent protection of large forest patches across regions and landscapes and which capture and include fire refuges…and old growth and which link all retained forest patches larger than 5 hectares in size in a network of permanent wildlife corridors.

We recommend that an independent analysis be undertaken of the current ecological condition of native forests and habitat and wildlife recovery needs to inform any ACCU baseline

Market trends

Wood production from the native forest sector has been in decline for the past 25 years. In the year 2022-23, before native forest logging ceased in Western Australia and Victoria, native forest sawlog and pulplog production fell by 24% and 37%, respectively (*56*).

Emerging changes in demand for wood products show a further decline in demand for native forest timber. China is reportedly scaling back its imports of Australian woodchips now that its own hardwood plantation estate is on stream (*57*). Essential Energy has a network of 1.33 million poles that, according to its modelling, are likely to experience increased risk of failure due to climate change and in particular the impact of bushfires on the network (*58*). The most cost-effective resilient solution they have arrived at is replaced the wooden poles with ones made from fire resistant composite/steel/concrete. These changes in demand are significant as woodchips, pallets and power poles currently provide economic underpinning for the native forest sector.

We recommend an independent assessment of recent industry developments and market trends be undertaken to inform a counterfactual baseline suitable for a 15-year crediting period.

The treatment of wildfire in the baseline

It is inappropriate to assume that the impacts of the 2019/ 20 fires are not relevant for establishing a modified sustained yield baseline. Impacts of the 2019/20 fires on forest ecosystem integrity will be evident for many decades (*15*, *59*) and should be reflected in modified sustained yield (*60*). Legacy impacts of past major disturbance events will interact with, and likely amplify, the impacts of future major disturbance events (*61*). Waiting until the next major disturbance event to modify sustained yield would create a major flaw in the baseline. Reflecting the increasing risk of losing forest carbon to the atmosphere following multiple disturbances and the impacts of climate change, and differentiating those risks based on forest age classes and protection status should be incorporated in the baseline.

These major disturbances “are provisionally defined as events likely to reduce carbon stocks by more than 15% across more than 20% of the net harvestable area in the project area”(Table 2.8 pp.10 & 32 method doc). Hence, this provision may include a range of impacts on forests, particularly wildfires but also tree mortality due to drought, peats and diseases.

The treatment of wildfire in the method does not provide a realistic scenario for the effects of fire in the Australian landscape - particularly as this threat is increasing as a result of climate change (*62*). The ability to exclude 3 years of the 10-year baseline period if more than 25% of the net harvestable area in the project area has been affected by wildfire, on the basis that they are not representative of normal operating conditions, would artificially inflate logging levels in the baseline. The explanation given in the guidance document is that “the inclusion of years impacted by major wildfire events in the calculations would mean the modified sustainable yield would incorporate the effects of these events, even though the method accounts for these impacts through the requirement for the sustainable yield to be recalculated following a major disturbance event”. However, all years should be included in the baseline period and subsequent calculations of yield so that the effect of disturbance regimes are incorporated fully. Major bushfire events are the new fire climate norm and should not be assumed an anomaly. The evidence is clear that climate change has and will continue to worsen dangerous fire weather conditions in eastern and southern Australia(*14*)..

Calculating ‘Modified sustained yield’ and reliability of data

While the proposal to modify sustained yield to improve the correlation between the estimate of sustained yield - as published prior to 1 July, 2024 - and log production is appropriate, the proposed reductions in sustained yield would need to be independently reviewed to ensure errors reported by FCNSW in October 2024 that halved log volumes previously reported for 2023 and errors reported by them in February 2025 that reduced previously reported log volumes by an average of a further 28% for each of the years 2022, 2023 and 2024, are accurately reflected in modified sustained yield (*12*, *13*).

The proposed ‘modified sustained yield’ of 80% of the sustained yield as at mid-2024 - where there is ‘sufficient correlation with log production’ - and 60% of sustained yield “where there is not a sufficient correlation” - appears arbitrary. In the absence of further information, we recommend a deeper and independent assessment across the whole public native forest estate to provide the necessary data to substantiate such prescriptions.

As noted above, the impacts of the 2019/20 fires on forest ecosystem integrity will (a) be evident for many decades and should be reflected in modified sustained yield and (b) legacy impacts of past major disturbance events will interact with and likely amplify, the impacts of future major disturbance events. Waiting until the next major disturbance event to modify sustained yield will create a major flaw in the baseline. Reflecting the increasing risk of losing forest carbon to the atmosphere and differentiating those risks based on forest age classes and protection status should be incorporated in the baseline. Excluding the financial year and two subsequent years from the calculation of modified sustained yield if 25% or more of “the net harvestable area is affected by wildfire”, on the basis that they are not representative of normal operating conditions, ignores the reality - as noted above - that increases in severe drought and fire is, for the foreseeable future, the new norma’.

A wildfire may not reduce carbon stocks more than 15% (*63*) but would significantly affect ecological processes. Areas severely burnt take decades for trees to fully regenerate and vegetation structure and composition to re-establish. These areas therefore could not be logged for a long time. However, under the proposed method these areas would not be included in a post-disturbance revision of the modified sustainable yield. This means that the unburnt area of forest would be logged more intensively to produce the sustained yield calculated for the whole project area.

2. Eligible project activities

Cessation of logging compared to deferral of logging

One major difference between (i) ceasing logging, which avoids emissions and allows ongoing carbon removals from maintaining growth of native forests, and (ii) deferring harvesting that maintains logging operations within a given project area, is the resulting change in the condition of the ecosystem. Under the cessation of logging scenario, protection of forests will allow natural ecological processes to occur, enhancing the quantity and quality of carbon storage as forest ecosystem integrity improves, and reducing the risks to carbon storage from drought, fire, pests and disease. In contrast, under the deferred harvest scenario, full ecological recovery of the forest to a high level of ecosystem integrity is never achieved as forest growth is capped at the harvest age. Carbon stocks at the landscape scale are maintained at a lower level than their potential. Maintaining the forest estate at older ages means that the total storage of carbon in the biosphere reservoir is highest in forests that are never logged. Additionally, the risks associated with logging disturbance remain for the project lifetime and beyond. These fundamental differences in the risks of emissions from carbon stocks in the two scenarios are not reflected in the method. They highlight the importance of, and the benefits of, focusing solely on forest protection and recovery.

The landscape approach adopted to assess the mitigation benefits of ceasing logging is correct. This approach has been demonstrated to show that the mitigation benefit of ending logging is much greater than allowing logging to continue, even taking into account the carbon stored in wood products *(9)*. The mitigation benefit from deferring logging is entirely debatable as this actually constitutes a short-term delayed emission. Furthermore, delayed emissions are far more complex to assess and monitor than the avoided emissions from ceasing logging. Allowing both activities - cessation and deferral of logging - increases the complexity of establishing a baseline and means that decisions about which activity is used to claim ACCUs and which areas could produce the best carbon credit gain would be open to manipulation and blind to forest conservation needs. Areas of greatest conservation value are unlikely to be protected in these circumstances.

Choosing which areas are subject to which of the two activities (i.e., deferral of harvesting and ceasing of harvesting) will not be based on conservation needs but on economic returns from ACCUs. Logging rotations are variable and care will be needed in assessing claims about lengthened logging rotations. Rotations as short as 20 -30 years can occur in areas predominantly producing woodchips. Markets have always played a major role in determining how Australia's forests are logged (*64*). Forest silvicultural management - including rotation lengths, reflected the needs of the woodchip market for almost 50 years - radically changing the native forest estate to the point where many forests are now dominated by young, even-aged stands. The intensity of logging is not merely determined by rotation lengths. Separating logging events in space and time is critically important. Sequential selective logging that removes hollow bearing trees in the same compartment over relatively short time frames can have broadly the same ecological impact as clear fell logging (*65*).

In the context of forests managed for commodity production, the term "sustainable" should be explicitly used to mean sustaining rates of timber production where the rate of harvest is equivalent to the rate of growth over a defined area. Timber harvesting is not sustainable in an ecological sense or in terms of carbon storage as it is a form of forest management that disrupts the natural ecological processes that maintain ecosystem integrity in terms of the composition, structure and function of the ecosystem and its carbon carrying capacity.

The accuracy and reliability of estimates of emissions from modest reductions in logging will be more open to question the smaller the project area. Management of forestry operations occurs at multiple scales and always has the capacity to be adjusted across regions to meet changes in requirements.

Plans are regularly re-designed in response to natural events. Areas able to be logged and wood volumes are never static, varying with weather, market requirements and unforeseen events. There is a very high chance that generating credits through modest reductions in logging and wood volumes would be open to manipulation. A method crediting abatement from ceasing harvesting for an entire State would lessen many of the problems regarding adequacy of data, predictions of sustainable yield and potential future harvesting.

The 'hurdle requirement'

The 'hurdle requirement' is designed to ensure a minimum reduction in logging intensity that can be claimed for a project area: "projects are only eligible to receive ACCUs if both the levels of harvesting and the volumes of wood extracted from the project area are greater than or equal to 20% below the level in the baseline scenario." This suggests that the minimum reduction could be achieved by ceasing logging in a portion of a project area and maintaining modified sustained yield levels within the rest of the project area, which would result in more intensive logging in areas where logging has not ceased. Furthermore, the 20% threshold is well below regularly reported error rates on log volumes (see above) indicating that a much higher hurdle requirement would be needed if it was going to be applied.

Harvested Wood Products

All harvested wood products are relatively short-term - in the context of the carbon cycle and the atmospheric lifetime of CO_2 - and make a negligible contribution to long-term carbon storage when compared to leaving forests *in situ* (*10*). Under the INFM method, woodchips are correctly treated as an almost instantaneous emission but there is no proposed category that appears to cover other very short-term products like pallets. The data input to models designed to attribute carbon storage to particular wood products will be vulnerable to manipulation as the categorisation of logs is open to subjective judgement based on market considerations and will be influenced by the availability of ACCU revenue.

The Land Gap Report, published in 2022, noted that: "The role of wood products for mitigation has been misrepresented, creating the false impression that carbon stored in products has a greater benefit than in forest ecosystems. The promotion of wood for construction as a mitigation strategy is based on the false assumption that wood provides emissions reduction benefits. Due to changes in how harvested wood products were accounted between the 2006 and 2019 IPCC guidelines, the carbon sink in wood products was halved (*21*). There is little evidence that wood is replacing steel and aluminium in major construction projects, and while their production currently is emissions intensive compared to wood, the situation will reverse as soon as these products transition to renewable, non-carbon energy sources. The use of wood for construction will always produce net emissions because the forest carbon stock is maintained at a lower level than an unlogged forest (*10*, *63*). Wood products do provide a store of carbon for their lifetime, but this is small and ineffective as a mitigation action compared to keeping forests intact (*66*). Only 30% of harvested wood is used for what is classified as long-lived wood products (sawn wood and veneer) (*67*) and these have an average longevity of only 35 years (*10*).

The modelling to be used by the INFM method "assumes 80% of the harvested stemwood is extracted for products with the remaining 20% left as slash." "Logs were assumed to be 50% sawlogs and 50% pulp logs and methane recovery in landfill is 75%." The 2021-22 ABARES survey on wood processing published in 2024 found that the recovery rate from logs going to hardwood sawmills was 39% (*68*). A range in proportions of wood product and slash were reviewed by Keith et al. (2015) (*10*). A critical point that is not specified in the proposed method is how the proportion of each component of forest ecosystem biomass is accounted. Typically, forestry data applies a proportion of the aboveground tree biomass that is harvested and divides this into that removed off-site for wood products and that remaining on-site as slash. However, the belowground biomass, understorey, non-commercial trees and dead biomass all remain on-site and are burnt as slash or decompose. Additionally, there is the proportion of the log volume that goes to waste during processing of products. All of these components contribute to creating a larger proportion of biomass where the carbon is emitted to the atmosphere in relatively short timescales. The volume of slash left on the forest floor is highly variable with much higher figures than 20% in most areas. Any assumptions about slash must be ground-checked and monitored closely. The assumption that logs are 50% pulp logs and 50% saw logs does not hold for all regions and varies with shifts in market demand as does the proportion of wood left on the ground.

In 2024 in Tasmania, native forest sawlogs and other high quality native forest products comprised less than 20% of total wood production whereas native forest pulp logs and other short lived products like firewood, sawdust and bark comprised close to 60% of total wood production (*69*).

3. Ensuring permanence

Activities for mitigation benefit should be credited only where the permanence of the carbon storage in the biosphere is ensured and that future mitigation efforts will also benefit. For any method prescribing mitigation activities to be effective, it must be scientifically robust and ensure the governance instruments to maintain the prescribed conditions over many decades.

Deferring forest harvesting delays but does not avoid emissions which merely serve to make the mitigation problem worse for future generations. A crediting period of 15 years is short in the timescale of forest growth and scientifically trivial in terms of mitigation benefit given the atmospheric life-time of a pulse of fossil fuel CO_2 (*29*).

Major disturbance events create risks to the carbon storage in forest ecosystem reservoirs. For example, GHG emissions from the 2019/20 fires were greater than the emissions from all sectors in 2018 (*22*). Reducing the severity and impacts of disturbance events such as drought and fire requires a management focus on improving overall forest ecosystem integrity at large landscape scales. Resistance to fire has been found to improve once forests reach 40+ years of age. Preventing logging in all long unlogged forests and fostering ecological recovery across the entire native forest estate would significantly reduce risks to carbon storage from severe drought and fire (*70*).

The proposed 5% risk of reversal buffer, taken from ACCUs issued over the 15-year crediting period, would be highly unlikely to cover either the risk of loss over the crediting period nor the escalating risk of loss over the permanence period – particularly under the 'deferred harvest' scenario. For the reasons noted above, all other things being equal, risks to stored carbon from drought and fire will increase more over the 100-year permanence period in the deferred logging scenario than in the cessation of logging scenario. A risk of reversal buffer does not insure against loss of income from selling ACCUs after fire and other natural disturbances or the costs of re-establishing carbon stores.

Insufficient attention has been paid to the interactions between the loss of forest ecosystem integrity, climate change and fire and the fact that fire severity in young re-growth forests is greater than in long unlogged forests (*16*). Deferral of harvesting will still result in logging and maintain a younger age distribution of the extant forest that exacerbates fire severity due to high debris loads, drier and windier microclimate and likely increased ignition sources (*23*, *24*, *36*).

A study in wet eucalypt forest found that the time taken to recover the forest carbon lost during severe wildfires is in the order of 8-10 years, however there is a significant shift in the proportions of the carbon stock in different pools of living and dead biomass (*63*). The chances of severe-catastrophic fire seasons occurring over the 100-year permanence period are high and likely to occur at some point during the 15-year crediting period of any given project. Other than 5 yearly reviews, there is no recommended mechanism to reflect this risk and the time taken to recover lost carbon stocks (page 32 of the method doc).

If we want to minimise the risk of forest ecosystems losing carbon stocks to the atmosphere, and to maintain their capacity to sequester carbon and avoid ecosystem tipping points – as is happening in parts of Victoria (*17*) - the integrity of forest ecosystems must be restored to improve their resistance and resilience to threats that are increasing with climate change. Climate trends and the interaction of logging with threats which are increasing with climate change, like severe fire, should be informing mechanisms designed to ensure permanence.

Accounting for wildfire in the permanence period

The method proposes to align with Australia's greenhouse gas (GHG) accounts which "factors out non-anthropogenic impacts on relevant carbon stocks and sources (of emissions)". Assessing the accounting treatment of wildfire in the method requires expert knowledge of Australia's approach to reporting and accounting for emissions from 'non-anthropogenic fire'. While improvements are being made in how the NGGI differentiates between non-anthropogenic and anthropogenic fire, more needs to be done to reflect the role of ecosystem fragmentation, logging and other forms of degradation on increasing fire severity (and thus emissions) and on increasing the risk of future emissions. Accounting approaches for emissions from bushfires need to take into the impact of human influenced climate change on worsening dangerous fire weather conditions (*14*). Shifting fire regimes could mean that emissions from bushfires many not necessarily be balanced by removals through forest recovery. Increasing severity and severity of wildfires and their cumulative impact can reduce the ecological recovery of forests. As threats associated with climate change increase, ignoring the increased risk arising from the interaction between logging and fire in the method would likely pose a problem for successful marketing of forest ACCUs (*16*).

4. Leakage

Dealing with leakage is a critically important challenge for the method. Without tight controls, leakage between states, RFA regions and into private native forests would occur.

How the method proposes to deal with Leakage

The mechanism chosen to prevent direct leakage is by establishing modified sustained yield baselines in "excluded sections of the proponents native forest estate" – i.e., all state-owned native forests outside the project area - utilizing the same modified sustained yield approach as that required for the project baseline. This is aimed at ensuring any increase in logging outside the project area will be penalized by reducing the number of ACCUs able to be generated from the project area.

A similar approach to developing a counterfactual baseline would be developed for private native forests (PNF) in "the same jurisdiction" as the project. Wildfire may be excluded from 3 of the 10 years of the historical baseline period even though "Lack of sustained yield estimates for PNF, high levels of uncertainty in log production estimates and high levels of uncertainty re wildfire impacts on harvesting and log production" (P39) make developing a baseline and assessing leakage into PNF difficult. Indirect leakage (e.g., leakage into other states) would be dealt with by applying a 5% indirect leakage deduction (P38) - a low discount rate in light of experience in Victoria. A regulatory change would be needed to prevent leakage between states and to prevent logging for the purpose of fire management.

Leakage into the plantation estate

Plantation timber has been progressively replacing native forest hardwood in the building sector over the past three decades, to the point where 90% of our domestic timber needs are now sourced from plantations (*28*). The method does not reflect consideration of the degree to which reductions in native forest supply would be met by increased logging and wood production in the plantation estate. Given that plantation timber, including softwood, directly out-competes native forest wood in almost all building products in all domestic markets, leakage would probably, if not inevitably, occur into the plantation estate (which in every other respect is desirable). An additional discount should be applied to products that can be substituted by plantations.

Cross Subsidization

The potential for cross subsidisation is identified as a potential pathway for leakage but is not addressed adequately in the method provisions. In the context of declining markets and increasing pressure to protect more native forests and remove subsidies for native forest logging, an ACCU method that pays State governments to protect and/or defer logging in some areas will always act as a subsidy to enable ongoing logging that would otherwise not be economically viable. Repeated economic analyses show that the native forest logging industry is not financially viable (*71–73*) so there is a high risk that funding generated from ACCUs would be used to keep subsidizing loss-making logging operations elsewhere in the landscape and delay reductions in, or an end to, native forest logging that would occur in the absence of ACCU revenue. Even within a project area, there will be areas of forest on low productivity sites and steep and rocky ground that are too expensive or otherwise too difficult to log. At the margin, revenue from ACCUs will make it feasible to log areas that in the absence of ACCUs would not be logged and/or increase the risk that carbon credits will be claimed for not logging places that would otherwise never have been logged.

5. Coverage of carbon pools

Soil organic carbon is excluded from the method. While it is acknowledged that estimation of soil carbon stocks and detecting change in stocks at landscape scales is challenging, the scientific evidence shows that harvesting practices deplete soil carbon stocks and thus omitting soil carbon will underestimate the losses of carbon from harvesting (*74*). In addition to soil carbon depletion, there are many other soil properties that are degraded due to mechanical damage, as well as changes in microclimate and vegetation as a result of logging (*27*). The omission of soil carbon in the baseline and project scenario will mean that the total carbon losses due to harvesting are not recorded even though the impacts of logging on soil carbon stocks are well known. Where the uncertainty lies is in the time taken for recovery of soil carbon stocks – making carbon recovery in soil difficult to ascertain and attribute over short periods (e.g., 15 years).

6. Revisions needed to FullCAM

As currently calibrated, FullCAM underestimates the carbon accumulation rates and carbon storage potential of protected forests that have older ages, as it is not calibrated adequately to estimate carbon carrying capacity of long unlogged/old growth forests nor all forest types. To help overcome this limitation, the proposed initial inventory of forest carbon stocks in the project area used to calibrate FullCAM should include old growth sites and other high integrity, long unlogged sites, to provide a reference condition that can be used to calibrate the carbon carrying capacity and hence estimate the potential carbon gain of regenerating forests.

A significant issue, given the increasing number of extreme weather events we are likely to experience over the project period, is how the effects of increased seasonal climate variability and climate change trends will be incorporated in the FullCAM model. The increased risks of losing forest carbon stocks to the atmosphere by keeping forests in a relatively young age class should be factored into modelling. The focus on changes in net annual fluxes misses the main mitigation value of forest ecosystems, namely, long term carbon retention (*29*).

The carbon storage potential of a forest region where the forest is managed for commodity production, (i.e., the additional carbon that can be removed from the atmosphere and retained in the ecosystem stock if logging ceases) should be considered at a landscape scale, inclusive of the effects of natural disturbance regimes on the age distribution of the forest and rates of carbon gain and loss (*11*, *75*). The total carbon storage may vary over time within a range defined by the variability in response to the disturbance regime. However, the time-averaged storage of carbon remains; it is not temporary storage. Changes should be reported as gross changes in stocks, emissions and removals.

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Appendix 1 Mitigation benefits of native forest protection

There is an opportunity for a change to native forest policy to reduce to Australia's emissions by 25.5 Mt CO_2e per annum (5.9% of total annual emissions, or 30% of our annual gap to Paris target).

Australia has a significant opportunity to reduce emissions and increase carbon storage from changing forest management. Annual emissions could be reduced through two key actions: (1) ending native forest logging which would avoid 7-11 Mt CO_2e emissions and enable ongoing removals of 2 Mt CO_2e which are otherwise forgone and (2) stopping land clearing which would avoid 14.5 Mt CO_2e emissions and enable ongoing removals[1]. These changes could play a crucial role in meeting Australia's Paris COP Agreement commitment of a 43% reduction in 2005-level carbon emissions[2]. With an annual gap of around 85 Mt CO_2e [3], improved native forest protection and restoration alone could contribute about 30% of the reductions required.

Opportunity 1: Ending Native Forest Logging (~11 Mt CO2e per year; 13% of Australia's annual Paris Gap; 2.5% of annual total CO2e emissions)

- Australia's native forest logging industry provides only 10% of Australia's wood supply (90% is from plantations) and the area of native forest logged has steadily declined over the past 30 years. Log production volume was still about 2.5 million m^3 per year as of 2022-2023[4] from logging around 10.7 M ha of native forest[5].
- This logging of forests results in an estimated 7-11 Mt CO_2e emissions[5] (with an average of 9 Mt CO_2e) as well as around 2 Mt CO_2e foregone removals (i.e., the sequestration that would have occurred if the forest had not been logged)[6].
- If native forest logging were entirely halted, the emissions would be avoided and the removals would continue, yielding an 11 Mt CO_2e annual contribution to Australia's Paris Agreement target.
- Australia's National GHG Inventory Reports show a strong correlation between emissions from the area under forest management and native forest log production. However, "net emissions" are reported which are calculated by summing (a) the emissions from the 1-2% of the public native forests available for logging and harvested each year, with (b) the removals of CO_2 from the atmosphere (sequestration) from growth in the unlogged 98-99% of the forest area. When the sum of the emissions and removals is a negative number, it means that more carbon is being removed in a year than is emitted. The latest inventory report shows the forest land sector has "net emissions" of -88 Mt CO_2e, of which about -23 Mt CO_2e are from native forests. If native

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[1] The magnitude of these removals is related to the forest type that would have been cleared and no estimates are currently available.

[2] Australia's Nationally Determined Contribution, 2022, (https://unfccc.int/sites/default/files/NDC/2022-06/Australias%20NDC%20June%202022%20Update%20%283%29.pdf)

[3] Quarterly update of Australia's National Greenhouse Gas Inventory, March 2024 (https://www.dcceew.gov.au/sites/default/files/documents/nggi-quarterly-update-march-2024.pdf)

[4] Australian forest and wood products statistics Production to 2022-23; https://daff.ent.sirsidynix.net.au/client/en_AU/search/asset/1035883/0

[5] Australia State of Forest Report criterion 1 forest area by tenure https://www.agriculture.gov.au/abares/forestsaustralia/sofr/criterion-1/indicator-1.1a.ii-forest-area-by-tenure#area-of-australias-forest-by-tenure-class

[5] The estimated range of logging emissions is 7-11 Mt CO_2e. The wide range in values is because there is little public data available on emissions from logging and gross emissions are not reported. The minimum amount is the emissions from deforestation reported in the Australian Government's 2022 national GHG inventory report plus a conservative estimate of emissions from native forest logging. The maximum includes logging emissions based on estimates from native forest log production presented in the national report plus supporting evidence from additional sources. Further academic research is needed to calculate more precise estimates nationally, and for each state and forest region.

[6] This estimate assumes that of the 9.9 M ha of native multiple use public forest (1.1a.ii Forest area by tenure (2023) - DAFF), 1% is logged in a year and if this forest was not logged the continued growth would sequester 18 t CO_2 per ha per year, producing 1.8 Mt CO_2 in removals.

forest logging were to cease, this would increase to -32 Mt CO2e because there would no longer be 9 Mt CO2e of logging emissions. (Foregone removals are not included here.)

- The federal government could immediately achieve 84% of this potential reduction by legislating to end native forest logging on public land (16% is private native forest logging)[7].

Opportunity 2: Stopping Land Clearing (14.5 Mt CO2e per year; 17% of the annual Paris Gap; 3.4% of annual total CO2e emissions)

- Australia is one of world's 24 deforestation hotspots[8], and the only developed nation on list. In 2022, land clearing in Australia generated 14.5 Mt CO2e of direct emissions, with 5.9 Mt CO2e from primary forest clearing and 8.6 Mt CO2e from secondary clearing[9].
- These figures would be higher if foregone carbon sequestration were included. However, estimating this requires data on the growth rates of the forest types undergoing clearing.
- Since much of the land clearing occurs on private land, government intervention and policy measures would be required to reduce these emissions. Implementing these policies may take time but could significantly contribute to Australia's emissions reduction goals.

Note: "Bio-carbon" (carbon stored in vegetation and soils) and "geo-carbon" (carbon stored in fossil fuels) are not considered equivalent. Effective carbon offsets must operate on a timescale aligned with the longevity of carbon's presence in the atmosphere.[10]

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[7] 2020 National Inventory Report, May 2022 – Volume 3, Table 11.28

[8] https://www.theguardian.com/environment/2021/jan/13/australia-the-only-developed-nation-on-world-list-of- deforestation-hotspots

[9] https://greenhouseaccounts.climatechange.gov.au/ Activity Table 1990-2022 – LULUCF (excel) table 6

[10] https://www.nrdc.org/stories/greenhouse-effect-101#gases ("Once [CO_2] is emitted into the atmosphere, 40 percent still remains after 100 years, 20 percent after 1,000 years, and 10 percent as long as 10,000 years later)