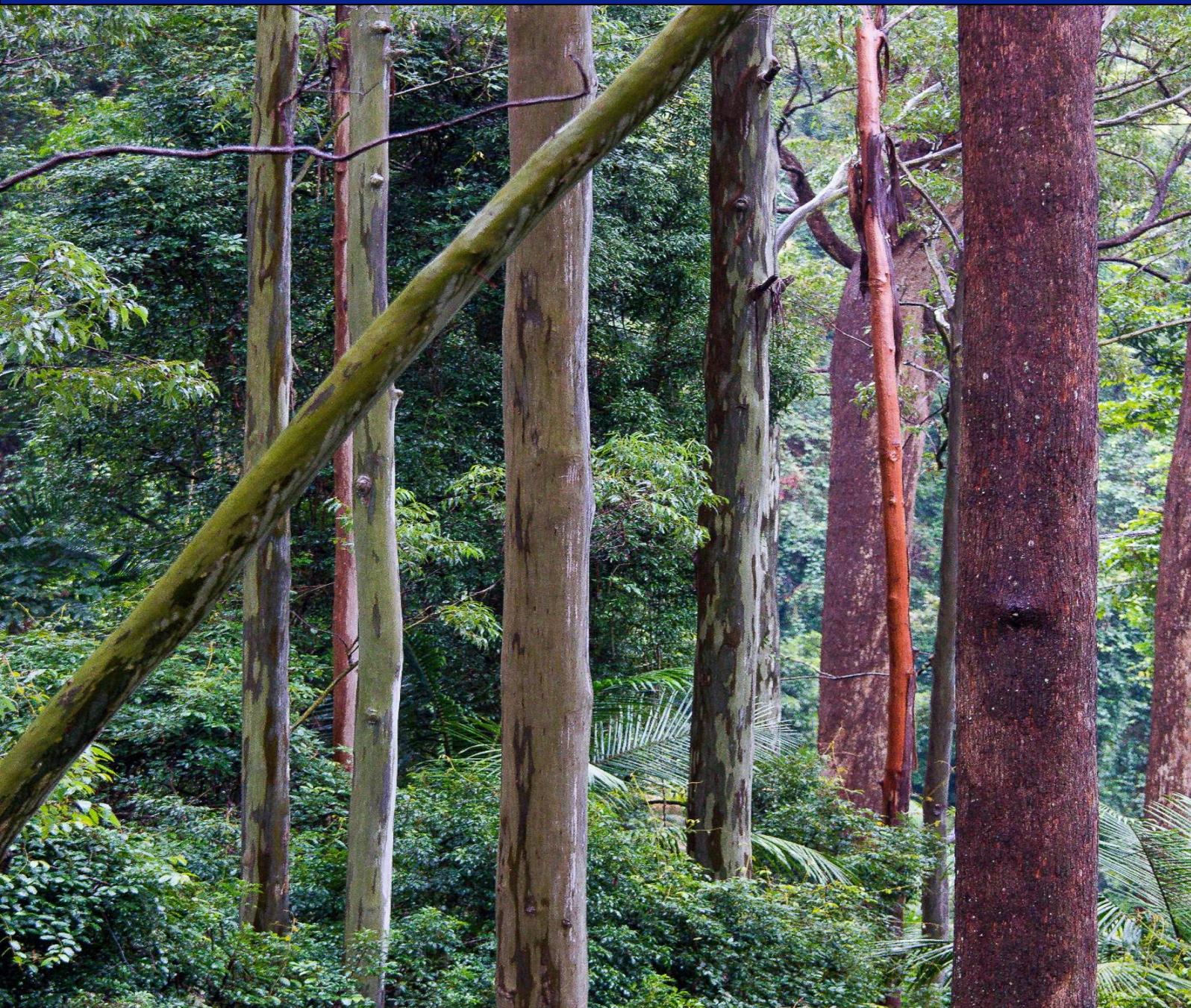




**Remake of the Coastal Integrated
Forestry Operations Approvals
Final Report
Threatened Species Expert Panel Review**



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Acronyms

DPI	Department of Primary Industries
EPA	Environment Protection Authority
FCNSW	Forestry Corporation of NSW
IFOA	Integrated Forestry Operations Approvals
NPWS	National Parks and Wildlife Service
NSW	New South Wales
OEH	Office of Environment and Heritage
TSL	Threatened Species Licence

1 Overview

In May 2012, the NSW Government announced a remake of the Integrated Forestry Operations Approvals (IFOA) for the Eden, Southern, Lower North East and Upper North East regions of coastal NSW. The government committed to delivering a single Coastal IFOA that is effective in achieving its objectives, and:

- reducing red tape
- making the rules clearer for everyone
- incorporating advances in knowledge and technology.

The objectives of the IFOA remake are to:

- reduce the costs associated with implementation
- improve clarity and enforceability
- result in no net change to wood supply and no erosion of environmental values.

The following key principles will guide the remake and underpin the new IFOA:

- commitments made under the Regional Forest Agreements and NSW Forest Agreements will not be affected
- the new IFOA will not change the comprehensive, adequate and representative reserve system
- the ability of Forestry Corporation of NSW (FCNSW) to meet high-quality wood supply commitments established in the NSW Forest Agreements will not be reduced
- the new IFOA will be outcomes-focused and supported by monitoring, evidence and risk management principles
- threatened species and their habitats will be better protected through an emphasis on landscape-based protection measures
- the new IFOA will be credible and transparent.

A new multi-scale landscape-based protection approach is proposed that applies habitat protections at the site, local landscape and broader landscape scales. The approach aims to ensure that multi-aged forests and connected habitat are maintained in the landscape to allow for native species persistence and re-colonisation of harvested areas.

The government recognises that changes to threatened species licences (TSLs) and the move to a multi-scale landscape-based approach for managing the impacts of forestry activities on species, populations and communities needs to be underpinned by the best available knowledge.

To assist in this, a panel of qualified and experienced experts, including independent ecologists and botanists, was convened to review and advise the government on:

- the adequacy of proposed settings to mitigate harvesting impacts across time and across the landscape
- the adequacy of proposed landscape, stand and site measures to protect threatened species, populations and communities
- specific species requirements
- specific requirements for various types of survey.

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This final report outlines the work undertaken by the expert panel, and ways in which the panel's findings have improved threatened species provisions in the draft Coastal IFOA.

More information on the remake of the four IFOAs for coastal regions of NSW can be found on the [Environment Protection Authority \(EPA\) website](#).

2 The expert panel

An expert panel of 20 qualified and experienced ecologists and botanists was convened to determine the effectiveness of the proposed multi-scale landscape approach for protection of species, populations and communities.

The panel included flora and fauna experts from the Office of Environment and Heritage (OEH), Department of Primary Industries (DPI) – Science, EPA and FCNSW, and independent experts. The panel membership and details of participation are listed in Appendix 1.

Panel members had extensive expertise in the threatened plants and animals that occur, or are likely to occur, in the forests covered by the new Coastal IFOA. Most panel members also understood the application of the previous threatened species licences (TSLs) and native forest biodiversity and management.

The composition of the panel changed at different stages of the review to address identified gaps in expertise. As a result, people with specialised knowledge and expertise were engaged to advise on mitigating the impacts of forestry operations on specific threatened species and their habitats. All new members of the panel were briefed and provided with information on past proposals and discussions.

The government also consulted with experts outside the expert panel. This was to ensure that adequate evidence and information was obtained on the suitability of the proposed TSL framework for threatened species and their habitats that are likely to be affected by forestry operations in the Coastal IFOA area.



State Forest near Port Macquarie. Photo: EPA.

2.1 Work undertaken by the expert panel

The expert panel provided independent expert opinion, information and evidence to inform the government's decisions on the proposed TSL framework. The panel did not make decisions, or endorse the proposed TSL framework.

Members of the expert panel were asked to:

- understand the basis of the TSL components of the draft IFOA, and the scope of the IFOA remake
- understand the proposed changes to the protection provisions at the landscape, stand and individual tree scale
- advise on how these proposed changes could affect threatened species, populations and communities
- provide constructive feedback on the proposed multi-scale landscape approach for protection of threatened species, communities and populations
- provide expert advice on additional or alternative protection measures and survey requirements.

In reviewing and providing information and advice, the expert panel considered the IFOA remake's objectives listed under '1. Overview'.



Sawlogs in a State Forest near Port Macquarie on the NSW North Coast. Photo: EPA.

2.2 Expert panel workshops

The expert panel review was undertaken in three stages.

Stage 1 was a preliminary review of the multi-scale landscape concept.

Stage 2 was a more detailed review of the NSW Government's proposed landscape framework and specific TSL conditions.

Stage 3 was a trial of proposed settings in five harvest areas on the mid-north coast of NSW.

Stage 1 – March 2014

The EPA convened three workshops in Sydney between 18–20 March 2014.

Before the workshops, the expert panel was provided with a range of materials including:

- details of the multi-scale landscape approach being proposed

- a preliminary report (PDF, 739KB) and final report (PDF, 1.4MB) by the Forests Practices Authority of Tasmania commissioned by the NSW Government as part of the IFOA remake – these reports contained advice, recommendations, cross-jurisdictional comparisons and research on the proposed TSL thresholds, limits and framework
- comprehensive lists of all threatened plants and animals that could occur in the native forests covered by the new Coastal IFOA.

This information provided context for the review and the panel's advisory role in the process.

The workshops covered the concept of the multi-scale landscape approach and discussed endangered populations as well as threatened and protected species that could occur in the forests covered by the new Coastal IFOA.

The expert panel advised on:

- improvements to proposed thresholds to limit the impacts of forestry operations on threatened species habitats over time, and on landscape conditions
- additional survey and specific protection measures to mitigate impacts of forestry operations on species requiring additional protection.

Stage 2 – September 2014

On 10 September 2014, the expert panel reconvened to discuss the adequacy and effectiveness of the detailed multi-scale landscape framework and specific TSL conditions. They discussed the revised landscape, stand and species conditions based on the feedback and recommendations they provided in Stage 1.

Before the stage 2 workshop, the expert panel was provided with a draft TSL framework and details of proposed landscape protections, environmentally sensitive areas, stand level measures, monitoring, tree retention and burning associated with forestry operations.

In particular, the panel focused on the adequacy of:

- the proposed overarching threshold limits of the protections designed to manage the impacts of forestry operations over time and across the landscape
- improvements to existing landscape exclusion zones, including high conservation old growth forest, rainforest, large forest owl landscape, ridge and headwater habitat corridors, forest management zones, rare forest (including rare non-commercial forest), heath and scrub, wetlands, riparian protection zones, rocky outcrops and cliffs, and general nest, roost and camp protection
- new landscape provisions, including minimum exclusion zone thresholds and threatened ecological community mapping
- new or improved stand-level protection, including hollow-bearing and recruitment tree retention, feed trees, giant trees, wildlife habitat refuges, coarse woody debris and burning
- new species-specific landscape protections
- improvements to species-specific survey and protection requirements
- the proposed strategic monitoring framework.

Additional expert panel reviews of proposed flora management conditions and survey requirements were undertaken outside the workshop.

Stage 3 – August and October 2015

In August 2015, the members of the panel went on field visits to the locations of the trial of the Coastal IFOA. The visits showed the expert panel how the proposed IFOA conditions had been implemented in the trial locations, and provided a visual representation of the proposed measures, to improve the panel's level of understanding of settings, and to enable them to provide informed advice. The trial assessed the application and enforceability of a range of proposed licence conditions and management approaches against the scope and objectives of the IFOA remake. The trial also assessed timber supply and ecological outcomes against a benchmark of current practice.

The trial was not intended to be a scientific study, but rather an opportunity to implement a range of options to help clarify and finalise negotiations around the threatened species licence (TSL) requirements at the landscape, stand and site scales.

Following the trial site visit, the panel were given:

- a list of targeted questions to focus feedback on outstanding TSL issues
- draft IFOA species tables
- draft wildlife habitat and aggregated retention conditions and protocols the results of the trial of the Coastal IFOA.

The members of the expert panel met again in October 2015 to discuss the findings of the trial. The information obtained from the trial, along with advice provided by the panel, was used to refine the proposed prescriptions and inform the finalisation of the draft Coastal IFOA.

A full report on the Coastal IFOA trial scope, the methods applied and outcomes will be made publicly available with the release of the draft Coastal IFOA.



Port Macquarie forest aerial. Photo: EPA.

3 Key recommendations from the expert panel

The strengths and weaknesses of the proposed multi-scale landscape settings were discussed over the course of the expert panel process.

3.1 Stage 1 and 2 recommendations

During stages 1 and 2, the panel recommended that further assessment, analysis or modifications be conducted regarding:

- alternate settings to limit intensive harvesting in certain blackbutt-dominated regrowth forest areas to prevent the cumulative impact of harvesting in these landscapes
- ensuring harvesting operations continue to maintain connectivity and support the existing comprehensive, adequate and representative reserve system
- ensuring that sufficient and suitable mature forests would be retained in the landscape to maintain forest structural diversity and habitat refuges over the course of multiple harvest cycles
- ensuring the timeframes between each cutting cycle, and spacing of operations, would enable species to persist in the landscape and recolonise following timber harvesting within a landscape management area
- ensuring the area of intensive harvesting would not introduce a barrier or impediment to the movement of species
- ensuring proposed species landscape exclusion zones are fit for purpose
- ensuring the selection criteria for recruitment trees delivers on the intent to permanently retain trees with the highest likelihood of developing suitable hollows and persisting in the long term.

The expert panel also recommended further work be undertaken to:

- obtain additional expertise for a few specific species to assess whether supplementary protection and survey measures were necessary
- have relevant experts review and update habitat models and survey requirements to ensure they were suitable for identifying species and habitats.

The expert panel generally supported:

- proposed conditions for many threatened species, although some panel members indicated such support was conditional on the final outcome of time and space settings
- the proposal to move to monitoring and adaptive management, and away from individual record-based prescriptions for many species
- the proposal to move to a multi-scale landscape approach rather than record-based prescriptions for many species.

3.2 Stage 3 recommendations

During stage 3, the expert panel provided further feedback on the settings proposed and on aspects of the TSL examined in the Coastal IFOA trial.

The expert panel generally supported:

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- the principle of retaining a minimum 20% landscape protection - although some panel members noted that this quota would often be met by the existing excluded area network in some management areas
- the principle of retaining a mosaic of retained habitat refuges, or clumps, scattered throughout harvest areas – the panel advised on important features to include in these clumps such as large hollow-bearing trees
- clearer requirements around boundary protection and associated implementation and regulation
- settings that provide for connectivity and the maintenance of a mosaic of forest structure and age class across the landscape
- permanent protection of current exclusion zones
- prioritising streamside areas for retention where they are outside the riparian protection network, particularly where they have been protected over previous harvest cycles.

Some panel members noted:

- a lack of scientific data made recommendations on the optimum size of the harvested area and the intervals between harvest events in the intensive zone challenging
- the impact of intensive harvesting had not been adequately assessed.

The expert panel submissions from stage 3 are included in Appendix 2. The panel's submissions are in their original form as submitted.

4 The government's response to key recommendations

The NSW Government is committed to ensuring that the IFOA remake is based on sound scientific evidence and that the new Coastal IFOA does not erode environmental values.

The information, evidence and advice provided by the expert panel during all three stages has been important in delivering this commitment. The key recommendations of the expert panel identified where more work, development and analysis were needed to ensure that the multi-scale landscape-based protection measures and specific TSL provisions in the new Coastal IFOA deliver their intended outcomes.

The panel's feedback and advice were reviewed by the EPA, FCNSW and DPI (Fisheries), and recommendations were adopted where appropriate. As a result of the panel's input, the Coastal IFOA now has TSL settings at the landscape, stand and site scales that provide more protection for species and their habitats.

However, the challenges of balancing wood supply, improvements in operational efficiency and regulatory practice with maintenance of environmental values are complex. Not all settings and issues could be acceptably resolved.

In mid-2016, the Premier referred outstanding issues regarding the Coastal IFOA to the Natural Resources Commission (NRC). Operating under terms of reference, the NRC was asked to provide the NSW Government with independent evidence-based advice on settings, and options for how best to meet commitments, having regard to objectives, and key principles of the Coastal IFOA remake.

The NRC has provided a comprehensive report containing findings and recommendations to the Premier, Minister for the Environment and Minister for Primary Industries. The findings of this review have helped the Ministers to make decisions on outstanding TSL conditions and enabled the completion of the Coastal IFOA.

5 Appendix 1: Expert panel workshops attendance

Name	Agency/ Consultancy	Workshop dates					IFOA trial	Notes
		18/03 2014	19/03 2014	20/03 2014	10/09 2014	15/10 2015	August 2015	
Mick Andren	OEH				X	X	X	
John Turbill	OEH				X	X	X	
Doug Binns	OEH			X				
Rod Pietsch	OEH		X		X	X	X	
Paul Sheringham	OEH			X				
John Briggs	OEH			X				
Keith McDougal	OEH			X				
Linda Broome	OEH		X					Participation ended after March, as species of expertise considered adequately addressed. Further input sought as required.
Damon Oliver	OEH		X					Participation ended after March, as species of expertise considered adequately addressed. Further input sought as required.
Dan Lunney	OEH	X						Advised in relation to koalas only.
Martin Predavec	OEH	X						Advised in relation to koalas only.

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Name	Agency/ Consultancy	Workshop dates					IFOA trial	Notes
		18/03 2014	19/03 2014	20/03 2014	10/09 2014	15/10 2015	August 2015	
David Hunter	NPWS		X					Participation ended after March, as species of expertise considered adequately addressed. Further input sought as required.
Rod Kavanagh	Niche Ecological Services		X		X	X	X	
Frank Lemckert	Niche Ecological Services		X		X	X	X	
Brad Law	DPI - Science	X	X		X	X	X	
Brian Tolhurst	EPA		X		X	X	X	
Chris Slade	FCNSW	X	X	X	X	X	X	
John Willoughby	FCNSW				X	X	X	
Peter Kambouris	FCNSW	X	X	X	X	X	X	
Jim Shields	Independent	X	X					Contracted to FCNSW to provide advice on koalas and other fauna for March workshops.

6 Appendix 2: Expert panel feedback

The expert panel was consulted on the development of TSL settings and provided feedback on key themes during the workshops. The final feedback of panel members on a series of short answer questions relating to the TSL are included in the table below.

The questions posed and positions discussed in this section are for context only and are a record of feedback of the expert panel. The content of this section is not necessarily consistent with that of the exhibited draft coastal IFOA, and the views presented are as received by the EPA following the completion of the final panel workshop in November 2015.

Question	Expert	Response
<p>General Principles</p> <p>The following principles have influenced the design of the threatened species protection model and represent the EPAs interpretation of the general view of the expert panel:</p>		<ul style="list-style-type: none"> • A minimum protection approach (20% protection rule at local landscape scale) at the local landscape scale has merit if the areas are selected from suitable habitat. Some members of the panel may wish to provide further advice on the priority habitat and/or criteria for selecting these areas. • Aggregated retention has merit over scattered tree retention if the areas are selected and located appropriately to deliver habitat protection outcomes. Some members of the panel may wish to provide further advice on the priority design criteria for selecting these areas. Multiple members of the panel also noted that further consideration of the selective harvesting proposal is required to demonstrate it is equivalent to “status quo” tree and threatened species protections. • The multi-scale model that delivers a minimum standard to habitat driven protection, monitoring and adaptive management is an improvement over the current survey and record triggered protection approach without monitoring. Some members of the panel agreed there was a need for select species to continue a survey and protection based approach. • Regeneration harvesting using less frequent but more intensive harvesting within a maximum coupe scale may be preferable to the repeated events at the local scale that the current AGS conditions provide. It was noted from some panel members that ideally smaller coupes should be considered. • Ideally longer return intervals between adjacent intensive harvesting events are desirable as 5, 7 or 10 year intervals are not necessarily ecologically meaningful. • Previously applied protections, particularly in intensively harvested areas, should be carried forward as permanent protection in the new licence as much as possible.

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<p>1. Do you agree that these points are representative of your general views expressed during the expert panel workshops?</p>	<p>Brad Law</p>	<p>Yes, though the phrase “5, 7 or 10 year intervals are not necessarily ecologically meaningful” is itself not meaningful. The habitat of some species can regenerate rapidly, for example ground cover for small mammals. In the case of the Hastings River Mouse, early successional habitat may even be preferred (after some initial recovery from the immediate disturbance). So different taxa will respond in different ways and habitat for a considerable range of species will recover in 10 years. Whether these are threatened species will be highly variable. Despite this, in general, longer time intervals after disturbance will allow for greater habitat recovery for a broader range of species.</p>
	<p>John Willoughby</p>	<p>Yes, I agree that the points discussed and presented above are representative of my views. When measured against the objectives of the IFOA remake, the points listed have the potential to deliver the desired result.</p>
	<p>Peter Kambouris</p>	<p>Yes.</p>
	<p>Frank Lemckert</p>	<p>Yes, I agree. There were a range of views expressed and could only be expected with so many people involved and so there were always points of contention. But I believe that this summed up the general agreed approach, with all of the caveats on not being absolutely certain on what would ultimately be decided upon and the uncertainty on what would actually work.</p>
	<p>Chris Slade</p>	<p>Yes, in general.</p>

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	<p>Brian Tolhurst</p>	<p>No, personally I find it extremely frustrating to try and contribute to a solution when the underlying driver of the wood supply agreements fundamentally restricts any chance of a balanced approach and I can see the environment being the inevitable loser in the equation.</p> <p>Sustainable forest management requires maintenance of forest stand structure complexity and heterogeneity to allow for biodiversity conservation. This key point seems to have been given up on in this review process with harvesting practices proposed that will severely degrade these forests to an artificial and simplified arrangement with severely reduced and limited biodiversity values.</p> <p>I think this remake is an interventionist approach to remedy a situation that has evolved through poor and desperate practices adopted to meet an unsustainable wood supply agreement at significant expense to the environment and the people of NSW. Continuing down this path will have long term deleterious environmental outcomes for the public forests of NSW in order to limp across the line and meet the final years of the wood supply agreements. This will be entirely at the expense of these forests. Recovery to some level of 'natural' ecological function will be decades and centuries, possibly without many species that will not survive this current and ongoing impact.</p> <p>I still don't accept as a basic premise that the heavy form of harvesting (Heavy STS/Regeneration Harvesting) is an appropriate form of management for native forests if you aim to look after an acceptable level of environmental values. Unfortunately many of the questions and decisions are based on accepting this approach which I believe has very little ecological merit and is entirely based on keeping up with an unsustainable wood supply arrangement. I find it very hard to answer many of these leading questions with that in mind.</p> <p>The idea of aggregated retention or clumping protected features together was originally put forward to help address the impacts of the Heavy STS harvesting at a compartment scale where the structure and form of a forest was heavily degraded by this intensive harvesting practice and the scattered retention tree approach had been compromised. This approach was not previously required under traditional STS practices largely because by default the impact of this light to moderate impact created a mosaic of disturbed and undisturbed areas. This protected a variety of features and the scattered retained trees were in sufficient numbers and arrangements to adequately provide the key elements of a disturbed but functional forest ecosystem.</p>
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	<p>Rod Pietsch</p>	<p>See response to question 3 below Aggregated retention has merit, particularly in the intensive harvesting zones. However, equivalency has not been demonstrated for selective harvesting and I am particularly interested in how it would apply on the south coast and tablelands. This is a major change to the TSL conditions and there is a lot of uncertainty about what the clump area % retention figures and rules will actually deliver on the ground. Therefore, if the clump approach is adopted there must be an explicit trial and review period during which independent data is gathered pre and post harvest to document the actual outcomes being delivered on the ground to ensure no erosion of environmental values. The multi-scale model with standard minimum levels of habitat protection, monitoring and adaptive management is in principle a better approach than the current survey and record driven protections. However, the success of the model will depend on the adequacy of the monitoring proposed and the mechanisms for delivering adaptive management. The panel should have a continued role in the design and analysis of the monitoring and adaptive management program. See responses to questions 9 and 10. Adjacency should be considered at the coupe scale. I agree that previously applied protections should be carried forward as permanent protection. However, if new information exists or is gathered as part of the monitoring to better configure these areas, then there should be scope within the licence under the adaptive management provisions, to change the boundaries of these areas where ecological benefits or improvements can be demonstrated.</p>
<p>2. If not, which points do you believe do not reflect your general views of the panel workshops? And what are your views on these matters?</p>	<p>Brad Law</p>	<p>As above.</p>
	<p>John Willoughby</p>	<p>Nil response.</p>
	<p>Peter Kambouris</p>	<p>Nil response.</p>
	<p>Frank Lemckert</p>	<p>The longer the return time the better, particularly in regards to harvesting adjacent coupes. Again I would point out that we have no real idea of how things are working at this time as they stand and any program that can deliver long-term monitoring that better assesses the effectiveness of license conditions is a huge improvement. The situation as it stands now is not likely to be able to improve the conditions for biodiversity across large parts of the logging estate as it shows no means of restoring hollow-bearing trees into that landscape and is more likely to lead to the slow decline in hollows – which is a critical problem. Whether the new methodology can do that will have to wait to be seen. But it will not be worse and should be better – in my opinion.</p>
	<p>Chris Slade</p>	<p>The proposal is an improvement compared to the status quo. Survey based triggers use a nil result as a nil requirement for implementation of a condition, clumps and 20 % protection won't require the presence or sign of a record to trigger a clump or other protection. The clumps, 20% protection and multi-scale model are part of an overall package which includes monitoring as a key component to provide a drastically improved understanding of biodiversity in State Forests. Significant value adding would be achieved if other land tenure monitoring programs were incorporated. Monitoring will provide significantly improved data over.</p>

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	<p>Brian Tolhurst</p>	<p>See above response.</p> <p>It is interesting to note that the model put forward by Forests Corporation in the recent trial as their version of a best practice approach to balance the equation of retained trees and habitat with the maximum allowable timber removal, on analysis, still did not allow wood supply targets to be met. I think this gives a good indication of the magnitude of the task of trying to reconcile wood supply with environmental protection given the current overharvested and poor condition of these State forests.</p> <p>The intensive harvesting has clearly moved the coastal state forests from being multiple use forests with significant biodiversity values to that of purely production forests more in line with plantations. I don't believe this is an appropriate outcome or use of these crown lands that was ever envisaged.</p> <p>It is my opinion, based on my experience working in State forests that the move by FCNSW to a more intensive harvesting regime in recent years is more to do with timber supply demands and economies of scale than any urgent requirement to change silvicultural practices. There are plenty of previous examples of sustainable STS harvesting and subsequent adequate regrowth in coastal forests. Heavy STS is not required in all coastal production forests for effective regeneration. I would argue that even in Blackbutt dominated forests it is not the default position required for regeneration. There are also examples of AGS that gave good balanced results. This was when it was undertaken with appropriate levels of planning and application to achieve the intended outcomes of this practice.</p>
	<p>Rod Pietsch</p>	<p>The points expressed above are my views.</p>
<p>20% Landscape Protection Threshold</p> <p>Within each LLA it is proposed to set a minimum threshold of 20% must be within permanent protection (biodiversity exclusion zones). Where LLAs are under the threshold, additional areas of Net Harvest Area must be included in permanent protections to meet the threshold.</p>		
<p>3. Do you agree that this rule will provide an improvement to how important habitat is identified and protected across the landscape?</p> <p>If not, why?</p>	<p>Brad Law</p>	<p>20% landscape protection is likely to be the single most important action for biodiversity. The importance of this level of protection has been reviewed recently by Slade and Law (in press – Australian Zoologist). However, it appears most areas already fall above the 20 % threshold, so an improvement on the status quo will likely be limited to the few areas that don't currently have a minimum of 20 % protection.</p>
	<p>John Willoughby</p>	<p>Yes, as a practitioner of the current rules, the 20% minimum threshold allows the flexibility to make meaningful biodiversity exclusion zones that are based on a wider, more considered range of factors.</p>
	<p>Peter Kambouris</p>	<p>Yes, in principle. It should also consider that some species require ongoing management or maintenance of habitat as they show preferences for early or mid-successional habitat stands, browse or forage.</p>
	<p>Frank Lemckert</p>	<p>Yes as a rule, this should be the case. Certainly, it has the potential to do so and should do so if managed properly as it will result in increased protection in logging areas and should consolidate habitat retention. The main concern, which probably applies rather more to the aggregated tree retention is to not erode current values in areas where the hollow-bearing tree resource is currently well distributed across the landscape and there are good numbers of hollows. There is a potential for hollows in such a landscape to become concentrated into only a few patches rather than leaving the resource more evenly spaced. I realise</p>

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		that there is a compromise needed to ensure that timber can be grown and harvested effectively in a more small area pattern and so hollow-bearing trees cannot be left everywhere, but keeping as even a distribution as is possible is the preferred target. We really don't yet know (at least I am not sure of any data) that shows how far apart clumps of hollows can get before they start to become isolated islands. Really depends on the landscape context (including riparian and retained other habitats) and the planning that people do with this more flexible approach. It certainly can and should be done well.
	Chris Slade	Yes, this brings every landscape unit up to a minimum of 20% protection. Currently protections are not evenly distributed across the landscape, this will ensure each landscape unit will have a minimum protection.
	Brian Tolhurst	A threshold has had to be set because of the unsustainable heavy harvesting practices that have become widespread in the coastal forest. I don't think it is an improvement on the intent of the original IFOA rule set but a necessary step to stop the continued widespread environmental impact currently being carried out and protect some remaining areas and values. 20% is an arbitrary ball-park start point not based on any real landscape assessment. In many areas this retention will already be achieved by existing exclusions. It will not be an improvement if harvestable areas are then more intensively harvested. It will take years of monitoring to reveal the relative success of otherwise of this mitigation approach.
	Rod Pietsch	The principle of a minimum level of retention/protection at the local landscape scale is sound. However, whether 20% is the appropriate proportion for all habitats and harvesting regimes and will provide an improved outcome for threatened species cannot be stated with certainty based on the information the panel has been provided. At this stage it is not clear what the 20% includes, however, tree retention clumps should be implemented at the coupe or compartment scale and be additional to the 20% retention in the local landscape.
4. What do you consider are the priority criteria for selecting additional environmental protections under this rule? Why?	Brad Law	1 st select riparian areas, mapped old growth forest and rainforest. Then over-ridge connection corridors to maintain connectivity between catchments. Add EEC's. Then increase the allocation of clumps to make up the 20 %. These should include riparian areas that were previously protected but are no longer protected in the current system. Emphasis is on riparian areas and mapped old growth because the former is the most productive part of the landscape for a range of biodiversity and it maintains connectivity. The latter because it is generally uncommon on SF estate.
	John Willoughby	The criteria for selecting additional area for protection may vary from one LLA to another. However the overarching outcome behind the decision is to provide sound bio-diversity / ecological values in perpetuity. The criteria should be almost self-evident for example: habitat resources required for species known to be or likely to be present; connectivity to other areas of value; inclusion of underrepresented communities.
	Peter Kambouris	Criteria should be developed for a taxa (or group of similar species where appropriate) and be applied where this taxa or species is the highest biodiversity value and your protection priority species. Where this is applied, it is highly likely that the measure will also cater for a range of other threatened species in either their core or marginal habitat within the cpt.

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	<p>Criteria may include:</p> <ul style="list-style-type: none"> • Inclusion of key habitat elements, dependant on the species (eg large hollow bearing trees, complex boulder tumbles, key flowering or browse species) • Proximity to other retained habitat or clumps • Distance to riparian corridors • Distance to nearest retained tree within HNA • Enhanced riparian protection as substitute for some clumps if frog breeding habitat highest priority value • Maintain minimum average clump size, but allow for variations based on habitat availability, topography, other values requiring consideration. <p>Noting some species require disturbance to maintain core habitat features, so allowing for management or maintenance of habitat if required, rather than uniform exclusion of all management actions.</p>
Frank Lemckert	<p>Hollows as always as these are critical in most situations. Then proximity to riparian corridors as the scientific evidence points to these corridors and habitats as being of high value to many fauna species. So linking these two where possible would appear to be a good option. The next most important element would be other non-riparian linkage areas – so areas of land that provide clear linkage between reserves and/or larger areas of retained habitat that are found in the landscape. My thought is that fauna (and flora) will continuously try to repopulate logged areas and will need good pathways to interact between large areas of retained land and that providing the stepping stones and corridors for them to do so will allow recolonisation and gene flow to happen as much as is possible.</p>
Chris Slade	<p>Criteria should be driven by the situation on site, that is desktop searches and local information should drive items for inclusion into the 20% exclusions to deliver the best ecological outcomes for the landscape unit. Why – not all landscapes are equal so hard to specify the exact criteria for each area.</p>
Brian Tolhurst	<p>There will be a variety of priorities in different landscapes with different target species and ecosystems. In general undisturbed areas with mature forest elements should be initially targeted where available. But as with all these criteria size and spatial arrangements will also need to be seriously considered and there site specific value assessed.</p>
Rod Pietsch	<ul style="list-style-type: none"> • Retained habitat patch size • Minimising boundary to area ratio • Connectivity • Habitat/vegetation types for local threatened species • Topographic position and vegetation type representativeness • Trees or forest in the mature or older age classes

Aggregated Tree Retention

Following feedback from the panel and the results of the harvesting trial, an aggregated tree retention model is proposed to replace the current scattered tree retention approach. It is recognised that the selection of clumps is important to the success of this approach. Proposed draft conditions for wildlife habitat clumps incorporate a much stronger tree retention focus in clump selection, whilst still allowing for the

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<p>habitat protection considerations that had been developed for the original, smaller clump approach. It is expected that these conditions will replace specific H and R tree retention rules.</p> <p>The draft conditions include elements considered suitable for conditions and those suitable for guidance and please note that these will need to be refined and then put in appropriate enforceable language during legal drafting. Key details around the rate of clumps in each of the tree harvesting zones is still being decided. This is to ensure that the clump model delivers comparable rates and selection of H and R trees to what is currently applied.</p>		
<p>5. Attached is a draft of revised clump conditions, including objectives, conditions, guidance and example maps of how clumps may be applied in the field. Is the proposed aggregated tree retention model with a focus in clump selection on the right track to deliver a suitable aggregated retention outcome?</p> <p><i>(please include any comments relevant to the minimum and maximum size specifications, the categorisation of sizes, rates and placement etc.)</i></p>	<p>Brad Law</p>	<p>Yes, the attached doc seems to be on the right track.</p> <p>One comment is the broad range of the large size class; ie 2-10 ha. My preference would be to tighten this to 5-10 ha, with medium being 0.5-5 ha. I think this would ensure retention of some truly larger clumps, which I think is ecologically important. However, I also acknowledge the need to retain flexibility in the allocation of clumps on the ground and that too much allocation to a large size class would restrict the number of smaller clumps and thus result in the loss of connectivity. This would not be a good outcome. Otherwise, the selection of 20 % of each size class is a good risk-spreading approach.</p>
	<p>John Willoughby</p>	<p>Yes, compared with current conditions the idea of clumping retained trees is an approach that will deliver the desired environmental outcomes. This is a very strong option to be given, whereby decisions can be made to protect ecological / habitat values on the basis of ecological principals. Bearing in mind that there are remaining trees between clumps such as seed trees, hollow trees and non-commercial trees.</p>
	<p>Peter Kambouris</p>	<p>Yes. Flexibility is the key given the range of values to be catered for. I think the inherent flexibility built into the current design and guidance material will allow for this</p>
	<p>Frank Lemckert</p>	<p>Yes, I consider that it is. As noted above, I don't think we have a strong understanding of the actual limitations that this approach may have, but the theory suggests that having clumps of habitat that form the islands of features critical for species maintenance will allow the best chance of maintaining populations in the forestry environment when that has to be balanced against wood supply. I cannot comment on minimum or maximum sizes with any authority. That will depend on the species under consideration and goes back to the old SLOSS debate. The main concern will be whether smaller clumps are adversely affected by light penetration and wind throw and so are more prone to degradation. That is likely early on in any cycle when the immediately surrounding forest is low. Some research determining minimum patch sizes would be nice too, but that is hard to then reconcile with a forestry environment when the surrounding habitat is not entirely alienated even at an early stage. Dare I say it – we need monitoring.</p>
	<p>Chris Slade</p>	<p>Yes.</p> <p>A range of sizes is important to enable protecting various criteria, from single trees (hollow bearing tree) to a patch of trees (stand of Allocasuarina, concentration of Tallowood) and unmapped habitat components (rocky outcrop). Protection afforded to smaller components (single trees) will be drastically improved within a clump compared to a free standing isolated tree. Clumps will apply independently of record based triggers, ie clumps will be implemented regardless of the results of any surveys undertaken; this is a large</p>

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		improvement over current system where a nil result from surveys (which is not always indicative of true absence) does not require the implementation of a condition.
	Brian Tolhurst	I repeat again that the idea of clumping protected features together is an interventionist approach that was originally put forward to help address the impacts of the Heavy STS harvesting. This was at a compartment scale where the structure and form of a forest was heavily degraded by this intensive harvesting practice that was never envisaged under the existing IFOA. The scattered retention tree approach was compromised by this unsustainable and widespread intensive harvesting. If heavy forms of harvesting are accepted then a mosaic of undisturbed areas scattered throughout the impact zones has merit. However, for these to be of any real value the spatial arrangements between clumps would need to be such that they are not isolated and remain ecologically functional. Large continuous canopy gaps in these forest would be detrimental for many forest species – see examples in next question response.
	Rod Pietsch	See comments in the marked up version of the document. Aggregated retention should improve retained tree longevity, resilience and likelihood of continued use by fauna. Priority should be given to retaining the largest trees as this is the best surrogate for suitability for use by fauna.
6. Please briefly describe what you consider are the most important principles (limit to 3-4 please) in choosing where and how to locate clumps	Brad Law	<ul style="list-style-type: none"> • Sample habitat trees. • Sample topographic gradient (different species have different habitat requirements and gullies are already protected. So it is essential to sample different topographies, which should also assist in protecting a diversity of tree species and associated flora). • Position to maximise connectivity across logging area. • Position in relation to habitat models for select species, where reliable models exist.
	John Willoughby	Distribution clumps need to be strategically positioned to mitigate the effects of harvesting and maximise the regeneration. Composition clumps should attempt to group a suit of species and resources that best represent the communities (on a macro and micro scale) disturbed by harvesting. Size clumps need to be large enough to assist the above principles to maximise their influence.
	Peter Kambouris	<ul style="list-style-type: none"> • Inclusion of key habitat elements, dependant on the priority species detected / known to inhabit area • Proximity to other retained habitat or clumps including riparian corridors • Maintain minimum average size, but allow for variations based on proximity and area of others, habitat availability, topography, other species within area requiring consideration
	Frank Lemckert	Keeping good dispersion of clumps across the landscape to make sure distances to each are not larger than necessary. Again, assistance in maintaining corridors by good placement relative to retained areas.
	Chris Slade	<ul style="list-style-type: none"> • Flexibility based on ecologists being able to use a clump budget to protect important habitat components such as hollow-bearing tree, stand of Allocasuarina, koala feed trees

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		<ul style="list-style-type: none"> • Range of sizes • Heterogeneous spread across area
	Brian Tolhurst	<p>This new proposed model of habitat protection needs to be focused around the existing remaining large trees to make sure there is no further loss of this limited resource. It is acknowledged that other elements such as the groundcover, understorey and sub canopy features will gradually improve over time in these clumps, but this will still be in a much shorter time frame than it would take to grow a new cohort of large habitat trees.</p> <p>The spacing of clumps across the harvestable area will conceivably be much greater than the distances between scattered individual retained trees and will have a significant impact on many arboreal species. For gliding mammal species these distance will be of critical importance – 30 m is the current reported average glide distance for Squirrel and Yellow-bellied Gliders and canopy gaps over 40 m would start to become barriers for regular and safe movement. For Koalas significantly separating the forest canopy will increase their time spent on ground and thus increase their exposure to terrestrial predation. In areas with records of these and similar arboreal species, wide scale intensive harvesting regimes would not be appropriate. For many small forest birds and microbats this would also be the case. Additional scattered trees between the clumps to provide some level of forest canopy connectivity would be necessary.</p> <p>It should be noted that it was particularly these type of large arboreal species that drove the existing IFOA's intent to limit the upper scale of intensive harvesting to the current AGS regime and this was not allowed in Koala areas. I have seen no evidence to date that the relative upper disturbance levels set in this approach for these species was unwarranted.</p>
	Rod Pietsch	See comments in the marked up version of the document.
7. Please provide advice on what environmental features you would prioritise into clumps?	Brad Law	<ul style="list-style-type: none"> • Hollow-bearing trees/recruits/ giant trees • Glider feed trees • Dead trees • Koala browse species
What would be the most important features that would achieve the highest ecological outcome for the landscape?	John Willoughby	This is a difficult question to answer in a generic or prescriptive way. I would expect it would be tailored to ecological requirements of each area. Clumps should preserve, protect or enhance key ecological values in such a way as to allow the resilience of the pre-existing community to respond to disturbance. I would expect that they are representative of the native forest community, distributed throughout the landscape to take advantage of relevant landscape features.
	Peter Kambouris	<p>Rocky Outcrops where confirmed TS habitat for species/values not otherwise protected (eg STQ den or latrine) Threatened flora (eg rhyolite outcrops) with variable buffer (0-20m)</p> <p>Flowering ground veg where significant forage resource for key TS not otherwise protected</p> <p>Clumps of hollow-bearing trees which include patches of varying complexity ground veg to cater for range of species (ie, both arboreal and terrestrial denning/nesting) in proximity to riparian corridors.</p>

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	Frank Lemckert	<ul style="list-style-type: none"> • Largest hollow trees available – priority in areas with few hollows • Larger recruit trees where hollows are limited • In areas with more hollows – locally important feed trees
	Chris Slade	<ul style="list-style-type: none"> • Priority of habitat components of known threatened species based on desktop search results • Hollow bearing habitat trees • Features noted in the field during habitat searches using desktop results as triggers for field searches (koala feed trees, stands of Allocasuarina spp) • threatened flora species • Most important feature to achieve highest ecological outcome. Genuine hollow-bearing trees included in clumps
	Brian Tolhurst	<p>All trees greater than or equal to 100 cm dbh should be retained and protected as a matter of urgency. Not only do these provide the best opportunity to develop the large hollows required by many species they also provide more flowers, fruit, nectar and seed along with nesting opportunities for large birds such as raptors. At this stage of the harvesting cycles across coastal NSW all remaining large trees are part of a limited resource and are critical for many threatened species and populations to survive. There is known clear deficit of hollow bearing trees in the forested coastal landscapes of NSW.</p> <p>Clumps need to be focused around the existing remaining large trees to make sure there is no further erosion of this limited resource. Other elements such as the understorey and mid storey features and the associated habitat features will largely be protected by default and improve over time.</p>
	Rod Pietsch	<p>See comments in the marked up version of the document.</p> <p>Priority should be given to retaining the largest trees as this is the best surrogate for suitability for use by fauna.</p>
8. Please provide any additional considerations or specific advice can you provide for the improvement of the proposed aggregated tree retention model and guidance material.	Brad Law	<p>I am a little concerned about loss of tree species diversity in intensively harvested coupes. ie a dominance of blackbutt in the regrowth. I think selecting clumps so that a diversity of tree species is sampled will be important. ie in a blackbutt area you may <u>not</u> want to clump mostly blackbutt. One example is the flowering nectar resource offered by species like northern grey ironbark (E. siderophloia). This species is very important and should be an addition to clumps, even though it does not commonly contain hollows nor is it a koala browse tree. There are likely to be others.</p>
	John Willoughby	<p>The health and quality of the clump should be the best areas available, for example, the selected habitat should be free of weeds and insect attack etc. This would be best done at the discretion of the surveying ecologist. The option of selecting areas to be protected based on the above criteria is not available under the current rule set.</p>
	Peter Kambouris	<p>Nil response</p>
	Frank Lemckert	<p>As above, I would not like to see the situation arise where there was a clumping of hollow trees in areas where there are currently an even spread of hollows. I do not believe that we have good information to show how hollow-using animals respond to having those hollows placed long distances apart. Will they be forced to be more territorial of the hollows in clumps if there are few clumps in order to ensure that they can use</p>

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		that hollow if needed, thereby excluding a larger population. That is, if there are several options on clumps they may be more willing to share than if there is just one. Of course, this may counter the issue of trying to have larger clumps that are more resilient to impacts. So a mix is going to be it. And then monitor to see what works and adapt.
	Chris Slade	The clumps offer significant improvement over the status quo - This is the opportunity for field ecologists to develop the best ecological outcome with a 'clump budget' to deliver improved ecological outcomes based on results of desktop searches and habitat searches.
	Brian Tolhurst	A rule set must be explicit, measurable and enforceable. Whilst intent statements and guidance notes are very important and useful tools, the pressure of contractual wood supply agreements will inevitably take priority for Forestry Corp at the expense of other elements. Clear regulatory arrangements will be necessary for all parties to reduce conflict when it comes to interpretations and implementation. History has shown that this was a fundamental flaw in the current IFOA that allowed unintended and perverse outcomes to eventuate through the varying interpretations of a document that became unfit for purpose in these conflicting circumstances.
	Rod Pietsch	See comments in the marked up version of the document.
<p>Time and Space – Intensive Zone</p> <p>In the intensive zone, the proposal is to replace the current AGS model that allows repeated small scale openings to an alternate coupe style harvesting model. The coupe harvesting model proposed has time limits that align with the upper limit of current AGS return times (to 7-10 years) to enable wood supply requirements to be met.</p> <p>To offset the impact of intensive harvesting it has been proposed to establish a clump budget, retain seed trees between clumps and to establishing minimum regulatory limits for harvesting in time and space. These limits generally represent the minimum or maximum that may be applied. In some limited instances or areas, it could be the likely average.</p> <ul style="list-style-type: none"> • A maximum area of 2,200 net ha of intensive harvesting in any one year over a 30,000-50,000 ha net area of the intensive zone (within a 140,000 ha gross area of State Forest). • A maximum of 33% of any one 1,500 ha LLA in any one event • A maximum coupe size of between 30 and 60 ha in size • A minimum interval of harvesting adjacent coupes of between 7 and 10 years. 		
9. Do you see any significant difference in the range values for maximum coupe size or period between adjacent events in delivering ecological outcomes?	Brad Law	Clearly there is a significant difference between 30 and 60 ha as a max coupe size. Smaller is better ecologically. I suggest smaller is better because disturbance is more localised and connectivity would be greater across the LLA with more, smaller coupes. We have a long-term study at Eden (Banksia Rd) looking at recovery in bats (Rod has done birds) in an alternate coupe system with coupes averaging about 15 ha. Time between operations here was ~ 23 years. Bat activity has remained low in regrowth coupes over the entire time period, ie there was limited recovery of bat habitat, primarily because of high stem density. However, all of this consideration has to be balanced against other trade-offs, especially time periods between operations. My preference would be increase the time between events at the expense of having a larger coupe. It is not clear how much extension in terms of extra years could be applied to the interval

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<p>If yes, please provide a rationale</p>		<p>between operations. The longer the better – can a minimum of 10 years be achieved?. My opinion is based on the fact that it takes considerable time for the habitat of many species to recover following intensive disturbance and maximising this opportunity for recovery is critical. I suggest this on the basis that there is already in place within the model 20 % landscape protection plus retention of clumps, because these will considerably ameliorate impacts of logging and provide a reasonable level of connectivity that would otherwise be provided by smaller coupes.</p>
	<p>John Willoughby</p>	<p>Again another difficult question that is answered more by feel than by science. I am not aware of much in the way of research to guide this answer. Perhaps monitoring pre and post harvesting that should follow if these changes occur will guide the decisions into the future. However, the suggested range values are a reasonable starting point. It will ultimately lead to each coupe receiving a long interval between disturbances.</p>
	<p>Peter Kambouris</p>	<p>No. Eden has been operating under an alternate coupe model for decades. It works well, with the only ecological advantage from options discussed is to allow for larger coupe sizes to maximise adjacent return times where possible. This would be beneficial. Where possible it should also be applicable to thinning where the scale is larger and could cater for PUs within the LLS and not coupes. This would be a preferred alternative to continual thinning of adjacent compartments which is operationally more efficient.</p>
	<p>Frank Lemckert</p>	<p>I do not know. The reality is that, in regards to return times, they are probably always going to be less than what would be considered adequate, which may be decades. Not an option and so it will probably be determined by harvest need. All I can say, and said with others at the meeting, the longer the better to provide the maximum regeneration. On the same lines, it is not likely that coupe size can be varied enough to impact positively on return times and so I do not see that there is going to be a better option on that. So stick with whatever provides the longest return times.</p>
	<p>Chris Slade</p>	<p>No.</p>
	<p>Brian Tolhurst</p>	<p>Yes, this is a very significant aspect of the equation especially when the impact is elevated to these intense levels. Smaller areas impacted spread over greater areas will inevitably create less impact. Unfortunately many of these forests are such a poor state that the ecological outcome required is rehabilitation and recovery not further intense pressure.</p> <p>This intensive harvesting has only been possible because the current IFOA conditions were poorly written making these aspects of this regulatory document largely unenforceable. Forestry Corporation have readily exploited this situation in an attempt to meet the demands of the wood supply agreements at the expense of public amenity, biodiversity and the environment. This attitude and approach by Forestry Corporation needs to be acknowledged and kept in mind to make sure that the remake and new rule set is constructed and written in such a manner that the intended outcomes are unambiguous, transparent and able to be consistently regulated.</p>
	<p>Rod Pietsch</p>	<p>I am not familiar enough with current AGS harvesting in the intensive zone to be able to draw informed comparisons to what is being proposed in the coupe harvesting model. However, I think that fewer repeat</p>

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		<p>visits for harvesting the same area should provide better environmental outcomes due to less disturbance events within a patch in a given period of time.</p> <p>In my view there is not much difference ecologically between 7 and 10 year return times for harvesting adjacent coupes. However, there is a substantial difference between 30 and 60 ha maximum coupe sizes as 60 ha creates a much larger impact area and would result in larger areas of even aged forest. In general, multi-aged forests provide better or more diverse habitat for fauna. The general principle should be to minimise coupe sizes and maximise the time between adjacent harvesting events.</p>
<p>10. Would you suggest maximum coupe size or the interval between harvesting adjacent areas is more important and why?</p>	<p>Brad Law</p>	<p>I think the interval is more important than coupe size, especially given the various prescriptions that will be in place to ameliorate impacts. See above.</p>
	<p>John Willoughby</p>	<p>Because of supply demands in a defined area both size and interval are connected in such a way that they are difficult to isolate in this context.</p>
	<p>Peter Kambouris</p>	<p>Interval more important. Although increased size allows greater tracts of undisturbed habitat within the PU at one particular time; Larger size allows for a longer return interval b/w disturbance events as a consequence. This consequently is likely to maximise regeneration rates and therefore regenerating tree size in time due to less edge and shading. Ultimately, expediting the larger tree = hollow philosophy adopted by some.</p>
	<p>Frank Lemckert</p>	<p>See above.</p>
	<p>Chris Slade</p>	<p>The concepts are linked. A larger coupe (60ha) will enable the area to remain undisturbed for longer affording more opportunity for recruitment and habitat development between disturbance events providing a mosaic of differing age classes in the local area with mature forest elements in the riparian and ridge and headwater zones.</p>
	<p>Brian Tolhurst</p>	<p>Coupe Size This new model proposed, with areas of 50- 60 ha intensively harvested at a time, is a large increase in the scale of impact from the current most intensive harvesting regime of AGS and is <u>not supported</u>. The size of this area may equate to several individuals of a single species home range. This includes many of the larger arboreal forest species that the IFOA is trying to manage such as the Koala, Greater Glider, Squirrel Glider, Phascogale etc. These species and many others that rely on the structure and form of the forest in their home range will be significantly affected by the large scale of this impact if they fall under the area of a harvesting event of this type. If intensive forms of harvesting are to be adopted then I would reluctantly recommend an initial model that would be set with a maximum of around 10 ha using natural boundaries in the landscape. These units should be well separated in time and space and then closely monitored to appraise the outcomes of this high level impact.</p> <p>Interval between harvesting Return times of 7 years are <u>not supported</u> with this newly proposed level and extent of intensive impact. This not a significant enough time for regeneration and recovery after impact for many species especially given the scale of the proposed new intensive harvesting regime. 12 to 15 year return times to adjacent areas would be the minimum in my opinion.</p>

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	Rod Pietsch	These two factors are highly correlated, however priority should be given to maximising the time between adjacent harvesting events. Shorter times between adjacent harvesting leads to more even aged landscapes and potentially longer habitat and population recovery times. It may be appropriate to consider a sliding scale of coupe size to adjacent harvest time, for example: 30ha coupes – 10 years for adjacent harvesting; 60ha coupes – 20 years. From the discussion and information provided it seems that the coupe size and adjacency thresholds are being driven by timber supply issues in a few select areas rather than ecological principles and timber supply commitments across the coastal IFOA regions. This is potentially a consequence of the pattern and amount of harvesting that has occurred to date. Rather than design the rules for the whole IFOA to meet a short term supply issue in particular areas, the rules should be designed to meet the long term ecological and timber supply outcomes. Where this impacts on short term timber supply, FCNSW should be required to make a special case and provide some other form of mitigation or compensation if ecological outcomes are compromised in particular areas.
11. Can you describe what key environmental considerations need to be maintained in landscapes that will be harvested using the more intensive regeneration harvesting practices?	Brad Law	No consideration appears to have been given to adjacency of LLAs. Ideally we would not want to see adjacent 'local landscapes' logged in a short period of time. So some staggering would be beneficial here. In order to achieve this but still meet wood production levels, I suggest that increasing coupe size from 50 to 80 ha's could be acceptable, though this might only result in increased efficiencies rather than more wood volume.
	John Willoughby	Connective corridors between exclusion zones.
	Peter Kambouris	Adequate sized, appropriately located and spaced habitat clumps. The harvesting intensity is less relevant where the key habitat values are retained which allow for the persistence of key/ target species and dispersal. A design which caters for all species is unlikely, however, few species are likely to need additional consideration.
	Frank Lemckert	There was a lot of discussion if this issue as more intensive operations obviously and necessarily will have more severe local scale impacts. A suitable spread of all resources, and particularly tree hollows. Back to SLOSS and Island Biogeography as we are assuming that we are creating islands of habitat that will allow refuge for populations that are impacted by logging, allowing for both the retention of a base population for recolonisation and also to provide stepping stones for migration and gene flow. As I said before, I don't think we have a good understanding of what is the best arrangement. But it is going to be better than what is otherwise going to happen and the theory indicates that, with a good base of larger retained patches of vegetation, this approach should work to maintain the overall population across the harvested estate.
	Chris Slade	Riparian habitat, ridge and headwater links between catchments, clumps to protect those features that are outside the more formal protection areas, habitat trees. Alternate coupe style logging is not new and has been undertaken in other parts of Australia & NSW with effective Biodiversity management outcomes incorporated into the system. The alternative of a coupe being intensively harvested once in 60 years compared to a gap style operation of 22.5 % of the harvesting area being harvested 4 times in 25 years is a big improvement in allowing regeneration and recruitment opportunities.

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	Brian Tolhurst	Some semblance of forest structure in the harvested area immediately after harvesting. Reduction in structural complexity of a forest will lead to reductions in biodiversity. All large and hollow-bearing trees.
	Rod Pietsch	Large old trees and areas of multi-age and mature forest should be maintained in the landscape to provide source populations for regenerating forest. There should be some level of habitat representativeness in retained areas in a local landscape. The size and configuration of the retained habitat should be related to the species that occur there particularly those of conservation concern.
<p>Selective Harvesting</p> <p>There is no intent to change the outcomes delivered by current selective silviculture practice (STS). However in the selective harvesting zones the proposal is to replace the current basal area removal limit approach (40-45% of existing Basal Area) to minimum basal area retention limits (m2/ha retained).</p> <p>These limits are designed to ‘future proof’ against a change in harvesting intensity, be easier to enforce, still allow for adequate eucalypt regeneration in selectively harvested areas and maintain a range of habitat features and structure within harvested areas. Proposed minimum retention limits are in the range of 10-12m2/ha in the regrowth zone and 10 -14 m2/ha in the non-regrowth zone.</p>		
<p>12. Do you see any significant difference in the range of values proposed for minimum basal- area retention in delivering an ecological outcome from selective harvesting operations?</p> <p>If so, provide a rationale for why.</p>	Brad Law	It is difficult for me to judge this as I don't have a good feeling for BA levels. However, a mixed age forest structure is an ideal to aim for (e.g. koalas appear to show a preference for uneven age forest with a diversity of browse species – research at Pine Creek). I am not sure about the extent to which a basal area retention of 10 will reduce this mixed age structure, but presumably it will. Bats in particular respond negatively to high stem density regrowth, although they are also known to use trails as flyways and this can off-set their response. Also research I did in Tasmania showed that aggregated retention in clearfell areas was effective at maintaining bat activity at similar levels to unlogged sites and that they were better than dispersed tree retention at doing this.
	John Willoughby	Basal-area retention is stated as a minimum limit/ha, taken as an average across the harvest area, there is no significant difference in the capacity to deliver ecological outcomes compared to current selective harvest operations.
	Peter Kambouris	No. As long as design meets the requirements to maximise ecological outcomes as per design guidelines then intent is likely to be met.
	Frank Lemckert	I cannot say. Really that is something that will require operational effect to see that the intent of maintaining a similar outcome is met. With less explicit rule sets, the intent of the process can be met with more flexibility, but equally can be biased in the hands of someone trying to produce a specific and different outcome. Need to undertake some harvesting and see if the outcome is as predicted and then adapt as needed, if needed. It looks like it should work, but only time will tell. But again, reducing the spread of habitat trees would be a poor outcome.
	Chris Slade	No, provided genuine habitat trees are retained within clumps allowing for the recruitment of future habitat trees from the range of trees retained as part of the clumps.
	Brian Tolhurst	Yes. (Note – I am pretty sure the current IFOA basal area removal upper limit is 40%) Removal of standing trees below a basal area of around 18 - 20m2/ha will reduce the structure of these native forests to such a simple form that the ecological processes will be severely diminished or non-functioning. Even in the best

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		<p>case scenario it will take many decades or even centuries of recovery for any level of native forest ecological function to be restored after this intensity and scale of impact.</p> <p>A typical healthily stocked Blackbutt forest could be expected to have a basal area of around 30 - 40 m²/ha. Currently under the IFOA a 40% removal would limit the minimum basal area retention of 18 m²/ha in the worst case scenario. These new retention limits are set well below this and would significantly change the outcomes of the STS practice if the range of values proposed are adopted.</p>
	Rod Pietsch	<p>In my view the panel has not been provided with enough information, data or examples to be able to comment on the differences or suitability of the basal area removal/retention requirements. It would be useful to clearly define the outcome that the basal area limits should deliver, then present real data to show what the current IFOA conditions deliver and what the proposed changes would deliver. As indicated in the previous panel discussion the figure of 10m² seems too low to retain appropriate forest structure.</p>
13. What key environmental values would a basal area limit need to deliver within each harvesting operation to ensure a maintenance of environmental values equivalent to those delivered by the current selective harvesting rules?	Brad Law	Mixed age-class across a range of species.
	John Willoughby	Regeneration of the native vegetation. In the context of a harvested forest, the establishment of environmental weeds are a major threat to the recovery and maintenance of environmental values. I don't have the answers to this problem but I consider it a major consideration.
	Peter Kambouris	Adequate spatial and temporal retention of habitat, features or species protection areas as required by revised design.
	Frank Lemckert	As above really. One package. Habitat attributes for all species need to be met at a consistent distribution to meet all of the diverse requirements.
	Chris Slade	The retention of a minimum basal area provides for the delivery of the range of important habitat components, a heterogeneous spread of a range of species, habitat trees, future habitat trees etc.
	Brian Tolhurst	<p>Sustainable forest management will require maintenance of forest stand structure complexity and heterogeneity to deliver key environmental values.</p> <p>Forest canopy and mid storey connectivity maintained at functional levels for dependent species e.g. arboreal fauna. Impact/basal area removal must be spread across coup and not be concentrated.</p> <p>H and R trees should always be selected from the largest available.</p> <p>Impact should also be spread across landscape. Numerous adjoining compartments should not be impacted at same time e.g. 2-3 maximum in any one event and return times to adjoining compartments must also be prescribed.</p>
	Rod Pietsch	I don't have a good understanding of this issue and what the various basal area limits mean on the ground to provide any further comment.
<p>Riparian Protection</p> <p>The proposal is to replace the current Land Information Centre (LIC) derived mapping and stream ordering with an alternative LiDAR derived Geonet modelled stream classification. The trial report and panel presentation highlights the elements of the proposed changes that see increases in protections in some areas and decreases in other areas, but that on balance produce an equivalent area of protection for each stream class.</p>		

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<p>It should be noted that under the current IFOAs, any streams not mapped by LIC are not afforded any protection unless these areas are within fisheries habitat or have triggered the soil and water conditions of the IFOA. The proposal is that all streams are now afforded some level of protection.</p> <p>Concerns regarding protection in areas of fisheries habitat have been considered and as a result, an additional 5m soft boundary outside the 5 m hard boundary on class 1 streams (ie 10 m total width) is proposed in areas of identified threatened fish habitat, as per the modelled habitat maps as provided by DPI, Fisheries. This will occur predominantly with discrete areas of the north coast and select areas of the south coast.</p>		
<p>14. On balance, do you think the proposed changes in stream identification and protection lead to an equivalent or improved ecological outcome to the current conditions?</p> <p>If not, why?</p>	<p>Brad Law</p>	<p>On balance, yes an equivalent or slightly improved ecological outcome would be expected with the new stream identification. Similar stream extents are mostly identified, and some stream headwaters previously not identified will be now receive some protection.</p> <p>In some areas where areas once mapped as riparian buffers are no longer identified then there would be a loss of habitat protected for the past 20 year period. Given the intensity of operations over the last 10 years, it would be important to try to ensure these areas remain protected. In such cases priority could be given to locating clumps in these zones.</p>
	<p>John Willoughby</p>	<p>Yes, on balance equivalent to current conditions, this has been demonstrated by the analysis.</p>
	<p>Peter Kambouris</p>	<p>Improved, as current mapped exclusions don't always protect the intended value.</p>
	<p>Frank Lemckert</p>	<p>Yes. There is a difference, but the more effective mapping should protect more streams.</p>
	<p>Chris Slade</p>	<p>The proposed changes offer an improved ecological outcome. More of the riparian network is now mapped using the Geonet system, offering greater certainty and protection for the upper catchment drainage lines and the actual location of all of them. This will lead to improved protection of the important landscape component.</p>
	<p>Brian Tolhurst</p>	<p>No or limited.</p> <p>Improvements in some areas may happen into the future for some areas such as LNE where previously unmapped drainage lines have already been harvested.</p> <p>No further loss or impact on the retained riparian areas that have been protected to date under the existing rule set should occur. The expert panel agreed that these areas were the few areas seen on the site visit that still retained habitat elements and the diversity, form and structure of a native forest.</p>
	<p>Rod Pietsch</p>	<p>On the basis of the information and examples provided, I believe the proposed stream identification and protection measures should provide similar or equivalent protection to that under the current conditions. However, consideration should be given to carrying over already established riparian protections, particularly those on 3rd or higher order streams that are not embedded within the new riparian protection network.</p>
	<p>Brad Law</p>	<p>See above.</p>

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15. If not, what additional considerations need to be identified to maintain the environmental values current provided by the stream protection network?	John Willoughby	Nil response
	Peter Kambouris	Nil response
	Frank Lemckert	Nil response
	Chris Slade	There is significant value in maintaining existing drainage line exclusions if Geonet mapping has significantly changed the location of the drainage line and its associated exclusion zones if harvesting has occurred up to the edge of the old protected riparian zone. These areas could be incorporated into the clump budget and or 20% landscape protection if they contain significant hollow bearing trees.
	Brian Tolhurst	I am not convinced that the proposed riparian buffers are adequate for ecological protection of these features. The widths seem to have been generated to deliver no net loss of available harvestable area rather than driven by an appropriate buffer for the size/importance of the feature.
	Rod Pietsch	See comment above.
Environmental Significant Areas – Exclusion Zone Protection		
ESA boundary conditions have been simplified to hard and soft boundary rules from the current complex range of rules around operating near boundaries.		
16. On balance, do you think the proposed changes to boundary protection lead to an equivalent or improved ecological outcome to the current conditions? If not, what ones and why?	Brad Law	I am not clear on what is being proposed for these.
	John Willoughby	On balance the proposed simplified boundaries are equivalent to the current conditions.
	Peter Kambouris	Much better as aligned to actual feature in the field and also clearer for practitioners and regulators to identify and enforce.
	Frank Lemckert	It should do if it is applied as discussed and with the intent to at least maintain the current situation and intent. As before, we will have to wait and see how it is implemented.
	Chris Slade	Yes A simplification of the boundary types will lead to improved understanding for field staff, operators and auditors thus reducing the ambiguity and leading to improved protection of the features.
	Brian Tolhurst	It appears to simplify the existing arrangements which is probably a better arrangements for all practical purposes.
	Rod Pietsch	I think the new ESA definitions and classifications provide a clearer implementation and auditing framework and therefore should provide equivalent or improved environmental outcomes.
Fauna Lists and proposed protection requirements		

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The fauna lists were developed during the first fauna panel in March 2014 and refined at the workshop in September 2014. The tables were developed based on a very similar threatened species licence model to that currently proposed (intensive, selective and non-regrowth zones, moving from record to landscape based conditions as far as possible, re-invest saved survey effort into monitoring). The only significant change to this model is the move from dispersed tree retention to an aggregated tree retention approach.

In addition feedback on carrying forward previously applied exclusion zones to the greatest extent possible has been incorporated into the new model. The panel considered:

- Threatened fauna species and populations considered adequately protected by the general IFOA conditions.
- Threatened fauna species and populations which are protected by the application of a landscape conditions and also a site-specific existing exclusion zone, nest, den, roost, camp or in-use feed tree retention condition
- Threatened Fauna Species that require application of a site-specific condition

<p>17. Given the proposed multi-scale threatened species licence model, are there any species which should be allocated to a different table?</p> <p>If so which ones and why.</p>	<p>Brad Law</p>	<p>The fauna lists look pretty good. I would suggest a new prescription should be developed for P. oralis in the light DPI's recent research. Perhaps this is planned as part of its SMP, but that is not currently clear. Also, rather than being record based, this species should be assessed based on the latest accepted habitat model and field site inspection. This then should trigger a prescription that needs to be refined/defined. It is also essential that a program of monitoring for this species (one was established in 2015) is supported so that the effectiveness of new management practices can be assessed and altered via an adaptive management process.</p>
	<p>John Willoughby</p>	<p>None which are relevant to the North Coast</p>
	<p>Peter Kambouris</p>	<p>Species which have an SMP as an IFOA amendment should be managed under the SMP and not the TSL if additional records result. Eg we inevitably find records of smoky mouse or something similar outside current SMP area when we look in suitable habitat. As such, its management should be catered for by the management plan for that species as per the amendment to the IFOA, and not managed under the TSL alone.</p>
	<p>Frank Lemckert</p>	<p>Not that I could see in regards to the reptiles and amphibians. I will leave it to others to comment in more detail on terrestrial mammals or birds. The bats of interest appear to be okay too from what I can see. Hollows are again a critical element for them and landscape protection of those should lead to landscape protection of hollow-dependent bats.</p>
	<p>Chris Slade</p>	<p>No</p>
	<p>Brian Tolhurst</p>	<p>The proposed harvesting regimes are significantly greater than the current IFOA arrangements. This is without any real monitoring having been undertaken in regard to the impact on those threatened species and ecosystems that this regulatory arrangement was set up to manage and protect. After 15 years of practice I would think that this would have been a fundamental step to have taken to support any changes proposed.</p>

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		<p>It must also be kept in mind that the current intensive harvesting or Heavy STS that Forestry Corporation are currently undertaking is not a harvesting regime that was envisaged or intended under the current IFOA. The scale and intensity of this harvesting is so significantly above that of the previously agreed and practiced STS and AGS treatments that I believe cautious re-appraisal is required of many of the biodiversity conservation measures under the IFOA general and species specific conditions to ensure they have not been compromised during this review. I don't think the level and extent of the proposed intensive harvesting was clear to all participants of the earlier expert panels dealing with the species lists. In areas with forms of intensive harvesting that create forest canopy gaps of around 30- 40m then surveys for Koala, Yellow-bellied Glider, Squirrel Glider and Greater Glider should be undertaken. (Note that Greater Glider is currently being reviewed for listing eligibility on the EPBC ACT Threatened Species list. It is a forest dependent species that is known to be susceptible to disturbance and threatened by timber production activities. It would be prudent to consider this species in this current context.). Rationale – see question 10. In regard to a Monitoring program the intensive harvesting practices currently being undertaken is already changing the coastal State forests significantly. Without any baseline data currently being collected a future monitoring program to measure the impacts of forestry practice on a variety of species is already being compromised. Any monitoring program agreed to must be designed, fully resourced and undertaken immediately and preferably before any new harvesting regimes are started. Until this Monitoring program is initiated any new intensive harvesting regime should be on hold.</p>
	<p>Rod Pietsch</p>	<p>It seems premature to comment on the adequacy of protection when the final local landscape, compartment and coupe scale retention requirements are not resolved. In particular, the habitat, recruitment and feed tree clump retention settings will be crucial for determining for a range of species. The panel should be given further opportunity to consider the adequacy of protection and allocation of species to tables once the landscape, habitat and tree retention settings are more tightly defined and resolved and are placed in the context of the whole licence conditions/package.</p>
<p>18. For the species listed are the protections proposed suitable? conditions in Table 4, are the proposed conditions suitable? If not which ones and why not?</p>	<p>Brad Law</p>	<p>Possibly. Monitoring data is desperately needed to assess these prescriptions. Kerivoula – landscape provisions may be adequate for this species, but the greatest level of uncertainty for this species is in landscapes with intensive harvesting. The monitoring data that we have is for group selection harvest on the south coast where harvest is not as intense. I suggest that this species will need targeted research/monitoring in an intensive harvest area, similar to what we have undertaken on the south coast – repeated radio-tracking rather than surveys.</p>
	<p>John Willoughby</p>	<p>Yes</p>
	<p>Peter Kambouris</p>	<p>Yes</p>
	<p>Frank Lemckert</p>	<p>In regards to Assa in Dorrigo, I know that they can be found in what is classified as wet sclerophyll forest and so this would not be picked up by rainforest buffers. On that basis, more would be needed, either in broadening the definition to include specific wet forest types or to include actual surveys. I would expect the former to lead to a lot of ineffective reservation without some detailed study and habitat modelling. The</p>

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		<p>alternative would be to include surveys of logging areas to determine if the species is present. One or the other would appear to be essential to me.</p> <p>In regards to <i>Litoria booroolongensis</i>, I am not sure what the additional creek buffers are meant to achieve. The species appears to be reasonably strongly tied to rocky stream environments and the issue impacting them, outside of chytrid fungus, is stream degradation through erosion or overgrowth of banks by willows (at least as I have heard). Additional creek buffers in Maragle would not mean much if it was on creeks that do not have the correct habitat and populations. The indications are that this is a general condition and it is not clear why a broad approach is needed. Maybe it is – just not clear.</p> <p>I would also note for Part B (page 15) that <i>Litoria castanea</i> is not going to be a separate species as is suggested in this table. It is part of a broader population of <i>Litoria raniformis</i> that is one of two species within this one species. This split into two species will eventually be described by Steve Donnellan at the South Australian Museum, but ultimately what is being called <i>Litoria castanea</i> will not be this species and will be part of a more widespread species (albeit still rare and having suffered a serious decline).</p> <p>For Part D I would be wary about the idea of avoiding new species being given at least an initial “species-specific” conditions and instead leaving it to guidelines to allow a species to be determined if it can be covered by general conditions. In most cases it would be appropriate to place a new species in a landscape category, but my concern is that allowing a “process” to determine a species status rather than asking experts what is appropriate can leave the decision in the hands of people who know little about a species and make a decision on what they think sounds good. I would like to think that this would not happen, but my experience is that this can easily happen in order to get a quick answer.</p>
	Chris Slade	Yes but need to ensure Hastings River Mouse conditions recognise it’s early to mid-successional status. Species Management plan with ability to disturb habitat is most appropriate for this species.
	Brian Tolhurst	<p>It is hard to answer this with any authority as the previous application of similar conditions has not been monitored or assessed for effectiveness.</p> <p>The <i>Assa darlingtoni</i> population south of around Grafton should be treated as one population i.e. not just Dorrigo MA as there are records in adjoining MA’s. Requirement to survey within 2km of known record or in compartments with model present – new model is also required. This is an example of a species that could potentially be affected by the proposed intensive harvesting regime. Significant reduction in forest canopy cover around habitat would have detrimental impacts on the microclimate including moisture levels at the forest floor. Also the potential for fire penetration into these moist areas would likely be increased.</p>
	Rod Pietsch	The conditions proposed for Giant Burrowing Frog, Booroolong Frog, Spotted-tailed Quoll, Southern Brown Bandicoot, Yellow-bellied Glider Endangered Population, Smoky Mouse and Northern Corroboree Frog are as agreed previously by the panel and remain suitable.
19. If you are unsure or unable to provide comment on specific species listed but are	Brad Law	I have discussed revising the squirrel glider model with Ross Goldingay – he is supportive of the need to update that model and would be willing to provide expert assessment of the updated model.
	John Willoughby	I will defer to Frank Lemckert for Frogs and Brad Law for Bats.

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aware of a suitable expert we can contact to review models/maps etc, can you please advise.	Peter Kambouris	Nil response
	Frank Lemckert	Nil response
	Chris Slade	Nil response
	Brian Tolhurst	NA
	Rod Pietsch	Nil response
Supplementary Questions from the Department of Premier and Cabinet		
A. In the intensive harvesting zone, would increasing the amount of exclusion zones in that landscape compensate for the environmental impacts associated with potentially less frequent but more spatially extensive intense harvesting activity at a site scale?	Brad Law	Yes, but at present it is difficult to quantify what is an effective % level of exclusion zones. Much of forest management and its impact on biodiversity is ultimately determined by this principal. However, at present the % level of exclusion is not strongly underpinned by science. DPI Forest Science (Brad Law) has previously submitted a research proposal to look at the area of exclusion and how effective this is for biodiversity, but to date it has not been funded. I would suggest that this is a key area for research that would give the new IFOA a stronger leg to stand on. A recent review paper (in press) by Slade and Law provides a number of examples demonstrating the importance of informal reserves to biodiversity in the timber production landscape, but it was not possible to recommend a particular % of exclusion.
	John Willoughby	Yes
	Peter Kambouris	Yes. Monitoring from the Eden MA where intensive harvesting has occurred since the 1960's indicates that targeted local retention in addition to landscape exclusions maintain a range of targeted endangered and threatened species within the intensively harvested State Forest. Considering the alternate coupe model of intensive regeneration harvesting that has been applied in the Eden region over the last 20 years, landscape scale monitoring of key threatened species in Eden and elsewhere clearly demonstrates that key targeted threatened species have persisted throughout the production forest areas where their habitat is maintained, with examples of declines of the same species in area reserved for their protection on other tenures. Furthermore, occupancy of a number of these key critical weight range species has actually increased in State Forests in response to management of key threats by introduction of landscape scale predator control and reintroduction of appropriate fire regimes. This demonstrates that at a landscape or population scale, harvesting intensity appears not to be a key threat to the persistence of many threatened species, particularly when also considering successional change of the habitat and the species that occupy it.
	Frank Lemckert	It is very hard to say, but there is no reason why it should not. The key issue is that the status quo situation is not returning hollows to the landscape and is not likely to ever do so and there are way too few hollows and big trees in general now. This needs to be changed if progress is going to be made in regards to

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		restoring these important habitat features. It is assumed that the current level of timber available for harvest has to be maintained and so there has to be a trade-off between intensity of that land available for harvesting with leaving more areas to regenerate and restore older elements. There does not appear to be any other available option to achieve both requirements.
	Chris Slade	Yes in the context of clumps retained within the coupes. The coupe model will enable appropriate silvicultural techniques to be applied to those forests requiring increased light for regeneration from seed, while allowing for longer periods between disturbance events enabling improved habitat recovery and greater recruitment opportunities amongst a multi-aged mosaic of regenerating forest patches.
	Brian Tolhurst	It must be clearly understood that these proposed intensive harvesting practices are effectively clear felling diverse native forest to replace with even age native plantations in a deliberate manner. I don't believe this was ever the intended outcome for these multiple use public forests. The intensive harvesting zones are being formally introduced to prop up an unsustainable wood supply arrangement at the expense of the environment. It is frustrating trying to be part of the solution when the underlying driver of the wood supply agreements fundamentally restricts any chance of a balanced approach. Whilst increasing the amount of exclusion zones always has merit on environmental grounds there comes a point where the intensity of harvesting renders the entire forest no longer a forest in form or structure e.g. resembles and functions as retained clumps in farmland landscape. If the exclusion zones are sufficiently isolated they may not be a functional units for many fauna. Unless the exclusion zones are close together or linked they may not actually deliver any real environmental outcomes.
	Rod Pietsch	Nil response
<p>B. Within areas subject to intensive harvesting, is it possible to rank the following site scale conditions in order of their ability to best protect environmental values –</p> <ul style="list-style-type: none"> • Setting a maximum size for each intensive harvest event (coupe size) • Implementing a minimum clump retention allowance • Requiring all giant trees to be retained 	Brad Law	<p>The data do not exist to adequately rank the importance of these site scale conditions. All are of importance, but they cannot be easily ranked for the diversity of species across different taxa (birds, mammals, frogs, etc) that occupy forest environments. However, I would rank the following as most important based on my opinion.</p> <ul style="list-style-type: none"> • Landscape level protection (min of 20%) • Retain clumps in addition to above. Habitat tress (including giant trees) are prioritised for clumping. Plus other features as previously specified. • set a minimum return time for adjacent coupes (eg 10 years) • Set a maximum coupe size (eg 60 ha) <p>Set a minimum return time for adjacent landscapes (ie avoid harvesting adjacent 1500 ha landscapes in close succession)</p>
	John Willoughby	No, not in any practical sense.
	Peter Kambouris	Yes, although difficult and subjective due to different species requiring differing habitat attributes to persist. A minimum clump retention allowance per harvest area is only essential where there is inadequate retained area for ecological values within a defined local landscape or planned harvest area. Clumps will be designed based on guidance for the relevant key threatened species requiring additional protection

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		<p>measures within a planning unit and consequently cater for a range of other species. A min threshold for this at that scale is, in my opinion, a higher priority for maintenance of ecological values than coupe size or big trees.</p> <p>A max coupe size is only relevant where return times to adjacent coupes is less. I.e. Larger the coupe size or area harvested per event, the greater the return time (ie less frequent) for harvesting the abject coupe within the harvestable area at a larger scale.</p> <p>What is a giant tree? For the purposes of maintaining ecological values, large trees are only of relevance to some species (ie hollow dependant) and usually only if they maintain hollows. Hollow dependant fauna do not account for the majority of threatened species the TSL aims to cater for. Although large trees are often used as a surrogate for tree hollows, in my opinion, this is only practically relevant in either single stand or less diverse forest communities. In mixed species forest stands often in regenerating forests, particularly following historic harvesting (50+ years) or fire events, trees of larger girth are often those growing in better local conditions (soil, aspect, moisture, shade, competition etc) and not necessarily the most prevalent to providing some habitat features (eg hollows) earlier or faster. As a consequence, often other tree species than those displaying the most vigorous growth, and often poorly formed or damaged trees are more likely to form hollows earlier and provide better habitat attributes.</p>
	Frank Lemckert	I honestly cannot try to say which is better. I do not know whether ranking anything will provide a better outcome. The situation is a bit too complex. I would be much more focused on adaptive monitoring and management to determine what is and what is no working. For species that are currently in low abundance because they lack habitat in the intensive harvesting zone, anything that returns that habitat is important. I do not know which will do it better. Only time and application is likely to tell.
	Chris Slade	<p>I'm not sure it is possible or useful but I would rank the items as per below:</p> <ul style="list-style-type: none"> • Implementing a minimum clump retention allowance • Setting a maximum size for each intensive harvest event (coupe size) • Requiring all giant trees to be retained.
	Brian Tolhurst	<p>No, I don't think simply ranking these is appropriate as they all have varying important implications/values. All giant trees should now be a given as harvesting in public forests is meant to be regeneration harvesting not old growth harvesting. All trees over 100 cm dbh should now be protected regardless of what regimes are adopted.</p> <p>Intensive harvesting maximum size was previously set under the existing IFOA as the AGS regime. This had a maximum size of intensive harvesting of 50m x 50m over 22.5% of the harvestable area with return times of 7 years average. Previous experts agreed that this was the appropriate scale of maximum impact appropriate to protect environmental values (but not in areas with Koalas). The new proposed regimes of impact are way beyond this without any real testing of this previous arrangement on its impact on ecological values.</p>
	Rod Pietsch	Nil response

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<p>C. Within areas subject to intensive harvesting, is it possible to identify which option would most likely improve or maintain environmental values at both the site and landscape scales:</p> <ol style="list-style-type: none"> 1. Smaller coupes with more frequent return times to adjacent areas 2. Larger coupes with less frequent return times to adjacent areas. <p>Provide any context behind what components of this are most important for maintaining environmental values and why?</p>	<p>Brad Law</p>	<p>Data is very limited (non-existent) on which we can base choosing which the better process is. But my opinion is that less frequent return times and larger coupes would deliver a better ecological outcome. This is because it takes considerable time for the habitat of many species to recover following intensive disturbance and maximising this opportunity for recovery is critical. I suggest this on the basis that there is already in place within the model 20 % landscape protection plus retention of clumps, because these will considerably ameliorate impacts of logging and provide a reasonable level of connectivity that would otherwise be provided by smaller coupes.</p>
	<p>John Willoughby</p>	<p>Larger coupes with less frequent return times. Time is a great healer; getting enough is the trick. Less frequent return times on a site scale allows uninterrupted successional changes in the plant communities, enriching bio-diversity in the vegetation and faunal communities. The same effect can be seen at a landscape scale with a patchwork of coupes supporting communities at differing stages of maturity. A landscape that should potentially facilitate the movement of species and genes, mitigating the loss of bio-diversity.</p>
	<p>Peter Kambouris</p>	<p>Yes. Option 2 – larger coupes with less frequent return times to adjacent areas. The alternate coupe model of intensive regeneration harvesting has been applied within mixed age stand forests in the Eden region over the last 20 years and followed on from the intensive harvesting which was in place since the 1960's. Landscape scale monitoring of key threatened species in Eden (large forest owls, arboreal mammals, small and medium terrestrial mammals, frogs, bats, flora) demonstrates that population of our key targeted threatened species have persisted throughout the production forest areas, with occupancy varying mostly as a consequence of the successional age of the forest and the habitat within it or other threats (predation, fire), not as a direct consequence of localised harvesting operations. The larger the coupe available for harvesting consequently results in the longer the duration between that and the adjacent coupe disturbance event. The longer the period between events, the greater the regeneration age of the first coupe, available cover, recruitment/development of habitat features etc which is preferred. Also, the larger coupe size also means there is a larger contiguous alternate coupe not yet harvested, ensuring more available habitat within it and less threats from the edge effects of smaller coupes (ie higher edge vs core ratio, susceptibility to windthrow, drying, predation etc)</p>
	<p>Frank Lemckert</p>	<p>I would think that the latter is likely to provide a better option in most instances (but being aware of the issue of having too few clumps to make isolation of areas). If there is any research that indicates an optimal or minimum size of coupe that maintains target or any species for that matter, that would form the basis for the minimum size of coupe to work on.</p>
	<p>Chris Slade</p>	<p>Larger coupes with less frequent return times – allows for longer time opportunities for habitat development and recruitment to occur between disturbance events. Adjacency return times will allow for the development of a mosaic of differing age classes of forest including mature forests to best cater for needs of a broad range of species. The protection within a clump for isolated habitat trees offers greater protection and improved longer term survivorship potential for this important component of the landscape.</p>
	<p>Brian Tolhurst</p>	<p>Look at the existing AGS silviculture practice for the relative magnitude of previously agreed maximum levels of harvesting impact that was agreed to.</p>

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		The reasonable answer is actually smaller coupes with less frequent return times to adjacent areas if you want to improve or maintain current environmental values that have been severely impacted upon over the last 5 – 10 years.
	Rod Pietsch	Nil response
<p>D. Within areas subject to selective harvesting, is it possible to rank the following site scale conditions in order of their ability to best protect environmental values:</p> <ul style="list-style-type: none"> • Setting a minimum basal area retention rate • Implementing a minimum clump retention allowance • Requiring all giant trees to be retained 	Brad Law	<p>Probably implementing a minimum clump retention would be best, but only if habitat trees were prioritised for retention in clumps (which is the proposed model). Habitat trees are the rarest resource in these forests and they take a very long time to replace (>100 years), so they must be prioritised for retention. Giant trees are even rarer, but I don't think these would necessarily be prioritised because:</p> <ol style="list-style-type: none"> 1. They are even rarer than 'habitat trees' (many compartments would not have one) and 2. They should be retained anyway under the habitat tree/clump condition. <p>NB that Tasmania has done a lot of research looking at aggregated retention in a clearfell silviculture system. Broadly speaking, they have found aggregated retention significantly ameliorates the impacts of clearfell (ie no basal area retention) and even more so when they have landscape level retention on top of this.</p>
	John Willoughby	<ul style="list-style-type: none"> • Implementing a minimum clump retention allowance • Setting a minimum basal area retention rate • Requiring all giant trees to be retained.
	Peter Kambouris	<p>Yes. Again, similar to previous comment.</p> <p>A minimum clump retention allowance per harvest area required where there is inadequate retained area for ecological values within a defined local landscape or planned harvest area. Given guidance rules for the clump design relevant to species requiring protection, a min threshold for this at that scale is, in my opinion, a higher priority for maintenance of ecological values than coupe size or big trees.</p> <p>A max coupe size is only relevant where return times to adjacent coupes is less. That is, larger the coupe size, the greater the return time (ie less frequent) for harvesting the abject coupe within the harvestable area at a larger scale.</p> <p>Again, for the purposes of maintaining ecological values, large trees are only of relevance to some hollow dependant species, with hollow dependant fauna the minority of threatened species the TSL aims to cater for. Depending on a range of edaphic variables including slope, soil, aspect, topography, climate etc, and ecological factors including forest type, species assemblage, age etc, alternate tree species other than those displaying the most vigorous growth (ie often poorly formed or damaged trees) are more likely to form hollows earlier and provide better habitat attributes than the largest trees in a similar age cohort stand.</p>
	Frank Lemckert	I would suggest a minimum clump retention allowance first followed by requiring all giant trees. Bit site dependent though as areas that have at least a reasonable number of big trees already will require less emphasis on retaining giant trees. And again, making sure that hollow distribution is not severely impacted by forcing hollows into only a few clumps is not preferable.

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	Chris Slade	<ul style="list-style-type: none"> • Implementing a minimum clump retention allowance • Setting a minimum basal area retention rate • Requiring all giant trees to be retained.
	Brian Tolhurst	<p>Again ranking these points is not really appropriate as they are not mutually exclusive arrangements and all have merit in getting the balance right.</p> <p>Minimum basal areas under the IFOA were previously set at 40% removal but without explicit time and space rules. This was abused in its time and space arrangements to repeatedly and unsustainably harvest native forests.</p> <p>Minimum clump retention rules help to increase protection of forest form and structure in discrete units but again without spacing arrangements that still provide across the landscape a forest canopy/mid storey structure they may provide limited value for many species especially in the years immediately after logging. If they don't survive this period then even when the forest recovers you have a hollow outcome.</p> <p>All giant trees should now be a given as harvesting in public forests is meant to be regeneration harvesting not old growth harvesting. All trees over 100 cm dbh should now be protected regardless of what regimes are adopted.</p> <p>Also check the PNF codes relative magnitudes of harvesting limits to compare with these currently proposed in this IFOA review. It appears there will be vastly different regulatory arrangements in regard to intensity of harvesting and biodiversity conservation between private and crown lands?</p>
	Rod Pietsch	Nil response

Expert	Date of submission
Brad Law	11.11.15
John Willoughby	27/11/2015
Peter Kambouris	25/11/2015
Frank Lemckert	30/11/2015
Chris Slade	19/11/2015
Brian Tolhurst	4/12/2015
Rod Pietsch	01.12.15

7 Expert Panel Submission: Dr Rod Kavanagh – 3 November 2015

	Question	Response
General Principles		
1	Do you agree that these points are representative of your general views expressed during the expert panel workshops?	<ul style="list-style-type: none"> a) Yes. 20% minimum protection in each local landscape. Priority habitat is comprehensive riparian reserve system together with comprehensive headwater/over-ridge connecting corridors. b) Yes. Aggregated retention has merit over scattered tree retention in intensively managed forests. c) Yes. Habitat-driven protection, monitoring and adaptive management could be an improvement over the current survey and record-triggered protection approach without monitoring. However, we know little about the proposed monitoring objectives and scope, and the resourcing that will be provided. Also, managing for presence of assumed habitat is not the same as managing species populations. d) Yes. Regeneration harvesting using less frequent but more intensive harvesting is preferable to more frequent, repeated events. Also, smaller coupes can be harvested more intensively, but these should be harvested alternately with a minimum of 10 years separating age-classes of adjacent coupes. e) Yes. Return intervals within the same coupe should be much longer than under AGS and STS – e.g. 30 years for thinning and 60 years for final cutting. f) Yes. Previously applied protections should be carried forward as permanent protection in the new licence.
2	If not, which points do you believe do not reflect your general views of the panel workshops? And what are your views on these matters?	<p>Not enough recognition that a comprehensive riparian reserve system, including a comprehensive headwater/over-ridge connecting corridor system, is fundamental to the conservation of most species in a forestry context. This reserve system is the backbone of any other conservation efforts and must be maintained and improved where possible. I think there needs to be a greater appreciation that managing for aggregated/clump retention will also result in better wood production outcomes, including better regeneration and faster tree growth in more open spaces that are provided – hence providing the opportunity to make larger claims to enhance conservation outcomes without causing net loss of wood production.</p>
20% Landscape Protection Threshold		

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3	Do you agree that this rule will provide an improvement to how important habitat is identified and protected across the landscape? If not, why?	The minimum 20% protection threshold in each Local Landscape Area is a very important part of the overall conservation strategy. However, this “rule” doesn’t offer any particular improvement to how important habitat is identified because existing exclusions take up most of the 20% retention that is on offer.
Aggregated Tree Retention		
4	What do you consider are the priority criteria for selecting additional environmental protections under this rule? Why?	<ol style="list-style-type: none"> 1. Enhancing headwater and over-ridge corridors, and riparian buffers if they are inadequate. 2. Existing threatened species protection areas, buffers and reserves. 3. Existing hollow-bearing trees and some nearby recruits all retained in clumps.
5	Attached is a draft of revised clump conditions, including objectives, conditions, guidance and example maps of how clumps may be applied in the field. Is this approach on the right track to deliver a suitable aggregated retention outcome? <i>(please include any comments relevant to the minimum and maxim size specifications, the categorisation of sizes, rates and placement etc.)</i>	Yes. The main issue is, under which conditions is it most appropriate to invoke either the 1. Small clumps (0.1 ha), 2. Medium clumps (0.5 ha), or 3. Large clumps (3.0 ha) rule, and when is it most appropriate to use a combination of all three approaches. Important to remember that only about 5 ha is available within a typical coupe to manage in this way. This is because 5 ha is 10% of the area of a typical 50 ha coupe. So, application of one or two large clumps effectively prohibits any other form of aggregated retention in the coupe – although there may be instances where this degree of flexibility could produce the best conservation outcome.
6	Please briefly describe what you consider are the most important principles (limit to 3-4 please) in choosing where and how to locate clumps	<ol style="list-style-type: none"> 1. That riparian/headwater/over-ridge corridors are comprehensive, and that they provide the required level of connectivity and habitat retention in reserves. 2. Larger clumps to protect specific habitat features for threatened species (e.g. nests/roosts). 3. Small clumps placed over the best hollow-bearing trees and nearby recruits.
7	Please provide advice on what environmental features you would prioritise into clumps?	<ol style="list-style-type: none"> 1. The best hollow-bearing trees and nearby recruits. 2. Specific habitat needs for threatened species not covered in existing protections. 3. Augmentation of the headwater/over-ridge corridor connectivity system.

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	What would be the most important features that would achieve the highest ecological outcome for the landscape?	4. Augmentation of the stream reserve system (e.g. additional protection near stream junctions, on wide creek flats, and as wider rainforest buffers).
8	Please provide any additional considerations or specific advice can you provide for the improvement of the draft clump conditions, protocol or guidance needs.	If no specific additional habitat needs have been identified then tree retention should be aggregated in small-medium (0.1-0.5 ha) clumps evenly spaced throughout the net logged area, centred on the locations of existing hollow-bearing trees and their recruits.
Time and Space – Intensive Zone		
9	Do you see any significant difference in the range values for maximum coupe size or period between adjacent events in delivering ecological outcomes? If yes, please provide a rationale	Yes. Frequent, repeated, logging visits to the same coupe should be avoided. Repeat visits to the same coupe should be limited to once every 30 years (e.g. thinning at 30 years, final cutting at 60 years). Accordingly, harvesting is likely to be more intensive in each 30 year visit, and this should be compensated by reducing the size of logging coupes (e.g. approximately 30-50 ha), practising alternate coupe logging, and setting adjacency rules that do not permit adjacent coupes to be logged within 10 years.
10	Would you suggest maximum coupe size or the interval between harvesting adjacent areas is more important and why?	Interval between harvesting is most important – better to reduce the number of logging events in time. Alternate coupe logging is also important for the same reason – to minimise the number of disturbance events in the landscape. Smaller coupe sizes will make this easier to manage.
11	Can you describe what key environmental considerations need to be maintained in landscapes that will be harvested using the more intensive regeneration harvesting practices?	Headwater/over-ridge corridors must be mapped and carefully managed to maintain their larger minimum widths compared to the reductions that will occur in the widths of first order (and possibly some second order) streams following the adoption of Lidar to revise the riparian reserve protection system. Despite the additional number of narrow headwater drainage lines that will be recognised, it is important that some of these areas are given the substantial protection that is afforded to designated headwater/over-ridge connectivity corridors.
Selective Harvesting		
12	Do you see any significant difference in the range of values proposed for minimum basal- area retention in delivering an ecological outcome from	Retaining higher levels of basal area (i.e. between clumps) in the regrowth zone, whether intensive or selective, simply means that logging return times will become more frequent (e.g. 5-10 years) than is desirable (i.e. ~ 30 years). Selective logging = more frequent logging, which should be avoided. Selective logging and setting minimum BA retention limits is poor silvicultural practice in regrowth zones, is more difficult to audit, and it does

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	selective harvesting operations? If so, provide a rationale for why.	not lead to the increased wood production outcomes that are required to compensate for the enhanced conservation outcomes that may be achieved through aggregated retention of habitat tree/recruitment tree clumps.
13	What key environmental values would a basal area limit need to deliver within each harvesting operation to ensure a maintenance of environmental values equivalent to those delivered by the current selective harvesting rules?	Selective harvesting is appropriate for non-regrowth forests, but I am struggling to see how this (i.e. minimum BA retention) could be an improvement over aggregated retention of habitat trees and recruit trees in regrowth zone forests. This is partly because aggregated clumps (HBTs + recruits, or just recruits if no HBTs are present) will be mapped and retained in perpetuity, and these clumps can be audited at any time. In contrast, minimum BA retention is not guaranteed protection in future logging cycles, and retained trees are not mapped for future management. Indeed, they are retained only to provide a source of future sawlogs, with some wildlife benefit along the way. However, this does not lead to a long term increase in the numbers of HBTs which would be the case under aggregated retention.
Riparian Protection		
14	On balance, do you think the proposed changes in stream identification and protection lead to an equivalent or improved ecological outcome to the current conditions? If not, why?	Not sure. Often the best habitat for many species, including the Greater Glider, Powerful Owl and Masked Owl, is found in the large trees growing on fertile sites in the upper basins of stream headwaters. Lidar will pick up more of these previously unmapped drainage lines and offer them some protection. But, whether the cost of doing so (i.e. reducing the width of first order and some second order streams) is worth it, I cannot say. The proposal (using Lidar) that drainage lines receive protection only when the catchment area exceeds 20 ha should be reconsidered to determine whether a smaller catchment trigger should be invoked (e.g. 5-10 ha).
15	If not, what additional considerations need to be identified to maintain the environmental values current provided by the stream protection network?	Part of the solution is to ensure that full (i.e. previous) width protection is given to all riparian corridor systems that include a headwater/over-ridge connectivity corridor. Headwater/over-ridge corridors are minimum 40 m wide which is larger than the width proposed for “first order” and “unmapped” drainage lines using the Lidar system.
Environmental Significant Areas – Exclusion Zone Protection		
16	On balance, do you think the proposed changes to boundary protection lead to an equivalent or improved ecological outcome to the current conditions? If not, what ones and why?	I was not aware that tree felling into, and machinery access through, was permitted in any environmentally significant areas, except for the passage of roads through the stream reserve and headwater/over-ridge corridor system. I can see that there may be a need to permit roads and tracks through buffers and other ESAs, but I do not see why tree felling should be permitted into these areas. What about fire management within ESAs?

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Fauna Lists and proposed protection requirements		
	Fauna Lists and proposed protection requirements	
17	Given the proposed multi-scale threatened species licence model, are there any species which should be allocated to a different table? If so which ones and why.	Yes. The Greater Glider, while not currently listed as a threatened species, is demonstrably and arguably the species most threatened by logging in NSW. The Greater Glider has a requirement for a higher density of hollow-bearing trees than is typically retained in forestry operations.
18	For the species requiring conditions in Table 4, are the proposed conditions suitable? If not which ones and why not?	Yes. The Greater Glider should be added to Table 4. This species is currently the subject of special hollow-bearing tree provisions in the current IFOA and these provisions (and survey effort) should continue under the new licence.
19	If you are unsure or unable to provide comment on specific species in Table 4, but are aware of a suitable expert we can contact to review models/maps etc, can you please advise. N/A	N/A
Supplementary Questions from the Department of Premier and Cabinet		
DPC request for advice		Response
In the intensive harvesting zone, would increasing the amount of exclusion zones in that landscape compensate for the environmental impacts associated with potentially less frequent but more spatially extensive intense harvesting activity at a site scale?		Yes. However, the more intensive harvesting that may be associated with increased environmental exclusions within the coupe, does not necessarily mean that logging operations would become more extensive spatially. Generally, more intensive harvesting leads to greater wood production outcomes due to improved regeneration and faster tree growth rates. Intensive management also enables longer intervals to be applied between harvesting events (e.g. 30 years), leading to less frequent disturbance in the coupe.
Within areas subject to intensive harvesting, is it possible to rank the following site scale conditions in order of their ability to best protect environmental values – <ul style="list-style-type: none"> Setting a maximum size for each intensive harvest event (coupe size) 		The most important consideration is getting the riparian reserve system right (i.e. comprehensive) as well as the placement and width of headwater/over-ridge connectivity corridors. Lidar-mapped drainage protection zones may need to be augmented. The 20% minimum area protection for local landscape areas is also very important.

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<ul style="list-style-type: none"> • Implementing a minimum clump retention allowance • Requiring all giant trees to be retained 	<p>Next is to implement aggregated retention of hollow-bearing trees and their nearby recruits into small and medium sized (0.1-0.5 ha), and occasionally large (3.0 ha) clumps that can be mapped, audited and protected in perpetuity.</p> <p>Within the regrowth zone, areas outside of reserves and aggregated clumps should be harvested intensively, ensuring that return logging events within the coupe are reduced to approx. once every 30 years.</p> <p>Spatial separation of logging impacts should be achieved by alternate coupe logging, where adjacent coupes cannot be logged within 10 years.</p> <p>Coupe sizes should be reduced (30-50 ha) to reduce ecological and aesthetic impacts.</p>
<p>Within areas subject to intensive harvesting, is it possible to identify which option would most likely improve or maintain environmental values at both the site and landscape scales:</p> <ol style="list-style-type: none"> 1. Smaller coupes with more frequent return times to adjacent areas 2. Larger coupes with less frequent return times to adjacent areas. <p>Provide any context behind what components of this are most important for maintaining environmental values and why?</p>	<p>While it is important to ensure that return times to adjacent areas are no shorter than 10 years (preferably 20 years), the big issue is to ensure that return times within the coupe are as long as possible (e.g. 30 years for thinning, 60 years for final cutting). Under current AGS and STS logging systems, logging return times are too short (5-20 years). This means that, within the regrowth zone, areas outside of reserves and aggregated clumps should be harvested intensively so that return times can be lengthened and the number of disturbance events reduced significantly. Coupe sizes should be reduced (30-50 ha) to reduce ecological and aesthetic impacts.</p>
<p>Within areas subject to selective harvesting, is it possible to rank the following site scale conditions in order of their ability to best protect environmental values –</p> <ul style="list-style-type: none"> • Setting a minimum basal area retention rate • Implementing a minimum clump retention allowance 	<p>Retaining higher levels of basal area (i.e. between clumps) in the regrowth zone, whether intensive or selective, simply means that logging return times will become more frequent (e.g. 5-10 years) than is desirable (i.e. ~ 30 years). Selective logging = more frequent logging, which should be avoided. Selective logging and setting minimum BA retention limits is poor silvicultural practice in regrowth zones, is more difficult to audit, and it does not lead to the increased wood production outcomes that are required to compensate for the enhanced conservation outcomes that may be achieved through aggregated retention of habitat tree/recruitment tree clumps.</p>

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<ul style="list-style-type: none">• Requiring all giant trees to be retained.	<p>Under the 10% rule, approximately 5 ha (i.e. 10% of a typical 50 ha coupe) is available to be placed into aggregated retention as either 1. Small clumps (0.1 ha), 2. Medium clumps (0.5 ha), or 3. Large clumps (3.0 ha). So, application of one or two large clumps effectively prohibits any other form of aggregated retention in the coupe – although there may be instances where this degree of flexibility could produce the best conservation outcome. Giant trees are a crucially important element in regrowth forests but they need to be protected within aggregated clumps that include some recruit trees around them.</p>
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8 Office of Environment and Heritage North East NSW members of the Expert Panel (Fauna) – Mick Andren and John Turbill

<p>Mick Andren Conservation Assessment Officer Ecosystems & Threatened Species North East Region Office of Environment & Heritage</p>	<p>John Turbill Threatened Species Officer Ecosystems & Threatened Species North East Region Office of Environment & Heritage</p>
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The Remake of the Coastal IFOA being undertaken by the NSW Environmental Protection Agency (EPA) offers a timely opportunity to review the conservation of forest fauna on public lands in North East NSW. Public native forests managed by Forestry Corporation in Upper and Lower North East regions total about 850,000ha and remain an integral component of the forest network required for the conservation of forest fauna in the region.

The timber production forests are at a crossroads. The current proposal from the EPA explicitly formalises the replacement of selective logging and gapping by a more intensive logging regime (coupe clear-felling) in large sections of the forest (the “Regrowth-Intensive” Zone where Coastal Blackbutt *Eucalyptus pilularis* is the targeted timber species). The proposal also formalises an intense selective logging regime in the rest of the forest. It is accepted that short-term unsustainable logging has already diminished the ecological value of the harvested area in the Regrowth Zone. However, intensive logging using modern mechanised techniques is presented as the only viable option for the timber industry.

According to Forestry Corporation, the 2014 buy-back of quota has enabled the industry to move to a long-term sustainable timber supply from the North East forests of 90,000m³ per annum of high quality sawlogs. This long-term level of supply will require timber from the more recently established plantations; however these plantations are not generally expected to come on line until after the term of the current timber supply contracts (i.e. after 2028). Native forests must therefore meet current demand and are consequently being cut to a very young age. While timber volumes may eventually recover from this period, following a long hiatus in logging, the critical question is whether the threatened fauna will recover.

Two examples are illustrative of just how close to the wire the timber supply limits are being pushed. The first occurred in the recent trial where the EPA trialled a habitat recruitment tree retention rule that enforced choosing the largest trees for recruits. Apparently this rule was the major factor in making logging of the compartment uneconomic and the EPA had to pay to get it logged! The second example is where the Panel suggested that Forestry Corporation examine a longer return rate for logging adjacent coupes in the Coopernook area. When the return rate was pushed above just 7 years, there was nowhere available to log in the study area. It is very difficult to improve ecological outcomes under these constraints.

The proposed intensive logging regime was never envisaged during the development of a comprehensive, adequate and representative reserve system that underpinned the North East NSW Regional Forest Agreements. In our view, if these proposed changes to logging intensity are to be formally adopted, they need to be met with a concomitant change in the network of protected areas, particularly in the Regrowth Zone (predominantly coastal foothills) where the reserve system is inadequate in size and connectivity. This is needed because of the reduced capacity of the very young forests in the harvest area to provide the key habitat resources required by fauna species. The protected component of the forest must therefore bear a greater conservation load, especially for threatened species with specific habitat requirements that are not found in young forests.

For example, a significant constraint on many species is the increasing rarity of tree hollows across the Regrowth Zone. In NSW, about 46 mammals, 85 birds, 32 reptiles and 16 frogs are reliant on tree hollows for shelter and nesting. Of these species, 45 are listed as threatened under the Threatened Species Conservation Act. In North East NSW, hollow-dependent species are already in very low numbers or absent from the harvest area in the regrowth forests. Implementing a more intensive logging regime will mean that these species will be increasingly dependent on protected areas.

About one third of the area of State Forests in Upper and Lower North East is already zoned for protection. However, this area is heavily biased in composition (it is made up of non-commercial vegetation communities, rainforest, old growth forest, etc) and distribution (more in the Non-regrowth Zone, i.e. escarpment areas). The EPA and Forestry Corporation have proposed to increase this protected area slightly by ensuring that at least 20% of the net harvest area is protected at every local scale. This results in a patchwork of areas that have not been properly assessed for their ability to sustain viable populations of threatened fauna or provide connectivity. There has been no systematic assessment at a regional or sub-regional scale.

There has not been an adequate assessment of the capacity of the network of protected areas proposed in the Remake to sustain threatened fauna populations. Our primary recommendation is that a thorough assessment of the adequacy of the protected area network at a regional (or at least sub-regional) scale needs to be undertaken. This assessment would need to be carried out by scientists with expertise and experience in wildlife conservation biology. If the protected area network was adequate, then the intensive logging regimes proposed would not raise such conservation concern.

We have consistently put forward this recommendation to the EPA since our first Panel meeting. The Panel did not consider many other issues, including grazing, weed and pest control, dieback, fire and disease. Impacts from all of these may be exacerbated by increasing the intensity of logging.

The following questions (blue type) were specifically asked of the Panel by the EPA and Forestry Corporation. Our answers must be viewed in the light of our primary recommendation above.

General principles that have influenced the development of the model

- a) *A minimum protection approach (20% protection rule at local landscape scale) at the local landscape scale has merit if the areas are selected from suitable habitat. Some members of the panel may wish to provide further advice on the priority habitat and/or criteria for selecting these areas.*
- b) *Aggregated retention has merit over scattered tree retention if the areas are selected and located appropriately to deliver habitat protection outcomes. Some members of the panel may wish to provide further advice on the priority design criteria for selecting these areas. Multiple members of the panel also noted that further consideration of the selective harvesting proposal is required to demonstrate it is equivalent to "status quo" tree and threatened species protections.*
- c) *The multi-scale model that delivers a minimum standard to habitat driven protection, monitoring and adaptive management is an improvement over the current survey and record triggered protection approach without monitoring. Some members of the panel agreed there was a need for select species to continue a survey and protection based approach.*
- d) *Regeneration harvesting using less frequent but more intensive harvesting within a maximum coupe scale may be preferable to the repeated events at the local scale that the current AGS conditions provide. It was noted from some panel members that ideally smaller coupes should be considered.*
- e) *Ideally longer return intervals between adjacent intensive harvesting events are desirable as 5, 7 or 10 year intervals are not necessarily ecologically meaningful.*

- f) *Previously applied protections, particularly in intensively harvested areas, should be carried forward as permanent protection in the new licence as much as possible.*

1. *Do you agree that these points are representative of your general views expressed during the expert panel workshops?*

2. *If not, which points do you believe do not reflect your general views of the panel workshops? And what are your views on these matters?*

- a) Our primary recommendation is for a thorough assessment of the protected area network. Simply targeting 20% of a local landscape area (LLA) is an inadequate way to develop the key areas required to adequately protect threatened species in the longer term. This cannot be corrected by “selection criteria” as it requires a regional-scale analysis. In most LLAs, all or a large portion of the 20% will already be in place and based on the distribution of non-commercial forest, rainforest, old growth, etc.

Notwithstanding this, a rule that increases the level of protection where levels are currently very low has merit.

We have not seen any drafts of the LLA boundaries. Drawing these boundaries would need to be done carefully so that biases do not occur. It would also not be appropriate for some of the other protected areas to be included as part of the 20%, such as clumps or threatened species exclusions.

- b) The existing logging regime in the Regrowth Zone is leading to the loss of habitat trees. We therefore support aggregated tree retention in “clumps” on the following conditions: there is an adequate protected area network in place, existing habitat trees are retained and specific feed tree retention is kept (e.g. for Koalas and Glossy Black-cockatoos). Clearly the clumps will have to be sufficient in number and size, well chosen and permanently protected to be effective. They will also have to be accurately identified so that they are auditable. While this could potentially improve existing practice, it is still unclear whether the clumps will be of sufficient size and location to contribute to viable habitat or will remain unoccupied by many threatened species.

This approach separates timber production forests and protected forests at a fine scale – a separation that will be accentuated over time as the habitat trees remaining in the production area are lost through attrition.

- c) We consider that the best approach would involve both multi-scale protection and survey for some species with appropriate protection when found. However, with this approach considered too expensive we support the multi-scale model as long as the regional scale protection is adequate (see primary recommendation).
- d) Both current AGS (gapping) and proposed regeneration harvesting (coupe clearfelling) result in very young forest that becomes more plantation-like over time due to favouring some species (such as Coastal Blackbutt) over others. It is apparent that coupe clearfelling is a more efficient logging method than gapping. Both are only acceptable where there is sufficient protected forest to ensure the persistence of species reliant on a floristically and structurally diverse native forest containing old growth elements.

20% Landscape Protection Threshold – design rules

Within each LLA it is proposed to set a minimum threshold of 20% must be within permanent protection (biodiversity exclusion zones). Where LLAs are under the threshold, additional areas of Net Harvest Area must be included in permanent protections to meet the threshold.

3. *Do you agree that this rule will provide an improvement to how important habitat is identified and protected across the landscape? If not, why?*

4. What do you consider are the priority criteria for selecting additional environmental protections under this rule? Why?

While it is an improvement to protect more forest in those areas where it is most needed, we repeat the need for a more informed assessment of the protected area network (see primary recommendation above).

Notwithstanding the above recommendation, we would suggest that the criteria of comprehensiveness, adequacy and representativeness remain relevant, combined with reserve design and consideration of current forest condition. Priorities will vary widely across the landscape and include the protection of examples of the forest types being logged that are in good structural condition and growing on fertile soils.

Aggregated Retention – design rules

Following feedback from the panel and the results of the harvesting trial, an aggregated tree retention model is proposed to replace the current scattered tree retention approach. It is recognised that the selection of clumps is important to the success of this approach.

Attached (Attachment 3) is a proposed draft conditions for wildlife habitat clumps that incorporates a much stronger tree retention focus in clump selection, whilst still allowing for the habitat protection considerations that had been developed for the original, smaller clump approach. It is expected that these conditions will replace specific H and R tree retention rules.

The draft conditions include elements considered suitable for conditions and those suitable for guidance and please note that these will need to be refined and then put in appropriate enforceable language during legal drafting. Key details around the rate of clumps in each of the tree harvesting zones is still being decided. This is to ensure that the clump model delivers comparable rates and selection of H and R trees to what is currently applied now. Link to analysis (or add to end) around clump budget and tree retention scenarios.

5. Attached is a draft of revised clump conditions, including objectives, conditions, guidance and example maps of how clumps may be applied in the field. Is this approach on the right track to deliver a suitable aggregated retention outcome? (please include any comments relevant to the minimum and maximum size specifications, the categorisation of sizes, rates and placement etc.)

Clumps will only be effective if they are supported by an adequate protected area network (see primary recommendation above). Otherwise, at least in the Regrowth Zone, as the logged area is reduced to a progressively younger age, regional metapopulations of many species may be too sparse to make use of small clumps. Furthermore as habitat trees remaining outside clumps are lost through attrition and previously retained recruitment trees are made available for logging, the clump rate of 10% of the net harvest area will be too small in size to contain enough habitat and recruitment trees (i.e. less than 10/ha in total). In the Non-regrowth Zone, it appears that the end result will be less habitat and recruitment trees than are currently retained.

Clumps must be independent of other areas protected under the IFOA such as wetlands, rocky outcrops, species exclusions, etc.

The objective of clumps to replace scattered hollow-bearing and recruitment trees has some merit because of the greater protection that individual trees derive from being located in a group and because it should be more easily audited.

6. Please briefly describe what you consider are the most important principles (limit to 3-4 please) in choosing where and how to locate clumps.

Clumps should contain as many hollow-bearing and recruitment trees as possible. Recruitment trees should sample the largest trees available. All logging zones should have the same rate of clump retention (currently proposed at 10% in the Regrowth-intensive and

Non-regrowth Zones). EPA and Forestry Corporation are currently proposing a rate of only 5% in the Regrowth-Selective Zone, despite the significant loss of hollow-bearing trees in large areas of this zone (e.g. across extensive areas of the Clarence Basin). In the longer term, when standing habitat trees outside clumps are lost

through attrition, this will equate to only about a total of 3.5 habitat and recruitment trees per hectare.

We think that the maximum size (10ha) proposed for clumps is too large as it does not provide protection for sufficient numbers of scattered hollow-bearing trees and large recruitment trees. Additionally, the distance between clumps would be too large at this size.

7. Please provide advice on what environmental features you would prioritise into clumps? What would be the most important features that would achieve the highest ecological outcome for the landscape?

Clumps must be independent of other areas protected under the IFOA such as wetlands, rocky outcrops, species exclusions, etc. Clump selection must primarily be based on the protection of hollow-bearing and recruitment trees and while other features such as feed trees can and should be included in clumps, this is a fortuitous circumstance not a selection rule. Where sufficient feed trees are not protected in clumps, they should be protected across the harvest area (such as Koala feed trees).

There are now few hollow-bearing trees remaining in the Regrowth Zone. All of those that do remain need to be protected regardless of whether or not they have been included in clumps. In the Non-regrowth Zone, at least 8 hollow-bearing trees per hectare must be retained regardless of whether or not they have been included in clumps.

Time and Space

Intensive Zone

In the intensive zone, the proposal is to replace the current AGS model that allows repeated small scale openings to an alternate coupe style harvesting model. The coupe harvesting model proposed has time limits that align with the upper limit of current AGS return times (to 7-10 years) to enable wood supply requirements to be met.

To offset the impact of intensive harvesting it has been proposed to establish a clump budget, retain seed trees between clumps and to establishing minimum regulatory limits for harvesting in time and space. These limits generally represent the minimum or maximum that may be applied. In some limited instances or areas, it could be the likely average.

- *A maximum area of 2,200 net ha of intensive harvesting in any one year over a 30,000-50,000 ha net area of the intensive zone (within a 140,000 ha gross area of State Forest).*
- *A maximum of 33% of any one 1,500 ha LLA in any one event*
- *A maximum coupe size of between 30 and 60 ha in size*
- *A minimum interval of harvesting adjacent coupes of between 7 and 10 years.*

9. Do you see any significant difference in the range values for maximum coupe size or period between adjacent events in delivering ecological outcomes? If yes, please provide a rationale.

10. Would you suggest maximum coupe size or the interval between harvesting adjacent areas is more important and why?

Sustainable selective logging would be ecologically preferable, however, this is apparently no longer an economic option in the Regrowth-intensive Zone. Gapping carried out over the last 15 years or so appears to have often failed as a silvicultural technique as after three gapping events it has sometimes resulted in a forest that contains a fine-scale patchwork of weed infestation and failed regeneration, and is difficult to log efficiently.

The above conditions have been primarily developed so that short-term wood supply can be met efficiently in economic and silvicultural terms. From the time and space criteria above, it appears that the entire net harvest area can be reduced to either 0-14 years old or 0-20 years. According to Forestry Corporation, it will result in a very long return time for all of these forests at the completion of the current logging cycle. To our knowledge, there is unlikely to be scientific data that could be used to justify fine-scale differences in coupe size and return time with respect to the impact on threatened species. However, we consider the options presented as far too short. In general, it is ecologically preferable to log smaller coupes with longer return times so that the impacts are dispersed in time and space. Ideally we would recommend return times in the order of 25 years.

11. Can you describe what key environmental considerations need to be maintained in landscapes that will be harvested using the more intensive regeneration harvesting practices?

The key consideration is to ensure that there is an adequate protected area network to support, in perpetuity, threatened fauna that are dependent on older forest (see our primary recommendation).

Selective Zone

There is no intent to change the outcomes delivered by current selective silviculture practice (STS). However in the selective harvesting zones the proposal is to replace the current basal area removal limit approach (40-45% of existing Basal Area) to minimum basal area retention limits (m²/ha retained).

These limits are designed to 'future proof' against a change in harvesting intensity, be easier to enforce, still allow for adequate eucalypt regeneration in selectively harvested areas and maintain a range of habitat features and structure within harvested areas.

Proposed minimum retention limits are in the range of 10-12m²/ha in the regrowth zone and 10 -14 m²/ha in the non-regrowth zone.

12. Do you see any significant difference in the range of values proposed for minimum basal- area retention in delivering an ecological outcome from selective harvesting operations? If so, provide a rationale for why.

13. What key environmental values would a basal area limit need to deliver within each harvesting operation to ensure a maintenance of environmental values equivalent to those delivered by the current selective harvesting rules?

We consider that the proposed basal area retention rates are too low and we find it difficult to equate them with the intent of the current requirement to limit logging to the removal of 40% of the standing basal area – it appears to represent an increase in timber availability in the short term. Maximising short term timber supply will result in higher short term ecological impact that may cause long term ecological change. This will potentially create an ecological bottleneck from which threatened species dependent on older forest will have to recover, particularly in the Regrowth Zone where the protected area network is less extensive than the Non-regrowth Zone.

For example, starting with a standing basal area of 30m² the existing 40% rule equates to 18m² remaining after logging. If a standing basal area of 30m² is logged is down to 14m² then that equates to 53% removal and if logged down to 10m² this equates to 67% removal. This appears to represent a significantly increased intensity of "selective" logging and increased timber availability in the short term.

Apparently, a minimal basal area that is commercially viable to log in many of the typical North East forests is around 25m². Using the existing 40% rule this would equate to leaving 15m² after logging. This minimum is still above all of the options presented by the EPA and Forestry Corporation.

Riparian

The proposal is to replace the current LIC derived mapping and stream ordering with an alternative LiDAR derived Geonet modelled stream classification. The trial report and powerpoint presentation (see presentation and feedback from the expert panel workshop – Attachment 5) highlights the elements of the proposed changes that see increases in protections in some areas and decreases in other areas but on balance produce an equivalent area of protection for each stream class.

It should be noted that under the current IFOAs, any streams not mapped by LIC are not afforded any protection unless these areas are within fisheries habitat or have triggered the soil and water conditions of the IFOA. The proposal is that all streams are now afforded some level of protection.

Concerns regarding protection in areas of fisheries habitat have been considered and has been agreed to implement an additional 5m soft boundary outside the 5 m hard boundary on class 1 streams (ie 10m total width) in areas of identified threatened fish habitat, as per the modelled habitat maps as provided by DPI, Fisheries. This will occur predominantly with discrete areas of the north coast and select areas of the south coast.

14. On balance, do you think the proposed changes in stream identification and protection lead to an equivalent or improved ecological outcome to the current conditions? If not, why?

15. If not, what additional considerations need to be identified to maintain the environmental values current provided by the stream protection network?

As a general principle the existing protected riparian zones on larger streams (second order and above) need to continue to be protected because they often contain critical landscape features such as older trees on more fertile soils, a more intact structure, floristic diversity and range of micro-habitats. We disagree with the proposal in so far as it allows logging in some of these areas that have been protected over previous logging cycles and are often highly susceptible to weed invasion following disturbance. On the other hand, it is proposed to protect other riparian zones such as the increase in first order streams protection. However, many of these areas were logged in recent cycles and the proposed buffer is only 5m wide.

ESA Boundary Conditions

ESA boundary conditions have been simplified to hard and soft boundary rules from the current complex range of rules around operating near boundaries. These are described in the presentation material.

16. On balance, do you think the proposed changes to boundary protection lead to an equivalent or improved ecological outcome to the current conditions? If not, what ones and why?

Fauna Lists

The fauna lists were developed during the first fauna panel in March 2014 and refined at the workshop in September 2014. The tables were developed based on a very similar threatened species licence model to that currently proposed (intensive, selective and non-regrowth zones, moving from record to landscape based conditions as far as possible, re-invest saved survey effort into monitoring). The only significant change to this model is the move from dispersed tree retention to an aggregated tree retention approach.

*In addition feedback on carrying forward previously applied exclusion zones to the greatest extent possible has been incorporated into the new model. There are three tables relevant to fauna that are provided in **Attachment 4**.*

Table 1: *Threatened fauna species and populations considered adequately protected by the general IFOA conditions.*

Table 3: *Threatened fauna species and populations which are protected by the application of a landscape conditions and also a site-specific existing exclusion zone, nest, den, roost, camp or in-use feed tree retention condition.*

Table 4: *Threatened Fauna Species that require application of a site-specific condition.*

For each of the species in Table 4 of Attachment 4, there is also proposed site-specific conditions along with proposed protocols describing potential survey and/or mapping/modelling approach to identifying areas where these conditions would apply.

17. Given the proposed multi-scale threatened species licence model, are there any species which should be allocated to a different table? If so which ones and why.

18. For the species requiring conditions in Table 4, are the proposed conditions suitable? If not which ones and why not?

19. If you are unsure or unable to provide comment on specific species in Table 4, but are aware of a suitable expert we can contact to review models/maps etc, can you please advise.

While it is acknowledged that the amount of survey effort expended on threatened species under the previous licence did not result in significant increases in protection for many species, it is important that all of the species exclusion zones previously identified are permanently protected.

Our primary recommendation is to undertake a scientific assessment of the adequacy of the protected areas in response to the proposed increase in logging intensity. This assessment would need to take advice from scientific specialists in specific species and consider the spatial distribution of species (which would include for example maps of exclusion areas resulting from the application of the existing threatened species licence which we have not seen). It is therefore difficult to answer the above questions, prior to such an assessment being carried out, and without the necessary expertise in many of the species.

Comments on two species with which we have significant experience are:

1. Koala

It is not possible to provide specific information regarding Koalas given that nothing has been provided from the Koala Expert Panel and the results of the field trials undertaken by EPA have not been provided. However, it is important that there is sufficient habitat protected for Koalas; feed trees will need to be spread across the harvest area and permanently protected, as well as in clumps. We understand that the Koala prescription was to be developed by the Koala Expert Panel after the completion of the field trials and assessment of the Koala habitat models.

2. Rufous Scrub-bird

There is limited occurrence of Rufous Scrub-birds on State Forest, they occur at low densities and are relatively easy to survey; they therefore do not need to be a major forestry issue. However, the Rufous Scrub-bird is an important species and needs to be protected where it occurs because forestry activities, particularly ground cover disturbance and burning, can impact on the habitat. Tree removal will also be detrimental if it results in significant ground disturbance or causes significant drying of the habitat or reduction in leaf litter. However, Scrub-birds are known to occupy logged areas where a dense understorey has formed post-logging.

Some additional considerations regarding survey are:

- In the past, it was difficult to model Rufous Scrub-bird habitat because factors governing the niche of the species were below the resolution of the predictor variables used, and the widely separated and variable high elevation occurrences were not equally successfully modelled. To overcome deficiencies in the modelling,

records in the vicinity of a compartment should also be used to trigger surveys that should be carried out in areas containing suitable micro-habitat.

- If the model is changed, a review of the survey sampling method needs to be triggered.
- Surveys should be done in the morning or afternoon on days of no wind or very low wind.
- It would be preferable to stagger surveys over multiple days. If surveys cannot be done in the peak calling period (September – January), then it would be preferable for surveys to be repeated on different days than twice as many surveys done in the same area on one day.
- If it is necessary to survey in May – July, then at least three repeat surveys should be carried out.

The key to protecting the species during logging events is to (i) protect occupied habitat and (ii) protect some additional potential habitat nearby for short to medium term refuge or dispersal. Some additional considerations regarding protective measures are:

- All exclusion zones previously identified for the Rufous Scrub-bird should be retained. However, in subsequent logging cycles, if the micro-habitat is no longer present and surveys have not relocated the species, an application could be made to remove the exclusion zone.
- Exclusion zones should not be burnt, with extra precaution taken not to burn occupied habitat.
- An issue with the existing criteria for protection zones is that they could conceivably miss the protection of the occupied habitat. Calling males show strong fidelity to a site, so 1ha (plus buffer) should be protected around or very near the site of a calling male that should include the most dense ground cover available – whether it meets the specified microhabitat criteria or not. This could be comprised of, for example, dense ground vegetation, vine thickets, dense ground debris (branches, logs, leaves) and dense leaf litter. To facilitate the identification of this habitat, survey records need to be plotted as accurately as possible.

The following questions (green type) were specifically asked of the Panel by the DPC.

20. In the intensive harvesting zone, would increasing the amount of exclusion zones in that landscape compensate for the environmental impacts associated with potentially less frequent but more spatially extensive intense harvesting activity at a site scale?

We consider that there has been an inadequate assessment of the capacity of the network of protected areas proposed to sustain threatened fauna populations in light of the increase in logging intensity over that envisaged when the current system of protected areas was developed. The silvicultural methods proposed have been designed to maximise timber volumes from native forests in the short term, with the effect of potentially impacting threatened species dependent on older forest.

Our primary recommendation is that a thorough assessment of the adequacy of protected areas networks at a regional (or at least sub-regional) scale is required. This assessment would need to be carried out by scientists with expertise and experience in wildlife conservation biology. If the protected area network was adequate, then the intensive logging regimes proposed would not raise such conservation concern.

21. Within areas subject to intensive harvesting, is it possible to rank the following site scale conditions in order of their ability to best protect environmental values –

- *Setting a maximum size for each intensive harvest event (coupe size)*
- *Implementing a minimum clump retention allowance*
- *Requiring all giant trees to be retained.*

See the answer above. The regional scale analysis needs to be done thoroughly before meaningful answers to some of these detailed questions can be provided. That said, there are very few giant trees remaining in areas subject to intensive harvesting and all need to be maintained regardless of other conditions.

22. Within areas subject to intensive harvesting, is it possible to identify which option would most likely improve or maintain environmental values at both the site and landscape scales:

- Smaller coupes with more frequent return times to adjacent areas
- Larger coupes with less frequent return times to adjacent areas.

Provide any context behind what components of this are most important for maintaining environmental values and why?

In general, it is ecologically preferable to log smaller coupes with longer return times so that the impacts are dispersed in time and space. From the time and space criteria proposed by Forestry Corporation, it appears that the entire net harvest area could theoretically be reduced to either 0-14 years old or 0-20 years. It will result in a very long return time for all of these forests at the completion of the current logging cycle. To our knowledge, there is unlikely to be scientific data that could be used to justify fine-scale differences in coupe size and return time with respect to the impact on threatened species. However, we consider the options presented as far too short and ideally would recommend return times in the order of 25 years.

These considerations are not so critical if a satisfactory protected area network is in place.

23. Within areas subject to selective harvesting, is it possible to rank the following site scale conditions in order of their ability to best protect environmental values –

- *Setting a minimum basal area retention rate*
- *Implementing a minimum clump retention allowance*
- *Requiring all giant trees to be retained.*

It is not really possible to rank these – see answers above.