



AUDIT REPORT – COLLOMBATTI STATE FOREST, COMPARTMENT(S) 1, 2, 82

Auditee:	Forestry Corporation NSW
Audit scope:	Collombatti State Forest, compartment(S) 1, 2, 82 (see Map 1 , below).
Region:	Lower North East
Date/Audit timing:	4-5 May 2016
Lead EPA auditor:	Stan Viney
Assisting EPA auditors:	Alex Statzenko
Justification of audit:	Initial audit in Lower North East IFOA focussing on EPA compliance priority area
Audit objectives:	To assess FCNSW and their level of compliance with conditions and environmental performance in line EPA compliance priorities.
Audit criteria:	To determine compliance with relevant compliance priority conditions in the Lower North East IFOA region (TSL/EPL) and the POEO Act.
Audit scope	<p>Physical scope: Collombatti SF</p> <p>Temporal scope: The audit period adopted for assessment of compliance with operational conditions is on the days of the audit inspection (4-5 May 2016). The audit period for assessment of reporting conditions is 12 months prior to the audit inspection.</p> <p>Activities examined during the audit inspection include:</p> <p>Hollow bearing and Recruitment tree prescriptions</p> <ul style="list-style-type: none"> • <i>Conditions 5.6 (a)(b)(c) (h) Non -regrowth retention, selection, protection & mark-up</i> <p>Water pollution - Crossings</p> <ul style="list-style-type: none"> • Schedule 5 cl37 (5-30m drainage) • S120 POEO Act – ‘A person must not pollute waters’ <p>Exclusion zone mark-up for EZ and buffer zones within scope of audit</p> <ul style="list-style-type: none"> • <i>5.1 f Operational requirements</i> <p>Forest Structure</p> <ul style="list-style-type: none"> • <i>Basal area retention (as defined within ‘Single Tree Selection definition TSL’)</i> <p>EEC identification and protection</p> <ul style="list-style-type: none"> • <i>Exclusion zone mark-up and protection</i>

Summary of Operations	<p>From the harvesting plan:</p> <p>“Compartment history records indicate these compartments (Cpts 1-4) were roaded in preparation for contemporary timber harvesting during the years 1960 - 1964. In the years during this road construction these compartments were progressively logged from 1962 - 1968. There were follow up salvage, sleeper and "crown" logging events during the years 1972 - 1974. A small timber harvest trial was carried out in these compartments in 1978.</p> <p>The most recent timber harvesting in these compartments is as follows:</p> <p>Compartment 1 = Salvage and Sleeper operations are recorded for the year 1986</p> <p>Compartment 2 = Salvage and Sleeper operations are recorded for the year 1985</p> <p>No records are available that indicate the logging history of Cpt 82.”</p>
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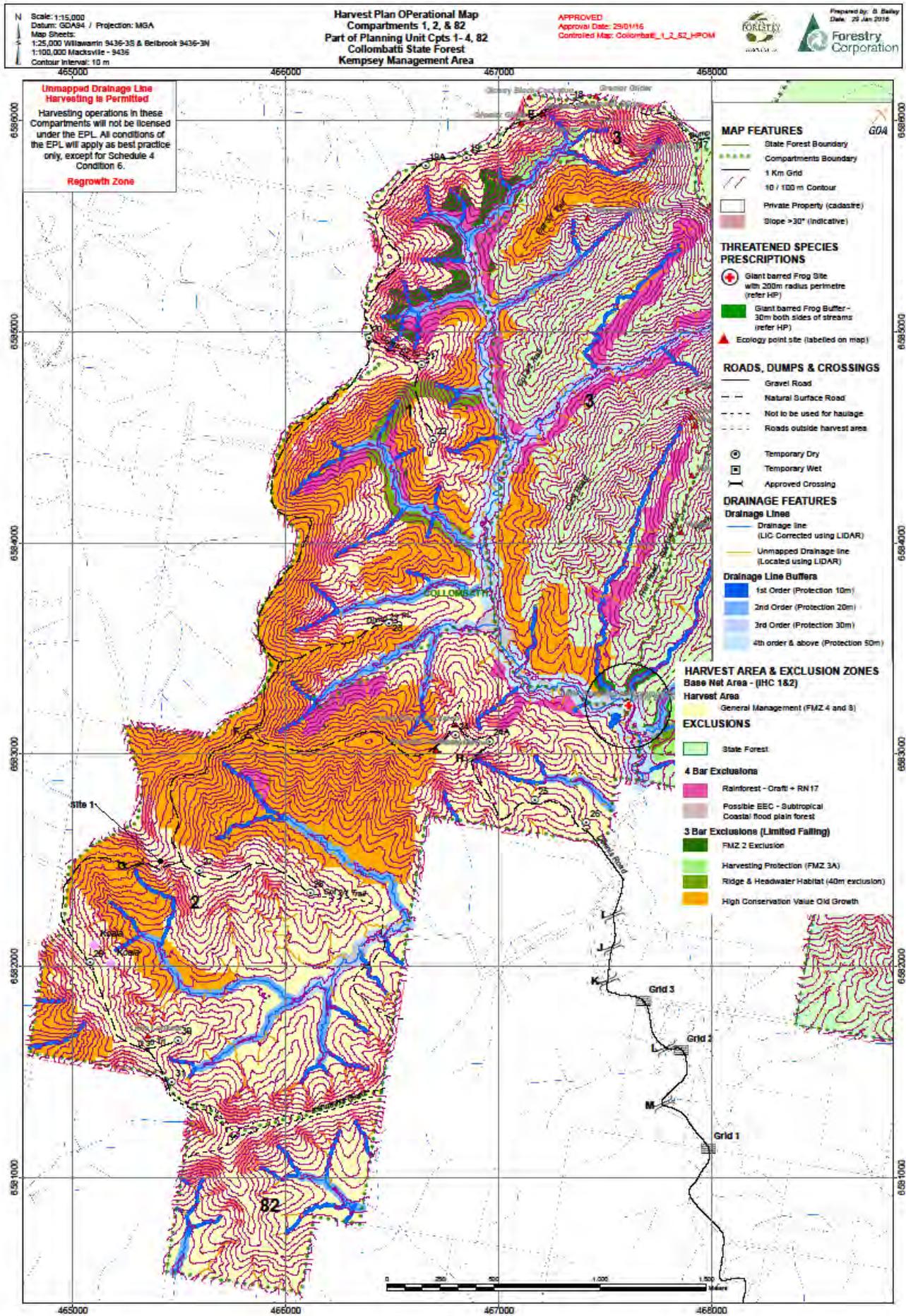


Figure 1. Harvest Plan Operational map – Collombatti SF Compartments 1, 2 & 82

1. Audit Findings - Overview

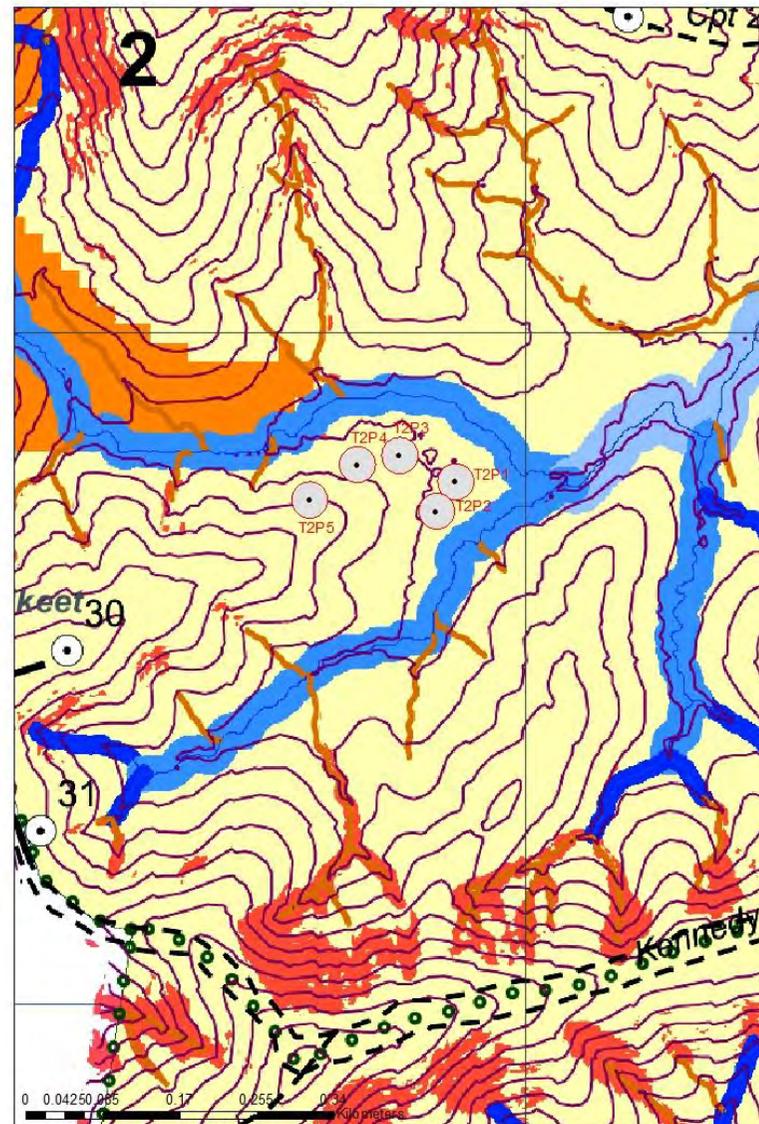
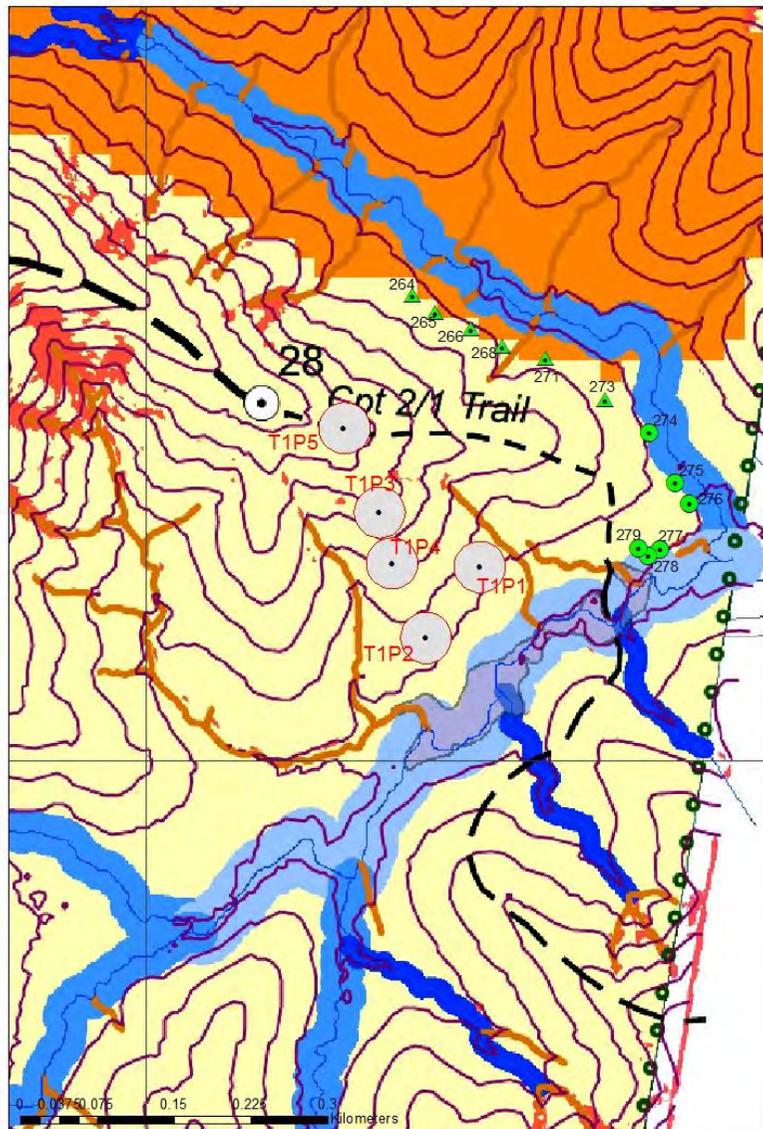
A summary of EPAs findings are shown in the table below.

Condition	Audit scope	Compliant	Non-compliant	Not Determined	Not Applicable
Exclusion zones	Old Growth protection	1	0		
	Old Growth mark up	0	1		
	Rainforest EEC			1	
	Riparian protection zone	1		1	
Hollow bearing and recruitment trees	H Retention	1	0		
	H Selection	4	0		
	R Retention	1	0		
	R Selection	5	2		
	H&R Protection	8	3		
Forest Structure	Basal Area Retention			1	
	TOTAL	21	6	3	

ATTACHMENT 1: AUDIT FINDINGS TABLE –COLLOMBATTI STATE FOREST, COMPARTMENT(S) 1, 2, 82

CONDITION RELATED TO HOLLOW-BEARING TREES – REGROWTH ZONE - RETENTION																																							
Condition No. and detail				Compliant? Yes/No/ Not determined/Not Applicable	Number of non-compliances (sample size & unit)	Action required by licensee																																	
<p>5.6(d) Tree Retention – Regrowth Zone Threatened Species Licence, Lower North East Region Within the Regrowth Zone the following requirements for retention of Hollow-bearing trees apply:</p> <p>i. A minimum of five hollow-bearing trees must be retained per hectare of net logging area. Where this density of hollow-bearing trees is not available all hollow-bearing trees within the net logging area must be retained.</p>				Yes	0 / 1 (post harvest area in two separate areas totalling 2 ha)																																		
Comment and Evidence																																							
<p>The Environment Protection Authority (EPA) determined FCNSW have not complied with this condition in the area assessed.</p> <p>EPA Officers assessed two transects inside harvested areas (Figure 1). The total area assessed was 2 hectares. Each transect was comprised of five 0.2ha circular plots. Plot centres were randomly selected on GPS before approaching the location. EPA counts marked and unmarked live standing candidate H trees towards retention up to the regrowth H tree retention rate threshold.</p> <p>All plots were in the net harvested areas and did not overlap each other or protected features. Across the two transects, EPA officers observed four marked H trees and zero candidate, unmarked H trees, totalling 4 H trees across 2ha. FCNSW achieved a retention rate of 2 H trees/ha.</p> <p>Table 1: H & R tree transects within harvested area – H tree results</p> <table border="1"> <thead> <tr> <th>Location</th> <th>Start GPS point</th> <th>End GPS point</th> <th>Assessment Method</th> <th>Area assessed</th> <th>H trees marked</th> <th>Unmarked candidate H trees</th> <th>Retention rate/ha</th> </tr> </thead> <tbody> <tr> <td>Transect One</td> <td>252</td> <td>258</td> <td>Plot transects (5 plots per transect)</td> <td>1.0 ha</td> <td>2</td> <td>0</td> <td>2 H/ha includes marked and unmarked</td> </tr> <tr> <td>Transect Two</td> <td>259</td> <td>263</td> <td>Plot transects (5 plots per transect)</td> <td>1.0 ha</td> <td>2</td> <td>0</td> <td>2 H/ha includes marked and unmarked</td> </tr> <tr> <td>Total (comprises marked H and unmarked candidate H)</td> <td></td> <td></td> <td></td> <td>2 ha</td> <td>4</td> <td>0</td> <td>2 H/ha marked and unmarked</td> </tr> </tbody> </table> <p><i>NOTE: EPA officers considered trees retained to be candidate H trees only where they met the TSL criteria (despite not being marked)</i></p>								Location	Start GPS point	End GPS point	Assessment Method	Area assessed	H trees marked	Unmarked candidate H trees	Retention rate/ha	Transect One	252	258	Plot transects (5 plots per transect)	1.0 ha	2	0	2 H/ha includes marked and unmarked	Transect Two	259	263	Plot transects (5 plots per transect)	1.0 ha	2	0	2 H/ha includes marked and unmarked	Total (comprises marked H and unmarked candidate H)				2 ha	4	0	2 H/ha marked and unmarked
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Figure 1: Locations of H & R plots (T1 & T2) and stream and old growth exclusion zone assessments (points 264-279) undertaken in Collombatti State Forest, compartment 2 during the EPA audit on 22-24 March 2016. Each plot has a radius of 25m. At each of the plot locations, EPA officers assessed basal area, tree retention and tree mark-up requirements.



WHY IS COMPLIANCE WITH THIS TSL CONDITION IMPORTANT?

Largest Size Cohort:

The presence, abundance and size of hollows are positively correlated with tree basal diameter, which is an index of age (Lindenmayer *et al.* 1991a, Bennett *et al.* 1994, Ross 1999, Soderquist 1999, Gibbons *et al.* 2000, Shelly 2005). Tree diameter at breast height (DBH) is, in turn, a strong predictor of occupancy by vertebrate fauna (Mackowski 1984, Saunders *et al.* 1982, Smith and Lindenmayer 1988, Gibbons *et al.* 2002, Kalcounis-Rüppell *et al.* 2006). The minimum size-class at which trees consistently (>50% of trees) contain hollows varies depending on the species and environmental conditions, yet is always skewed toward the larger, more mature trees. (Reference: *Loss of Hollow-bearing Trees – key threatening process determination - NSW Scientific Committee - final determination (2007)*)

CONDITION RELATED TO HOLLOW-BEARING TREES – REGROWTH ZONE – SELECTION

Condition No. and detail	Compliant? Yes/No/ Not determined/Not Applicable	Number of non-compliance (sample size & unit)	Action required by licensee
<p>5.6(d) Tree Selection Threatened Species Licence, Lower North East Region Within the Regrowth Zone the following requirements for retention of Hollow-bearing trees apply:</p> <p>(ii). In selecting hollow-bearing trees for retention, priority must be given to any hollow-bearing trees which exhibit evidence of occupancy by hollow dependent fauna and trees which contain multiple hollows or hollows of various sizes.</p> <p>(iii). Hollow-bearing trees must be selected with the objective of retaining trees having as many of the following characteristics as possible:</p> <ul style="list-style-type: none"> • belonging to a cohort of trees with the largest dbhob, • good crown development, • <i>Note: this does not restrict the selection of trees with broken limbs consistent with the hollow-bearing tree definition.</i> • minimal butt damage, • represent the range of hollow-bearing species that occur in the area, • located such that they result in retained trees being evenly scattered throughout the net logging area. 	<p>Yes</p>	<p>0/4 (4 H trees in the area assessed)</p>	

Comment and Evidence

The EPA found that FCNSW did comply with the condition in the area assessed. EPA uses the presence or absence of marking (paint) on trees to indicate whether a tree has been selected or not. Assessments were done in post-harvesting areas only (see Figure 1).

The results are shown in **Table 2**. There were two marked H trees in Transect 1. There were 2 marked H trees in Transect 2. Four unmarked, unselected candidate H trees equates to six non-compliances. These habitat resources were required to be selected prior to operation and marked in the field but were not selected. Failure to select them are non-compliances. It is very important that these H trees be selected and marked, particularly in a regrowth zone where H tree resources are generally scarce. Selection and field marking is important as it informs harvest contractors to not harvest and protect them.

Figure 2: Marked H trees in Compartment 2, Collombatti State Forest



Marked H tree



Marked H tree



Within the harvested area, EPA officers conducted two transects, each comprising of 5 circular plots (Figure 1). Within each plot, EPA officers measured the retained trees (both marked and unmarked) and the diameters of fresh stumps. **Tables 2 and 3** contain the detailed results of these transects.

EPA officers recorded three marked H trees, four marked R trees and three marked E trees in Transect 1. Two marked H trees, three marked R trees and three marked E trees were recorded in Transect 2.

The average DBHOB of retained trees – including unmarked trees – was 67.3cm. The average DBHOB of marked trees was 66.7cm. The average DBHOB (with a conservative taper of -5cm) of cut trees was 58.6 cm.

Table 2: EPA Post-Harvest Assessments – Retained tree characteristics across assessed areas

Plot # / waypoint	Species	DBHOB (cm)	Marked H tree / E tree / candidate H tree / unmarked tree	Crown Damage (Y / N)	Logging Debris within 5m (Y / N)	Tree used as Bumper	Ground Disturbance within 5m	Hollows, Burls and/or Protuberances	Crown Development	Tree Growth Stage
Transect 1										
Plot 1, wpt 252	Bloodwood	59	Candidate R	N	N	N	Y (Snig track)	Hollows	Dominant	Early mature
	Iron Bark	58.5	Unmarked	N	Y	N	N	Protuberances, broken limbs	Dominant	Early mature
	Iron Bark	46.5	Unmarked	N	Y	N	N	N	Co-dominant	Early mature
	Iron Bark	49	Unmarked	N	N	N	N	N	Dominant	Early mature
Plot 2, wpt 254	Iron Bark	40.5	Unmarked	N	N	N	N	Protuberances, broken limbs	Dominant	Early mature
	White Mahogany	66	Candidate R	N	N	N	Y (Snig track)	Protuberances, broken limbs	Dominant	Mature
Plot 3, wpt 255	Spotted Gum	33	E	N	N	N	N	N	Co-dominant	Early mature
	Spotted Gum	42	R	N	Y	Y	Y (Snig track)	Broken limbs	Co-dominant	Early mature
	Spotted Gum	64.5	R	N	N	N	N	Protuberances, broken limbs	Dominant	
	Spotted Gum	51	H	N	N	N	N	Dead Branches, Hollows, Protuberances	Co-dominant	
	Spotted Gum	102	H	N	N	N	N	Hollows, Protuberances, broken limbs	Dominant	
	White Mahogany	52.5	Unmarked	N	N	N	N	Hollows, Protuberances, broken limbs	Co-dominant	Early mature
	Iron Bark	41	Unmarked	N	N	N	Y (Snig track)	N	Suppressed	Early mature
Plot 4, wpt 2577	White Mahogany	65	Unmarked	N	N	N	N	Hollows, Protuberances,	Dominant	Early mature

Plot # / waypoint	Species	DBHOB (cm)	Marked H tree / E tree / candidate H tree/ unmarked tree	Crown Damage (Y / N)	Logging Debris within 5m (Y / N)	Tree used as Bumper	Ground Disturbance within 5m	Hollows, Burls and/or Protuberances	Crown Development	Tree Growth Stage
								broken limbs		
	Iron Bark	53	E	Y-natural	N	N	N	Broken limbs	Dominant	Mature
Plot 5, wpt 258	Iron Bark	53/21.5	E	N	N	N	Y (Snig Track)	N	Dominant	Early mature
	Spotted Gum	47	Unmarked	N	N	N	Y (Snig Track)	Protuberances, broken limbs	Dominant	Early mature
	Spotted Gum	43.5	R	N	N	N	Y (Snig Track)	Protuberances, broken limbs	Co-dominant	Mature
Transect 2										
Plot 1, wpt 259	Bloodwood	61	E	N	N	N	N	N	Co-dominant	Mature
	White Mahogany	57	Unmarked	Y-operational	Y	N	N	Broken limbs	Dominant	Mature
	Bloodwood	88	R	N	N	N	N	Broken limbs	Dominant	Mature
	Bloodwood	81	R	N	N	N	Y (Snig Track)	Broken limbs	Co-dominant	Mature
	Bloodwood	55	E	N	N	N	N	Broken limbs	Co-dominant	Mature
Plot 2, wpt 260	No trees above 40cm									
Plot 3, wpt 261	Blue Gum	72	H	N	N	N	N	Protuberances, broken limbs	Dominant	Mature
	Blue Gum	48	Unmarked	Y	Y	N	N	Broken limbs	Dominant	Mature
	Blue Gum	42	Unmarked	N	2m	N	N	N	Co-dominant	Early mature
	Iron Bark	43	Unmarked	N	N	N	N	N	Co-dominant	Early mature
Plot 4, wpt 262	White Mahogany	87	H	N	Y	N	N	Broken limbs	Dominant	Mature
	Bloodwood	78	E	N	N	N	N	Broken limbs	Dominant	Mature
	Iron Bark	48	Unmarked	N	N	N	N	Protuberances	Dominant	Early mature
	White Mahogany	39	Unmarked	N	N	N	N	Protuberances, broken limbs	Dominant	Early mature
	Iron Bark	43	Unmarked	N	N	N	N	Broken limbs	Dominant	Early mature
	White Mahogany	50	Unmarked	N	N	N	N	Broken limbs	Dominant	Early mature
	White Mahogany	63.5	R	N	N	N	Y (Snig Track)	Broken limbs	Dominant	Mature
Plot 5, wpt 263	Iron Bark	58	R	N	N	N	Y (Snig Track)	N	Dominant	Mature

Table 3: Stump diameters recorded inside the H & R plots within the three transects.

Location/waypoint	Tree/Stump no.	Basal Area (m ² /ha)	Species	SDOB (cm)	Stump Height (cm)	DBHOB using taper
Transect 1						
Plot 1, wpt 252	S1	8	Blue Gum	42	85	37
	S2		Blue Gum	35	49	30
	S3		Blue Gum	43.5	45	38.5
	S4		Tallowwood	55	98	50
	S5		White Mahogany	46	77	41
Plot 2, wpt 254	S1	10	Blue Gum	42	105	37
	S2		Blue Gum	43	45	38
	S3		Iron Bark	53	66	48
	S4		Blue Gum	38	41	33
	S5		Tallowwood	58	92	53
	S6		Iron Bark	47	63	42
Plot 3, wpt 255	S1	11	Spotted Gum	47.5	42	42.5
	S2		Spotted Gum	52	48	47
	S3		Spotted Gum	47	104	42
	S4		Iron Bark	41	81	36
Plot 4, wpt 257	S1	6	Spotted Gum	65	49	60
	S2		Grey Gum	43	34	38
	S3		Iron Bark	48	51	43
	S4		Iron Bark	43	92	38
	S5		Spotted Gum	36	34	31
	S6		Spotted Gum	42	39	37
	S7		Spotted Gum	42	52	37

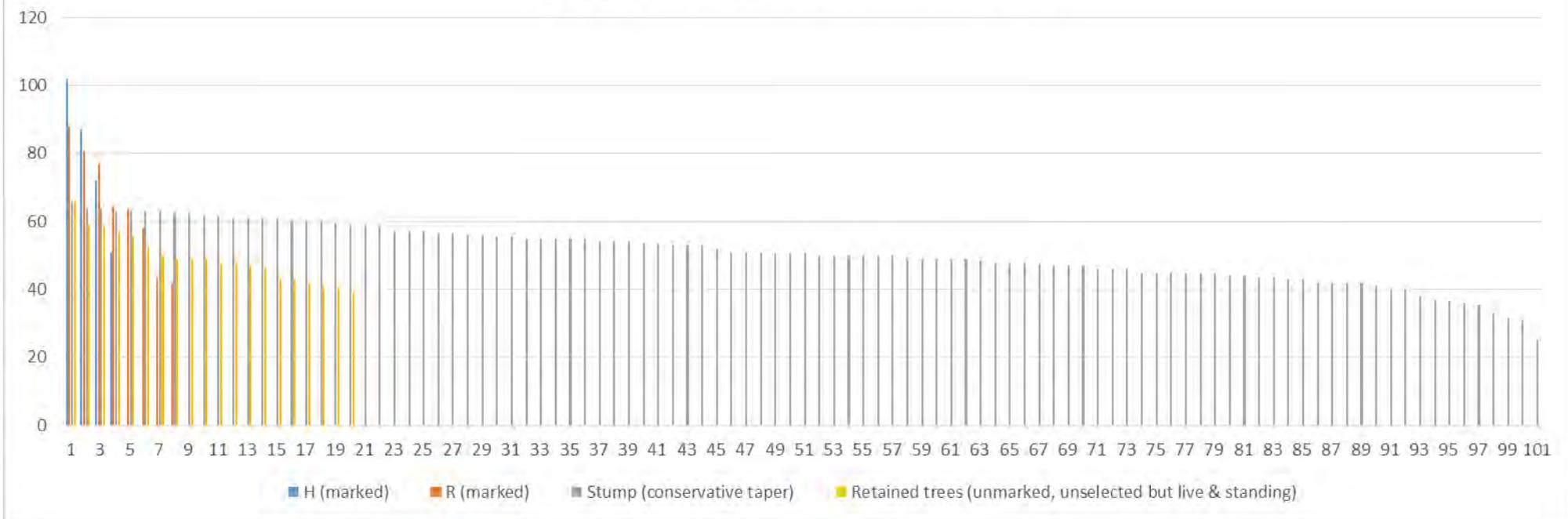
Location/waypoint	Tree/Stump no.	Basal Area (m ² /ha)	Species	SDOB (cm)	Stump Height (cm)	DBHOB using taper
	S8		Iron Bark	39	61	34
	S9		Spotted Gum	58	71	53
	S10		Spotted Gum	57	48	52
	S11		Spotted Gum	66	61	61
	S12		Spotted Gum	49	22	44
	S13		Spotted Gum	60.5	71	55.5
Plot 5, wpt 187	S1	5	Spotted Gum	45	46	40
	S2		Spotted Gum	46	55	41
	S3		Iron Bark	45	84	40
	S4		Spotted Gum	44	87	39
	S5		Spotted Gum	49.5	62	44.5
	S6		Spotted Gum	56	37	51
	S7		Spotted Gum	45	48	40
	S8		Spotted Gum	51	59	46
	S9		Spotted Gum	55.5	58	50.5
Transect 2						
Plot 1, wpt 259	S1	13	Blue Gum	53	24	48
	S2		Blue Gum	41	53	36
	S3		Blue Gum	43	31	38
	S4		Blue Gum	32.5	43	27.5
	S5		Blue Gum	40	42	35
	S6		Blue Gum	34	16	29
	S7		Blue Gum	42	29	37

Location/waypoint	Tree/Stump no.	Basal Area (m ² /ha)	Species	SDOB (cm)	Stump Height (cm)	DBHOB using taper
	S8		Blue Gum	51	24	46
	S9		Blue Gum	44	28	39
	S10		Blue Gum	44	28	39
	S11		Blue Gum	41.5	30	36.5
	S12		Blue Gum	40	32	35
Plot 2, wpt 260	S1	6	Blue Gum	37	36	32
	S2		Blue Gum	44	21	39
	S3		Blue Gum	42	45	37
	S4		Blue Gum	41.5	35	36.5
	S5		Blue Gum	38	21	33
	S6		Blue Gum	44	21	39
	S7		Blue Gum	45	71	40
	S8		Blue Gum	42	40	37
	S9		Blue Gum	34	23	29
	S10		Blue Gum	36	32	31
	S11		Blue Gum	36	39	31
Plot 3, wpt 261	S1	10	Blue Gum	45	44	40
	S2		Spotted Gum	71	69	66
	S3		Tallowwood	59	30	54
	S4		Blue Gum	44	39	39
	S5		Blue Gum	54	41	49
	S6		Blue Gum	62	49	57
	S7		Blue Gum	38	36	33
	S8		Tallowwood	68	60	63
	S9		Blue Gum	44	56	39
	S10		Blue Gum	44.5	20	39.5
	S11		Blue Gum	48.5	54	43.5
	S12		Blue Gum	38	58	33
Plot 4, wpt 262	S1	8	Blue Gum	54	43	49

Location/waypoint	Tree/Stump no.	Basal Area (m ² /ha)	Species	SDOB (cm)	Stump Height (cm)	DBHOB using taper
	S2		Spotted Gum	56	42	51
	S3		Spotted Gum	55.5	72	50.5
	S4		Iron Bark	39.5	18	34.5
Plot 5, wpt 263	S1	7	Spotted Gum	48	31	43
	S2		Spotted Gum	42	72	37
	S3		Spotted Gum	44.5	66	39.5
	S4		Spotted Gum	43	37	38
	S5		Spotted Gum	46	38	41
	S6		Iron Bark	47	46	42

(conservative taper)

Figure 3. DBH of retained and harvested trees



CONDITION RELATED TO RECRUITMENT TREES – REGROWTH ZONE - RETENTION

Condition No. and detail	Compliant? Yes/No/ Not determined/ Not Applicable	Number of non- compliance (sample size & unit)	Action required by licensee
<p>5.6(e) Tree Retention Threatened Species Licence, Lower North East Region The following condition must be applied within the regrowth zone:</p> <p>e) Within the Regrowth Zone, for each hollow-bearing tree retained in (d) above a recruitment tree must be retained.</p>	Yes	0/1	

Comment and Evidence

EPA found that the area assessed was compliant with this condition. Four H trees were retained thus Four R trees are required to be retained across 2ha in this regrowth zone. EPA counts and contributes marked and unmarked live standing candidate R trees for retention up to the TSL retention rate threshold.

Within the logged area, EPA officers undertook two transects comprising of five circular plots each (see **Figure 1**). Within each plot, EPA officers measured the retained trees (both marked and unmarked) and the diameters of fresh stumps. **Tables 2 and 3** above contain the detailed results of these transects. EPA officers recorded four marked R trees and one unmarked, unselected R tree in Transect 1 and four marked R trees in Transect 2 (see **Table 5** below). FCNSW achieved a marked retention rate of 4 R trees per hectare.

Table 4: H & R tree transects within harvest area - R tree results.

Location	Start EPA waypoint	End EPA waypoint	Assessment Method	Area assessed	R trees marked	Unmarked candidate R trees	Retention rate/ha
Transect One	252	258	Plot transects (5 plots per transect)	1.0 ha	3	2	4 R/ha includes marked and unmarked
Transect Two	259	263	Plot transects (5 plots per transect)	1.0 ha	4	0	5 R/ha includes marked and unmarked
Total (comprises marked R and unmarked candidate R)				2 ha	7	2	4.5 R/ha marked and unmarked

NOTE: EPA officers considered trees retained to be candidate R trees only where they met the TSL criteria (despite not being marked)

Table 5: EPA Unmarked Tree Assessments – Candidate R trees

GPS Waypoint	Easting	Northing	Photo reference	Species	DBHOB (cm)
252	466326.12	6582188.91	873-874	Bloodwood	59

CONDITION RELATED TO RECRUITMENT TREES – REGROWTH ZONE – SELECTION

Condition No. and detail	Compliant? Yes/No/ Not determined/Not Applicable	Number of non-compliances (sample size & unit)	Action required by licensee
<p>5.6(e) Tree Selection Threatened Species Licence, Lower North East Region Recruitment trees must be selected with the objective of retaining trees having as many of the following characteristics as possible:</p> <ul style="list-style-type: none"> i. belong to a cohort of trees with the largest dbhob, ii. located such that they result in retained trees being evenly scattered throughout the net logging area iii. good crown development, iv. minimal butt damage, v. represent the range of hollow-bearing species that occur in the area. 	<p align="center">No</p>	<p align="center">2/7 (7 trees were selected and marked in the area assessed as R trees)</p>	<p>An action plan must be developed and implemented to ensure that recruitment trees are retained across the compartment having as many of the characteristics listed in TSL condition 5.6e i-v, and consistent with the requirements of the R tree definition.</p> <p><i>This non-compliance has an orange risk category. The likelihood of environment harm is unlikely. The scale of harm is low (considering rate of incidence and that more R trees were selected and retained than what was required under retention criteria).</i></p>
<p>Comment and Evidence</p>			

EPA found that FCNSW did not comply with this condition in the area assessed. EPA uses the presence or absence of marking (paint) on trees to indicate whether a tree has been selected or not. Assessments were done in post-harvesting areas only (see Figure 1).

Four R trees were required to be selected. Seven R trees were selected and of these, two (size from 42cm and 43.5cm) were in a size cohort outside the cohort of trees with the largest DBHOB (12 stumps were recorded with a DBHOB greater than 42cm). EPA considers all elements of the condition (audit criteria) when determining compliance but considers the size ('largest DBHOB') element of the condition as a key indicator of compliance.

Within the logged area, EPA officers undertook two transects comprising of five randomly selected circular plots each (see **Figure 1**). EPA officers observed seven (7) marked R trees and one (1) unmarked candidate R tree.

Figures 4 and 5 plot tree diameters with stump diameters, sorted by size, for each respective transect. In transect 1 stump diameters were consistently larger than two of the marked R trees.

Two selected and marked R trees in transect one, with diameters of 42cm and 43.5cm, were over 20cm smaller than trees not selected in the 1 ha transect. The larger unmarked/unselected candidate R trees belonged to the cohort of trees with the largest DBHOB in the area assessed.

Figure 4: DBHOB of H Trees, R Trees, Candidate R Tree & Harvested Trees - Transect

1

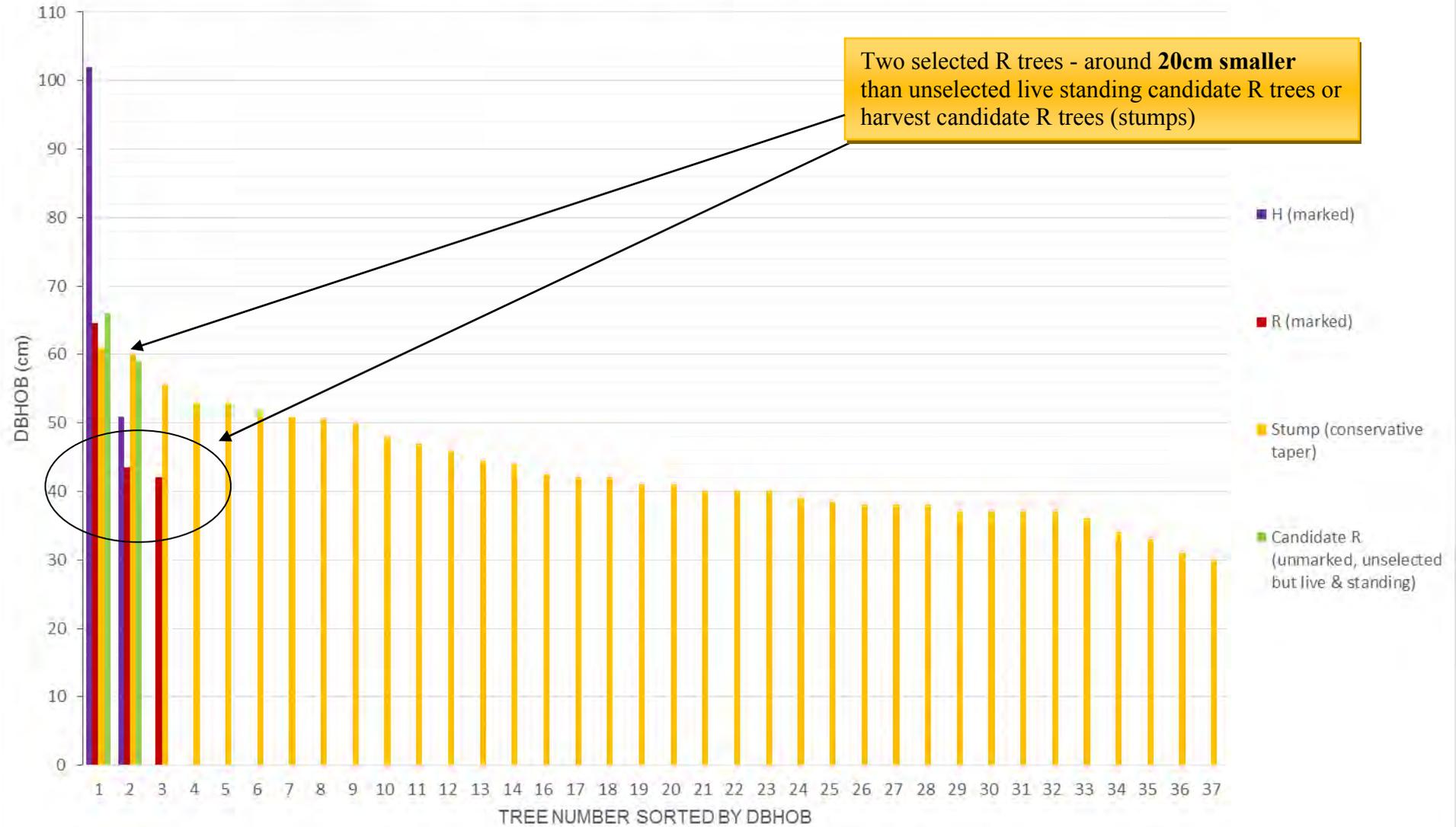
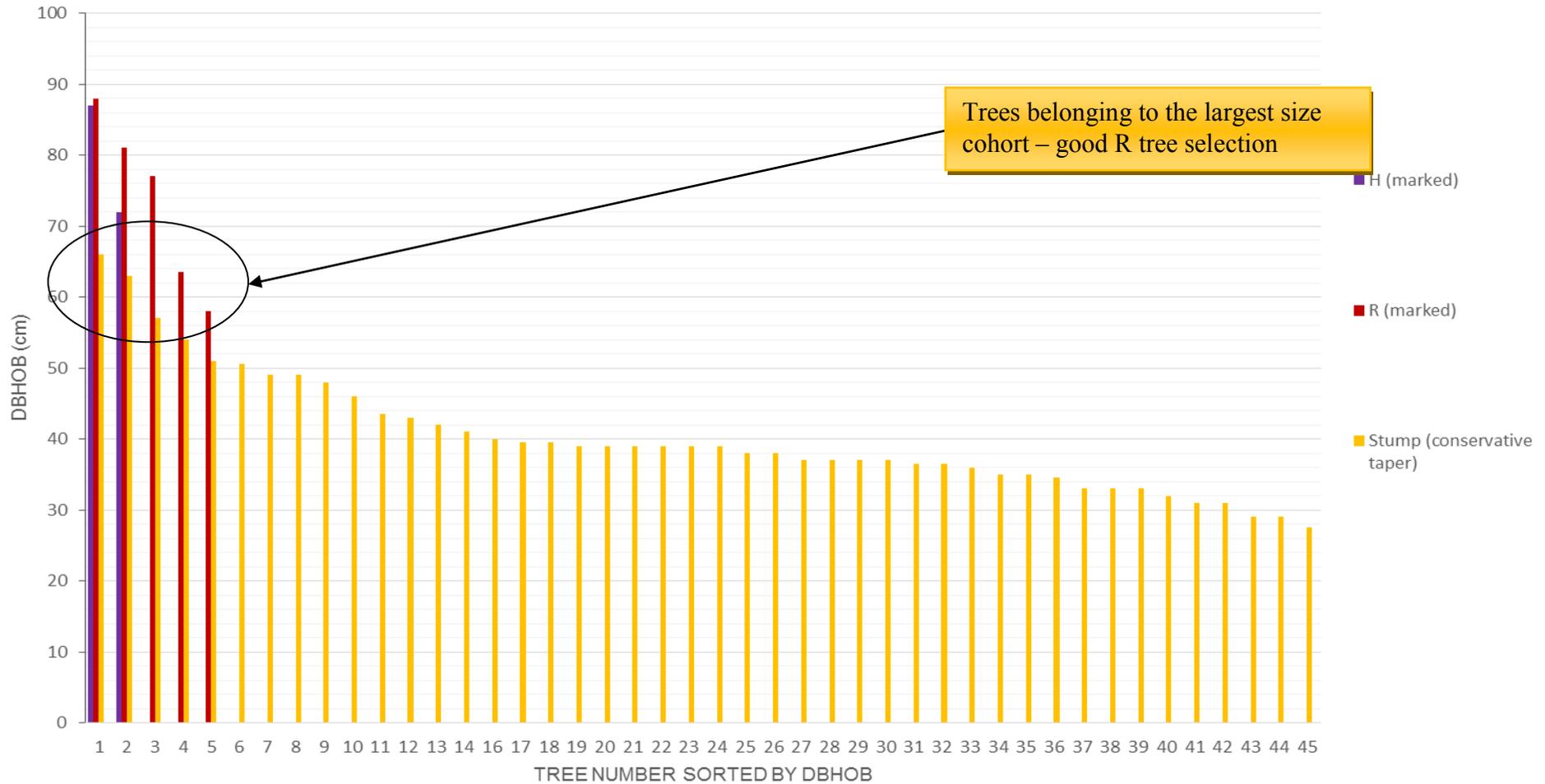


Figure 5: DBHOB of H Trees, R Trees and Harvested Trees - Transect 2



WHY IS COMPLIANCE WITH THIS TSL CONDITION IMPORTANT?

Largest Size Cohort:

The presence, abundance and size of hollows are positively correlated with tree basal diameter, which is an index of age (Lindenmayer *et al.* 1991a, Bennett *et al.* 1994, Ross 1999, Soderquist 1999, Gibbons *et al.* 2000, Shelly 2005). Tree diameter at breast height (DBH) is, in turn, a strong predictor of occupancy by vertebrate fauna (Mackowski 1984, Saunders *et al.* 1982, Smith and Lindenmayer 1988, Gibbons *et al.* 2002, Kalcounis-Rüppell *et al.* 2006). The minimum size-class at which trees consistently (>50% of trees) contain hollows varies depending on the species and environmental conditions, yet is always skewed toward the larger, more mature trees. (Reference: *Loss of Hollow-bearing Trees – key threatening process determination - NSW Scientific Committee - final determination (2007)*)

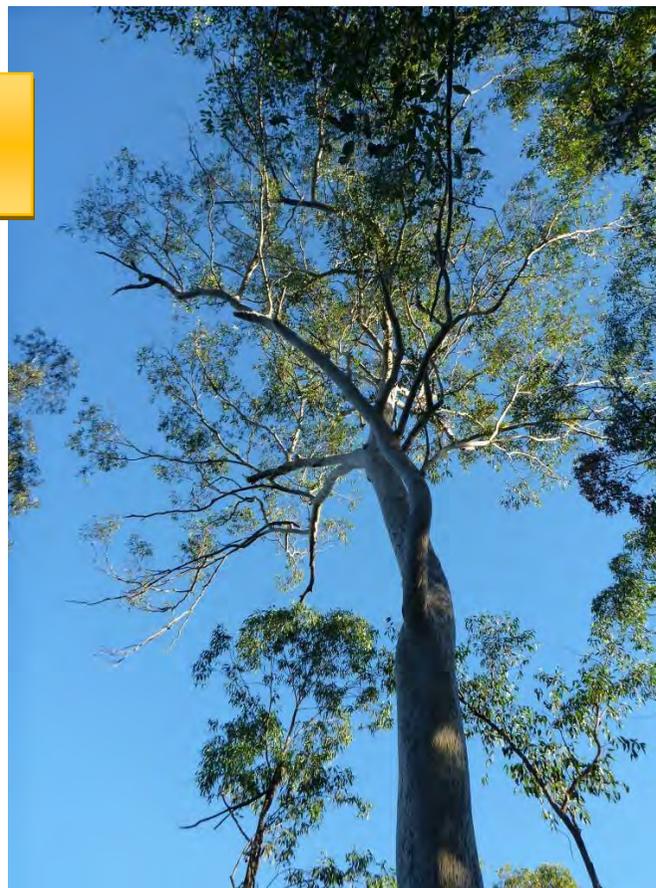
Figure 6: Photos showing unmarked candidate R tree in compartment 2, Collombatti State Forest



Figure 7: Photos showing marked R tree in compartment 2, Collombatti State Forest



Marked **R Tree** – 64.5cm – good selection with all elements including belongs to the cohort with the largest DBHOB



Transect 1 - Location 3

CONDITION RELATED TO HOLLOW-BEARING AND RECRUITMENT TREES – PROTECTION

Condition No. and detail	Compliant? Yes/No/ Not determined/Not Applicable	Number of non-compliance (sample size & unit)	Action required by licensee
<p>5.6(h) Protection of retained trees Threatened Species Licence, Lower North East Region</p> <p>i. When conducting specified forestry activities and post-logging burning, damage to trees retained under conditions 5.6 a), 5.6 b), 5.6 c), 5.6 d), 5.6 e) and 5.6 f) of this licence must be minimised to the greatest extent practicable. During harvesting operations, the potential for damage to these trees must be minimised by utilising techniques of directional felling.</p> <p>ii. In the course of conducting specified forestry activities, logging debris must not, to the greatest extent practicable, be allowed to accumulate within five metres of a retained hollow-bearing tree, recruitment tree, stag, <i>Allocasuarina</i> with more than 30 crushed cones beneath, eucalypt feed tree, or Yellow-bellied Glider or Squirrel Glider sap feed tree. Logging debris within a five metre radius of retained trees must be removed or flattened to a height of less than one metre. Mechanical disturbance to ground and understorey must be minimised to the greatest extent practicable within this five metre radius. Habitat and recruitment trees must not be used as bumper trees during harvesting operations.</p>	<p align="center">No</p>	<p align="center">3/11</p> <p align="center">(11 trees, including 4 marked H trees, 7 marked R trees)</p>	<p align="center">An action plan must be developed and implemented to ensure that all marked H and R trees are protected in future operations in line with TSL condition 5.6h.</p>

Comment and Evidence

EPA officers determined that FCNSW did not comply with both parts (i) and (ii) of this condition in the assessed area.

In relation to part (i) EPA identified an R tree which had operational butt damage where it appeared to have been used as a bumper during the harvest operations. It is important to protect retained trees from operational damage as these trees need to remain healthy to ensure they eventually become a suitable hollow-bearing tree. In relation to part (ii) out of the total of 11 marked H and R trees within the assessed areas, EPA officers recorded two instances of logging debris allowed to accumulate and greater than 1m high and within 5m of the base of a marked H tree and a marked R tree. In both instances increased operational effort could have minimised this debris by flattening it or removing it especially the larger logs at the base. It is important that each H and R tree is protected (no debris within 5 metres higher than 1 metre) to minimise the potential damage which may occur to a tree during a fire. This is especially important where the resource is scarce such as here in regrowth forest. Protecting these resource consolidates the effort of selecting and retaining these resources in that operation.

Risk code orange: This is a moderate risk as the likelihood of environmental harm to these resources is likely and the consequence is moderate to high due to the extent and size of the debris allowed to accumulate and the scarcity of the resource.

Figure 8: examples of excessive debris around retained trees and increased risk of fire damaging this R tree. Harm to this tree will decrease it's long term survival and ability to serve as a successive hollow bearer in the future.



Clearly marked R tree, transect 1, spotted gum (42cm) with debris around the base >1m and within 5m, and butt damage

Large logs = high risk
Accumulating larger logs around R trees increases risk. Burning logs **increases fire intensity, residence time and fire temperature** at the base of the tree. Higher temperature and residence time increases the risk of harm to the R tree & risks its longevity and purpose to become arboreal habitat for the extended future.



Clearly marked H tree, transect 2, white mahogany with excessive debris around the base

CONDITION RELATED TO FOREST STRUCTURE – BASAL AREA RETENTION

Condition No. and detail	Compliant? Yes/No/ Not determined/Not Applicable	Number of non-compliance (sample size & unit)	Action required by licensee
<p>Lower North East IFOA Condition 5 – “Single Tree Selection”</p> <p>“Single Tree Selection” refers to a silvicultural practice, which in relation to a tract of forested land has the following elements:</p> <p>(a) trees selected for logging have trunks, that in cross-section, measured 1.3 metres above ground level, have a diameter (including bark) of 20cm or more (that is, a diameter at breast height over bark of 20 cm or more); and</p> <p>(b) trees are selected for logging with the objective of ensuring that</p>	<p>Not determined</p>	<p>Post-harvest: 10 BA sweeps. Range: 5m²/ha-13m²/ha Average: 8.4m²/ha = a decrease of 65%</p> <p>Unharvested: 3 BA sweeps. Range 20-28 m²/ha Average: 24</p>	

the sum of the basal areas of trees removed comprises no more than 40% of the sum of the basal areas of all trees existing immediately prior to logging within the net harvestable area of the tract.			
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Comment and Evidence

Preliminary observations: The smallest diameter tree selected for logging in the assessment areas was recorded at 27.5cm (including taper), which complies with part (a) of this condition. EPA was not able to determine compliance in relation to part (b) of this condition as the size of the sampling area which would be required to assess the tract would be too great. However these are the results from the sampling conducted.

In considering compliance with part (b) of this condition, the EPA carried out 10 basal area sweeps within the harvested areas. The results are shown in Table 6. The lowest basal area recorded was 5 m²/ha, with the highest at 13 m²/ha. The average across all plots was 8.4m²/ha.

The EPA could not determine compliance with part (b) of this condition, due to lack of pre-harvesting data.

As a surrogate, EPA officers conducted three basal area sweeps in the unharvested Future Treatment Area to provide a baseline. The results are shown in Table 7. The lowest basal area recorded was 20m²/ha, the highest at 28m²/ha. The average basal area in these plots was 24m²/ha. These figures should be considered conservative, as the sweeps were conducted in dry ridge locations, where basal area may be expected to be comparatively lower than the wetter, lower-lying forest types harvested in this operation.

The difference in basal area between the harvest and future treatment areas represents a reduction of 65%, which is not in line with the basal area removal percentage of 40% reduction as specified by part (b) of IFOA Condition 5.

The Harvest Plan anticipated a 40% basal area removal limit was unlikely to be reached due to un-merchantable, and un-viable areas and a silvicultural prescription across much of the area of light-medium STS.

Table 6: Basal Area sweeps carried out by EPA officers in harvested areas

Plot Number	Basal Area (m ² /ha)	Waypoint	Easting	Northing
1	8	252	6582188.91	466326.12
2	10	254	6582120.03	466273.39
3	11	255	6582241.91	466227.99
4	6	257	6582192.63	466240.19
5	5	258	6582323.92	466193.52
6	13	259	6581837.53	465921.44

7	6	260	6581805.10	465900.42
8	10	261	6581566.36	465859.51
9	8	262	6581856.35	465812.71
10	7	263	6581817.39	465759.89
AVERAGE	8.4			

Table 7: Baseline basal area sweeps conducted in Future Treatment Area (Figure 1)

GPS point	N-E-S-W photos	Basal Area (m ² /ha)
283	33-34	28
284	37-38	24
285	29-30	20

CONDITIONS RELATED TO HIGH CONSERVATION VALUE OLD GROWTH EXCLUSION ZONE – PROTECTION

Condition No. and Detail	Compliant? Yes/No/Not determined/Not applicable	Number of non- compliance and (sample size)	Action required by licensee
<p>5.3 High Conservation Value Old Growth Forest</p> <p>a) Specified forestry activities, except tree felling in accordance with condition 5.3 (b), road and snig track construction in accordance with 5.3 (i), and road re-opening, are prohibited within all High Conservation Value Old Growth Forest.</p>	Yes	0/1 (200m of boundary assessed)	
Comment and Evidence			
EPA found FCNSW to be compliant with this condition in the area assessed.			

CONDITIONS RELATED TO HIGH CONSERVATION VALUE OLD GROWTH EXCLUSION ZONE – FIELD MARK UP

Condition No. and Detail	Compliant? Yes/No/Not determined/Not applicable	Number of non- compliance and (sample size)	Action required by licensee
<p>5.1 f Operational</p> <p>b) Specified forestry activities, except tree felling in accordance with condition 5.3 (b), road and snig track construction in accordance with 5.3 (i), and road re-opening, are prohibited within all High Conservation Value Old Growth Forest.</p>	<p>Yes</p>	<p>0/1 (200m of boundary assessed)</p>	
<p>Comment and Evidence</p>			
<p>EPA found FCNSW to be compliant with this condition in the area assessed.</p>			



CONDITIONS RELATED TO RAINFOREST AND RAINFOREST EXCLUSION ZONES – PROTECTION

Condition No. and Detail	Compliant? Yes/No/Not determined/ Not applicable	Number of non- compliance and (sample size)	Action required by licensee
<p>5.4 Rainforest</p> <p>c) Specified forestry activities, except road and snig track construction in accordance with condition 5.4 (e), and road re-opening, are prohibited within all areas of Rainforest and exclusion zones around warm temperate Rainforest.</p>	Not determined		

Comment and Evidence

EPA officers were unable to determine compliance with this licence condition as no logging had occurred within 50m of the rainforest exclusion zones.

CONDITIONS RELATED TO STREAM EXCLUSION ZONE - PROTECTION

Condition No. and Detail	Compliant? Yes/No/Not determined/ Not applicable	Number of non- compliance and (sample size)	Action required by licensee
<p>5.7 Riparian Habitat Protection</p> <p>a) Protection zones (hard) must be retained along the entire length of all streams and must have the minimum widths either side of the stream in accordance with Table 1. The width of the protection zone (hard) must be measured from the top of the bank of the incised channel or, where there is no defined bank, from the edge of the channel. Where there is no incised channel, the protection zone (hard) must be measured from the centreline of the drainage feature.</p>	Yes	0/1	

<p>b) Protection zones (soft) must be retained along the entire length of all protection zones (hard) and must have a minimum width either side of the protection zone (hard) in accordance with Table 1. The width of a protection zone (soft) must be measured from the edge of the protection zone (hard) furthest from the stream.</p>			
<p>Comment and Evidence</p>			
<p>5.7 b) Riparian Habitat Protection zones (soft)</p> <p>EPA officers inspected a total of 100m of stream exclusion zones, 50m of a 2nd order stream and 50m of a 3rd order stream. EPA officers observed 4 incursions one into a 3rd order stream exclusion zone which was approximately 15 metres and three into a 2nd order stream exclusion zone ranging from 10–12 metres. Therefore 4 non-compliances existing in relation to this licence condition. However trees may be felled into protection zones (soft) therefore there is no breach of this licence condition.</p>			

Table 9: Stream exclusion zone survey results

Location	GPS Waypoint	Easting	Northing	GPS accuracy	Point feature	Photo reference	Details of field observations
Stream Exclusion Zone	274	6582319.43	466493.26	3		002 – looking in 003 – looking out 004 - gps	Incursion of approximately 8m into EZ of 2 nd order stream
	275	6582271.19	466518.26	3		006 – looking in 007 – looking out	Branch from fallen tree on opposite side of drainage line. Total incursion of approximately 12 metres into EZ for 2 nd order stream
	276	6582250.84	466532.08	3		009 – looking in 010 – looking in from boundary	Felled Glue gum – potential candidate H however may not have been a very healthy tree based on size of hollow throughout trunk. 10m incursion into EZ of 2 nd order stream.
	277	6582206.65	466503.64	3		011 – on boundary looking in 015 – from boundary looking out	Brush box felled into EZ of 3 rd order stream, incursion of approximately 15m
	279	6582207.24	466481.76	3		016 - boundary	Photo of EPA officer standing on boundary
FURTHER OBSERVATION:							

Figure 11: Images from stream exclusion zone assessment



Potential candidate H tree, spotted gum, felled across exclusion zone boundary



Tree head of large Brush box, felled across exclusion zone boundary

CONDITION RELATED TO EEC EXCLUSION ZONES – PROTECTION

Condition No. and detail	Compliant? Yes/No/ Not determined/Not Applicable	Number of non- compliance (sample size & unit)	Action required by licensee
<p>Section 118A, 118D NSW National Parks and Wildlife Act 1974</p> <p>188A - Harming or picking threatened species, endangered populations or endangered ecological communities</p> <p>118D - Damage to habitat of threatened species, endangered populations or endangered ecological communities</p> <p>Subtropical Coastal Floodplain Forest EEC</p>	<p>Not determined</p>		

Comment and Evidence

EPA officers were unable to determine the protection of the EEC exclusion zone boundary as no logging had occurred in the area adjacent to the exclusion zones in Compartment 1.

CONDITIONS RELATED TO ROAD CROSSINGS AND DRAINAGE FEATURES – 5 & 30 DRAINAGE

Condition No. and Detail	Compliant? Yes/No/Not determined/Not applicable	Number of non-compliance and (sample size)	Action required by licensee
<p>Schedule 5 – Environment Protection Licence I. ROAD CROSSINGS WITHIN 30 METRES OF DRAINAGE FEATURES 37. Roads must be drained using a crossbank, relief pipe, spoon drain or mitre drain between 5 metres and 30 metres from a watercourse, drainage line, wetland or swamp crossing. This distance must be measured from the top of the bank of the incised channel, or where there is no defined bank, from the edge of the channel.</p>	<p align="center">Yes</p>	<p align="center">0/4</p>	

Comment and Evidence

EPA officers inspected four crossings as part of this audit, as shown in Figure 13.

These crossings were all functioning properly and had been constructed in accordance with licence condition **I. Road crossings within 30 metres of drainage features** and was therefore compliant with this condition.

(1) Crossing E

Upstream



Downstream



Left approach



Cross fall to table drain

Cross bank at 10m

Right approach



Cross bank at 26m

(2) Crossing F

Upstream



Downstream



Left approach



Cross bank at 17m

Right approach



Cross bank at 14m

(3) Crossing CP-G

Upstream – inlet appears to have been filled in

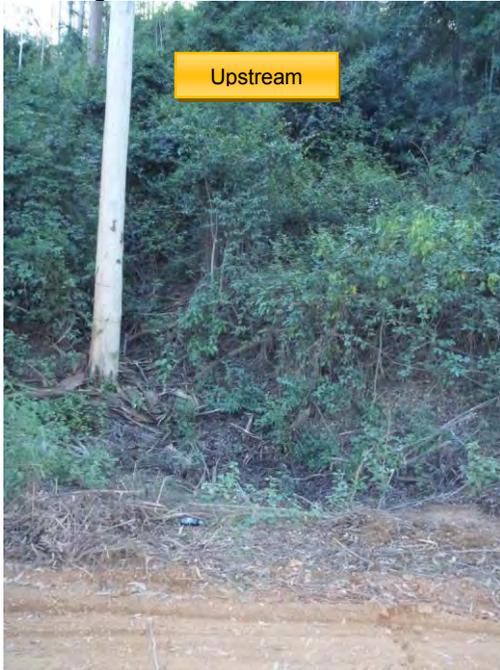


Downstream



Unable to locate outlet

(4) Crossing H



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CONDITIONS RELATED TO PROTECTION OF THE ENVIRONMENT OPERATIONS ACT – SECTION 120(1)

Condition No. and Detail	Compliant? Yes/No/Not determined/Not applicable	Number of non- compliance and (sample size)	Action required by licensee
Protection of the Environment Operations Act 1997 Section 120 Prohibition of pollution of water ¹⁾ (1) A person who pollutes any waters is guilty of an offence.	YES	0/4	

Comment and Evidence

EPA found FCNSW complied with this condition at all four crossings located E, F, G and H. All crossing observed did not pollute waters at the time of the audit.

FURTHER OBSERVATIONS TABLE – COLLOMBATTI STATE FOREST, COMPARTMENT 1, 2 AND 82

These are matters that were recorded during the field investigation but relate to conditions outside the audit scope

Details of matter	Compliant? Yes/No/Not determined/Not applicable	Risk Code	Recommendation
Fallen E tree (Spotted gum) waypoint 253, observed within Transect 1 Plot 1	No	Yellow	Develop an action plan to ensure this doesn't occur in future operations

Comment and Evidence

All marked trees should be protected from damage by logging machinery. It could be assumed this is accidental damage, however the tree is clearly marked so the operator should have seen the marking and ensured the tree was protected. Tree retention condition 5.6 (g)(iii) of the Threatened Species Licence states; At least six eucalypt feed trees must be retained in every two hectares of net logging area where they occur. Where a retained eucalypt feed tree also meets the requirements of a hollow-bearing or recruitment tree, the eucalypt feed tree can be counted as a hollow-bearing or recruitment tree.



Pushed over marked E tree, spotted gum

ACTION PLAN – COLLOMBATTI STATE FOREST, COMPARTMENTS 1, 2 AND 82

Condition No.	Number of non-compliances	Action Details	Non-compliance Code*	Target/Action Date
5.6(e)	2	<u>R Selection</u> An action plan must be developed and implemented to ensure that recruitment trees are retained across the compartment having as many of the characteristics listed in TSL condition 5.6e i-v, and consistent with the requirements of the R tree definition.		
5.6(h)i	2	<u>H & R Protection</u> An action plan must be developed and implemented to ensure that all marked H and R trees are protected in future operations in line with condition 5.6h(i)		Immediately
5.6(h)ii	1	<u>H & R Protection</u> An action plan must be developed and implemented to ensure that all marked H and R trees are protected from machinery during future operations in line with condition 5.6h(ii)		
5.1(f)	1	<u>Operational requirements – HCVOG boundary field mark up</u> An action plan must be developed to ensure exclusion zones are marked in the field according to TSL requirement 5.1F.		
5.6(h)ii	N/A	<u>Feed tree protection – further observation</u> Pushed over marked E tree - An action plan must be developed and implemented to ensure that all marked H and R trees are protected from machinery during future operations in line with condition 5.6h(ii)		
Total	6			

Attachment 2: Risk Assessment of Non-compliance

The significance of any non-compliances identified during the audit process are categorised according to the Risk Matrix below. The risk assessment for any non-compliance involves assessment against two criteria: the likelihood of environmental harm occurring and the level of environmental impact.

	Likelihood of Environmental Harm Occurring			
		Certain	Likely	Less Likely
Level of Environmental Impact	High	Code Red	Code Red	Code Orange
	Moderate	Code Red	Code Orange	Code Yellow
	Low	Code Orange	Code Yellow	Code Yellow

Risk matrix for determining the risk assessment code.

- a code red risk assessment denotes that the non-compliance is of considerable environmental significance and therefore must be dealt with as a matter of priority.
- a code orange risk assessment denotes a significant risk of harm to the environment however can be given a lower priority than a red risk assessment.
- a code yellow risk assessment indicates that the non-compliance could receive a lower priority but must be addressed.

There are also a number of licence conditions that do not have a direct environmental significance, but are still important to the integrity of the regulatory system. These conditions relate to administrative, monitoring and reporting requirements. Non-compliance of these conditions is given a blue colour code.

The colour code is used as the basis for deciding on the priority of remedial action required by the licensee and the timeframe within which the non-compliance needs to be addressed. This information is presented in the action program alongside the target/action date for the non-compliance to be addressed.

While the risk assessment of non-compliances is used to prioritise actions to be taken, the EPA considers all non-

ATTACHMENT 3: AUDITEE SUBMISSION AND NSW EPA RESPONSE

EPA Condition / Audit finding reference / page No.	EPA finding / risk categorisation	Location – description, GPS	FCNSW evidence submission	EPA final finding / risk categorisation	EPA response to FCNSW submission
5.6 e) (TSL)	Not Compliant / Code yellow	Various	<p>With regard to the alleged non-compliance with condition 5.6 e). When marking trees for recruitment tree retention, FCNSW must consider retaining trees with as many of the characteristics as possible. Selecting trees from a cohort with the largest DBHOB is only one of these characteristics, and cannot be treated in isolation to other characteristics.</p> <p>The data presented by the EPA is not evidence of non-compliance to this condition, and so FCNSW request that these two alleged non-compliances be withdrawn.</p> <p>FCNSW would like to opportunity to discuss recruitment tree selection and retention with the EPA to align the implementation of these conditions. This could be conducted prior to your next audit of our operations.</p> <p>FCNSW will continue to conduct pre harvest Quality Assurance Audits to monitor compliance of retained tree conditions.</p>	Not compliant / Code yellow	<p>EPA doesn't consider size (cm DBHOB) of trees in isolation. It is a key element when determining compliance with the recruitment tree selection criteria but not the only element considered. All elements are consider and size is a key element. If a key element of the criteria is missing and missing multiple times then the selection of R trees is more likely to be determined as a non compliance.</p> <p>The audit data shows a consistent pattern of cut stump diameters being larger than selected R tree diameters and retained and selected R trees belonging to a cohort of trees with a smaller DBHOB. This audit evidence was used to determine the level of compliance with the condition. This evidence was</p>

					<p>used and a non-compliance was determined.</p> <p>The data presented by EPA audit demonstrates a clear comparative difference in cohort with up to a 20cm DBHOB difference between harvested trees and marked R trees.</p> <p>EPA written and photographic audit evidence of the trees and stumps in question.</p> <p>EPA retains its draft audit finding in the final audit report.</p>
5.6 h i) and ii)	Not Compliant / Code orange		<p>FCNSW undertakes quarterly audit inspections on harvesting operations. Since this audit the intensity on this issue of protection of retained has increased. FCNSW audit minimum standard is 10 X 1ha plots per quarter. The performance standards for H, R, E are:</p> <ul style="list-style-type: none"> • <u>% Retained trees with debris</u> <p><10% = Acceptable 10-20% = Poor >20% = Very poor</p> <p>These results have bearing on the harvesting crews KPI's.</p> <p>Results from Collombatti where. Total of 58 trees checked 3 with damage and 5 with debris which gives a performance standard of 13.7% this equates to a performance value of poor FCNSW agrees that your findings of 3/11 trees with debris or damage. This equates to a performance standard of 27.2%</p>		<p>These performance standards are set by FCNSW.</p> <p>Accumulating logging debris is relevant to each individual retained tree. If it impracticable to minimise the logging debris around an individual tree because of its location or natural access, then the TSL provides clearance for that and the EPA accounts for that accordingly.</p> <p>Percentiles are not an</p>

			<p>which gives a performance value of very poor. However FCNSW feels that 2x 1ha plots does not give a true reflection of the total harvested area. FCNSW will continue to work with its contractors and harvesting staff to work towards achieving full compliance. FCNSW would welcome an opportunity to discuss the management of debris around retained trees in the field as 100% compliance is operationally difficult to achieve.</p>	<p>appropriate measure or element of the TSL condition.</p> <p>Percentiles are not part of the TSL condition, they don't exist in the TSL, and shouldn't be used to assess compliance with this condition. This is a compliance audit and only licence conditions are used for audit criteria. Only the elements of the TSL is used to determine compliance.</p> <p>It is concerning that there appears to be an acceptance of non compliances with this TSL condition. It is concerning that there is an acceptance that up to 10% of marked and retained H & R resources is afforded not to be protected.</p> <p>It is particularly concerning that this acceptance is in regrowth forests like Collombatti SF where the resource as in this forest is very scarce. At Collombatti SF, there were 4 H trees found in 2 ha of random area assessed. Therefore it percentiles are accepted, some of these scarce resources are likely to have</p>
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					<p>their longevity cut short.</p> <p>In this case, it means that the spread of habitat resource across the forest landscape is even more few and far between. With the retention of smaller R trees, the time gap between obtaining suitable hollow bearing tree replacements widens. Combined with the acceptance of inadequate tree protection, it will reduce the biodiversity values of a forest and not uphold the values of ESFM.</p> <p>This is an emerging issue in this IFOA region. The level of non compliance and the extent of non compliance and environmental risk appears to be aggravated by the intensity of 'regenerative harvesting', the incidence of high basal area reductions, the harvesting of trees belonging to the largest size cohort and harvesting from boundary to boundary. These factors combine to significantly increase logging debris on the forest floor and increase the risk of harm to</p>
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					<p>retained hollow bearing and recruitment trees from fire.</p> <p>The EPA will continue to focus compliance and regulatory work on this protection priority</p> <p>EPA retains its draft audit finding in the final audit report.</p>
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