

COOMA-MONARO SC COMPREHENSIVE KOALA PLAN OF MANAGEMENT

KOALA MONITORING PROGRAM –PHASE 1 INTERIM REPORT
May - July 2016



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Fieldwork was undertaken by Emily Fishpool, Rob Summers and Mark Lems (contractors), Luke McLachlan, Debbie Hunt and Chris Allen (Office of Environment and Heritage) and James Fitzgerald. Accommodation for the fieldworks was provided by Fran Robertson and a campsite by James Fitzgerald.

Project Aims

The aims of the 2016 Southern Tablelands koala monitoring program were:

1. To commence the koala monitoring program for the Southern Tablelands koala population as recommended by the draft Comprehensive Koala Plan of Management (CKPoM) for the Cooma-Monaro LGA (Martin and Phillips 2015)¹.
2. To undertake a preliminary assessment of the extent and severity of dieback of the preferred koala browse species *Eucalyptus viminalis* in the assessment area.

BACKGROUND AND INFORMATION

Management Plan and Project Funding

The koala monitoring reported here was initiated by the Steering Committee established by the Snowy Monaro Shire Council to guide the development and implementation of a Comprehensive Koala Plan of Management for what is now, with the recent amalgamation of three local councils, the north eastern part of the shire.

The Draft CKPoM recommends: a) a baseline occupancy rate is calculated from the results of the Habitat Study that underpins the CKPoM (Allen 2015)² and; b), a three yearly-reassessment of koala occupancy rates is undertaken at no less than 50 randomly selected macro field-sites from the 186 originally sampled in the study.

Numeralla focus

The monitoring project reported here was undertaken in the Numeralla area. This area was selected, primarily because the dieback of one of the main koala browse species (*E. viminalis*) was reported from localities in this part of the region and little is known about this threatening ecological process, including its potential threat to the carrying capacity of koala habitat.

The dieback appears to have spread from the west where almost all *E. viminalis* in an area of approximately 2000 km² is either dead or severely affected (Ross and Brack 2015)³. The dieback is always associated with the presence of the eucalypt weevil (*Gonipterus* sp.).

¹ Alison Martin and Dr Stephen Phillips (2015). Cooma-Monaro Comprehensive Koala Plan of Management (CKPoM). <https://www.cooma.nsw.gov.au/421/DRAFT-Comprehensive-Koala-Plan-of-Manage>

² Chris Allen (2015). *Cooma-Monaro Local Government Area -Koala Habitat Study. Towards a Comprehensive Koala Plan of Management for North East Monaro*. Office of Environment and Heritage. PO Box 656 Merimbula NSW 2550.

³ Catherine Ross & Christopher Brack (2015). *Eucalyptus viminalis* dieback in the Monaro region, NSW. Crossmark. DOI: 10.1080/00049158.2015.1076754 pages 243-253. Publishing models and article dates explained Accepted: 11 Jun 2015. Published online: 16 Sep 2015. <http://www.tandfonline.com/doi/abs/10.1080/00049158.2015.1076754?journalCode=tfor20>

Because of the above information the Steering Committee guiding the development of the CKPoM recommended the dieback of *E. viminalis* be included as a threat to the Southern Tablelands koala population in the Plan.

An additional reason to target this part of the study area was that fuel reduction burning was undertaken in two areas subsequent to the original assessment and the monitoring provided the opportunity to assess whether any significant changes in koala occupancy in and near to the burnt areas had occurred.

Changes to data collection

Since the time when the fieldwork for the Habitat Study was undertaken in 2011-13, data collection at grid-sites and some aspects of the database holding RG-bSAT data gathered in SENSW have been changed. These changes include:

1. Data is now electronically recorded in the field;
2. Each tree is allocated a canopy health score (1-5) so that a general health score for each species sampled and all the overstorey species at the site can be recorded and changes over time monitored.
3. Fuel hazard levels at each site are estimated following guidelines in *Overall Fuel Hazard Guide* (Edition 3)⁴ to assist with fire planning.

Work undertaken by the the Institute of Applied Ecology (University of Canberra)

Subsequent to the completion of the draft CKPStaff at the Institute of Applied Ecology (Canberra University) have developed a tool *I koala* that links the database to the statistical analysis package *R* to enable a range of analyses of the koala's tree species and size class preferences to be automatically generated.

In addition, Gruber and Aalmack (2016)⁵ undertook analyses of grid-site data from the SENSW coastal forests to assess the probability to detect a simulated trend between sampling periods. In this analysis *occupancy rate* is simply the proportion of grid-sites with koala pellets compared with the number assessed.

Based on these analyses and those from more recent fieldwork results the Institute are also upgrading *ikoala* so that reports can also be automatically generated that analyse changes in occupancy rate data and the confidence levels that can be attributed to these changes in SENSW koala study areas

Contractors

The contractors engaged to undertake the site assessments were mainly the same as those who undertook most of the fieldwork for the Habitat Study⁶.

Project Objectives

The objectives of the project were to assess:

1. A minimum of 20 randomly selected macro field sites in the central (Numeralla and adjacent areas) part of the study area using the RG-bSAT method and analyse the results try to discern changes in koala occupancy rates and koala distribution.

⁴ *Overall Fuel Hazard Guide* (Edition 3) (1999). Department of Natural Resources and Environment, Fire Management Branch 250 Victoria Parade East Melbourne, Victoria 3002.

⁵ Bernd Gruber and Aron Aalmack 2016. *Draft: Report to inform the sampling effort of the Koala monitoring programme around Bega*. Institute of Applied Ecology. Canberra University.

⁶ Allen (2015) *Koala Habitat Study*.

2. The extent and severity of *E. viminalis* dieback both at the survey sites and other patches encountered by the survey team in the field surveys, and whether the eucalyptus weevil (*Gonipterus* sp.) was present at the dieback sites.
3. Fuel hazard levels at grid-sites to assist with fire planning.

METHODS

Site selection

Fieldwork for the Habitat Study assessed grid-sites at 500m intervals across parts of this locality. In this survey, grid-sites that were at the 1km UTMS coordinates on the 1:250000 Land Information topographical maps were selected for survey.

Field site assessment methods for koala evidence

The assessment method at each field site was the same as described in Allen (2015)⁷. Briefly, the centre tree of each previously assessed site was relocated if possible and this tree and the nearest 29 live trees over 150mm dbh were searched for evidence of koalas, including the leaf litter within 1m of the trunk of each tree. If the centre tree was not relocated the nearest tree to the planned Eastings and Northings was selected.

Assessing dieback extent and severity

Dieback severity was scored for each tree at each field site using the assessment method in Stone (1996)⁸. Where evidence of dieback of *E. viminalis* was encountered en route to field sites the locations and a visual estimate of its extent were recorded.

Data analysis

The information gathered in the field (see Addendum 1) was entered into the koala database managed by OEH. This stores koala site occupancy and activity level data, as well those concerning the koalas' trees species and size class preferences that have been gathered in SENSW in the past decade.

Comparative occupancy rates were calculated following the approach developed by Gruber and Aalmack (2016)⁹ by comparing the numbers of replicated sites where koala pellets were found in each survey period.

Average activity levels (ie the percentage of trees at each site with koala pellets) for the same cohort of sites assessed in each period were also calculated.

RESULTS

Grid-site selection and assessment

Site selection capacity was limited to some extent by failure to obtain landholder permission to access areas where grid-sites occurred.

Twenty four grid-sites that had been assessed in 2011-13 were surveyed. An additional five sites in the Coornarthra Nature Reserve that had not previously been surveyed were assessed, primarily to inform decision-makers considering whether parts or all of the Reserve should be designated as an Strategic Fire Advantage Zone (SFAZ).

The locations of the sites assessed and their activity levels in each period are shown in Figures 1 & 2.

⁷ *Ibid*

⁸ Cristine Stone (1996). The role of psyllids (Hemiptera: Psyllidae) and bell miners (*Manorina melanophrys*) in canopy dieback of Sydney blue gum (*Eucalyptus saligna* Sm.) *Austral Ecology*. Volume 21, Issue 4 December 1996. Pages 450–458.

⁹ Gruber and Aron Aalmack 2016. *Report to inform the sampling effort of the Koala monitoring programme*.

Figure 1: 2011-13 Activity-level results for grid-sites in the Numeralla area replicated for survey in May-June 2016

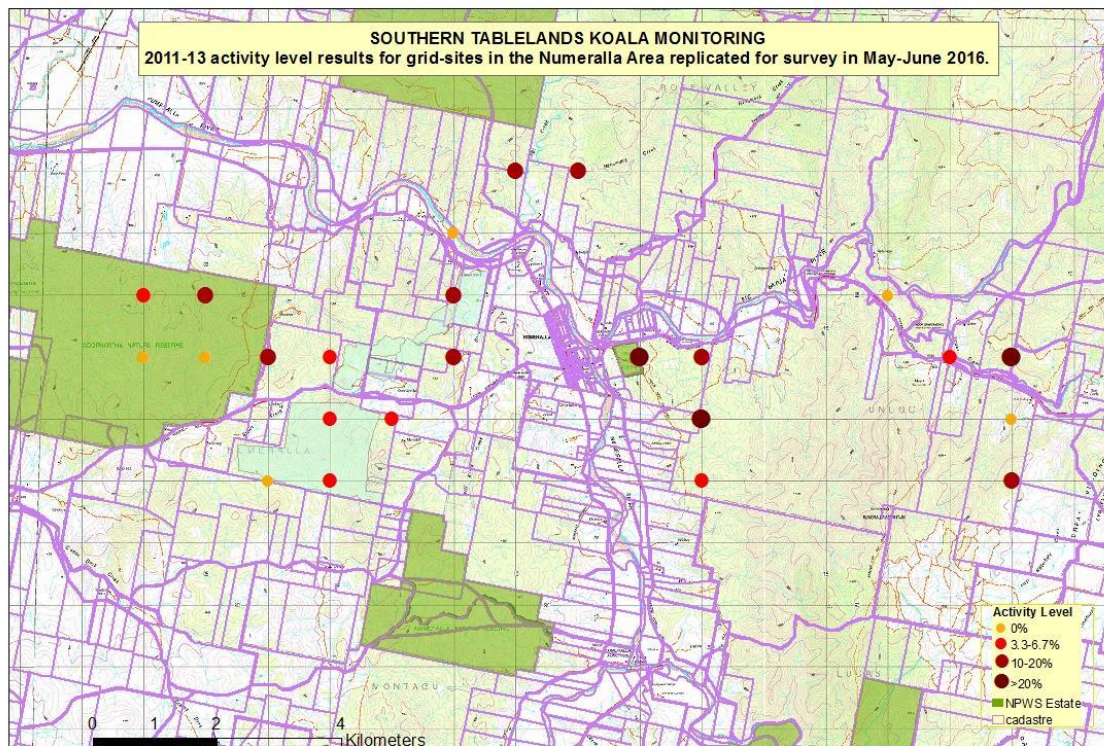
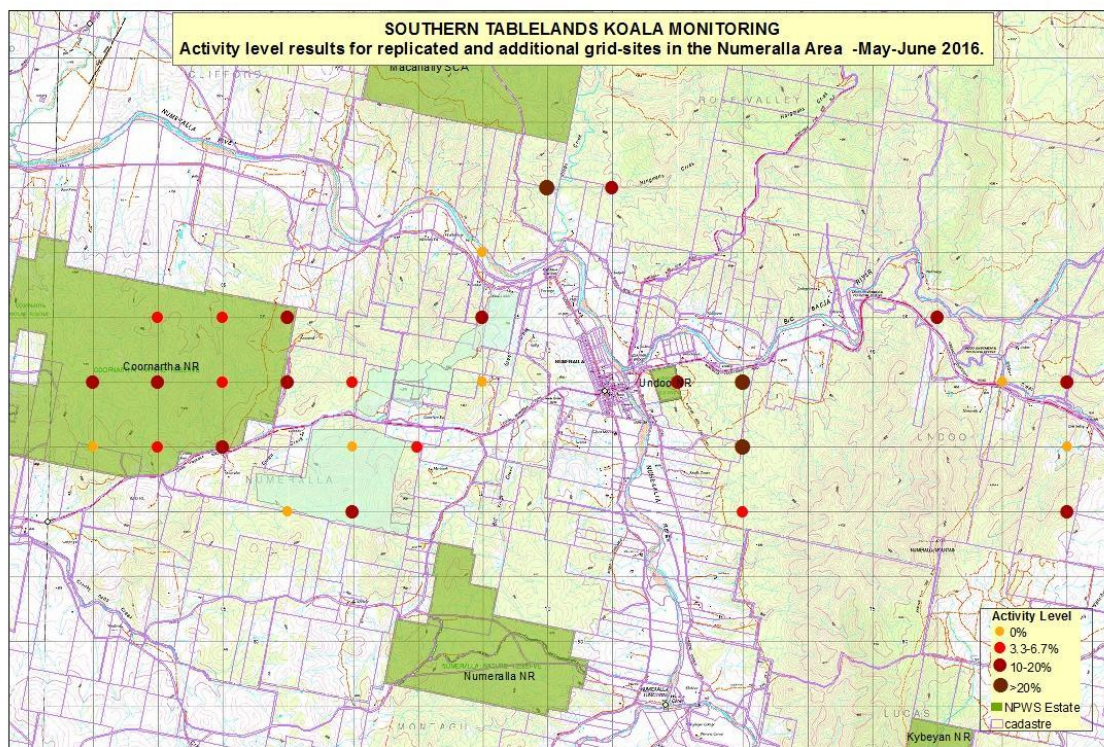


Figure 2: Activity-level results for replicated and additional grid-sites in the Numeralla area



Comparative occupancy rates and activity levels

Table 1: below provides the details of the sites, their results and a comparison in occupancy rates and activity levels of the sites assessed in the two periods.

Location ID	P_EASTING	P_NORTHING	A_LEVEL		DATE SURVEYED	
			Period 1	Period 2	Period 1	Period 2
144964	704000	5994000	0.0%	10.0%	19-Jan-12	23-Jun-16
144966	704000	5995000	3.3%	3.3%	19-Jan-12	2-Jun-16
144966	705000	5994000	0.0%	3.3%	23-Apr-11	24-Jun-16
148250	705000	5995000	10.0%	6.7%	18-Nov-11	23-Jun-16
151528	706000	5992000	0.0%	0.0%	28-Oct-11	22-Jun-16
151532	706000	5994000	16.7%	10.0%	13-May-11	3-May-16
154812	707000	5992000	3.3%	16.7%	11-Aug-11	22-Jun-16
154814	707000	5993000	3.3%	0.0%	28-Jul-11	3-May-16
154816	707000	5994000	6.7%	3.3%	11-Mar-11	4-May-16
158098	708000	5993000	6.7%	3.3%	28-Jul-11	17-May-16
161384	709000	5994000	20.0%	0.0%	24-Feb-11	4-May-16
161386	709000	5995000	10.0%	10.0%	2-Dec-11	24-Jun-16
161388	709000	5996000	0.0%	0.0%	13-Mar-13	30-Jun-16
164673	710000	5997000	20.0%	26.7%	4-Mar-13	6-May-16
167955	711000	5997000	13.3%	13.3%	21-Mar-13	5-May-16
171233	712000	5994000	33.3%	10.0%	4-Apr-13	5-May-16
174514	713000	5992000	3.3%	3.3%	12-Mar-13	29-Jun-16
174516	713000	5993000	30.0%	23.3%	12-Mar-13	18-May-16
174518	713000	5994000	20.0%	23.3%	9-Jul-11	18-May-16
184371	716000	5995000	0.0%	10.0%	29-Sep-13	20-May-16
187653	717000	5994000	3.3%	0.0%	16-Oct-13	20-May-16
190933	718000	5992000	10.0%	20.0%	24-Aug-13	24-Jun-16
190935	718000	5993000	0.0%	0.0%	24-Aug-13	18-May-16
190937	718000	5994000	43.3%	20.0%	29-Sep-13	18-May-16
Number of grid-sites assessed			24	24		
Number of inactive sites			6	6		
Number of inactive sites			18	18		
Occupancy Rate			75%	75%		
Average Activity Levels			15%	12%		
15 sites	# Active in both periods					
3 sites	# Inactive in both periods					
3 sites	# Inactive in Period 1 and active in Period 2					
3 sites	# Active in Period 1 and inactive in Period 2					

Defoliation and Dieback

Figure 3 maps the canopy health score for all trees at each of the assessed grid-sites, with each tree given a score between 1-5, the total scores summed and expressed as a percentage of the highest possible score for the site.

Figure 3: Canopy health score for all trees at each of the assessed grid-sites.

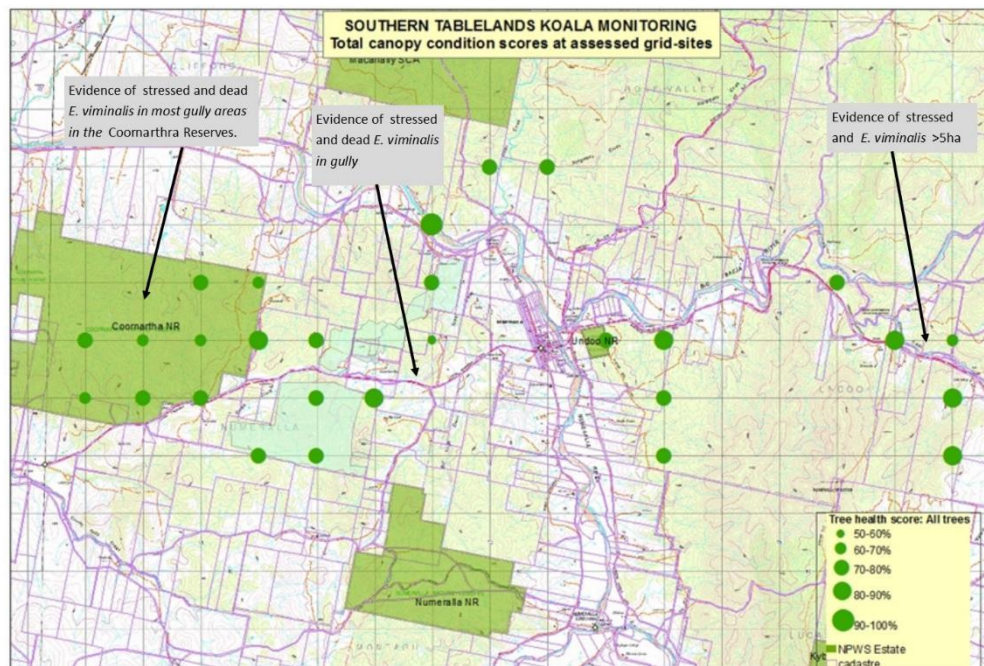
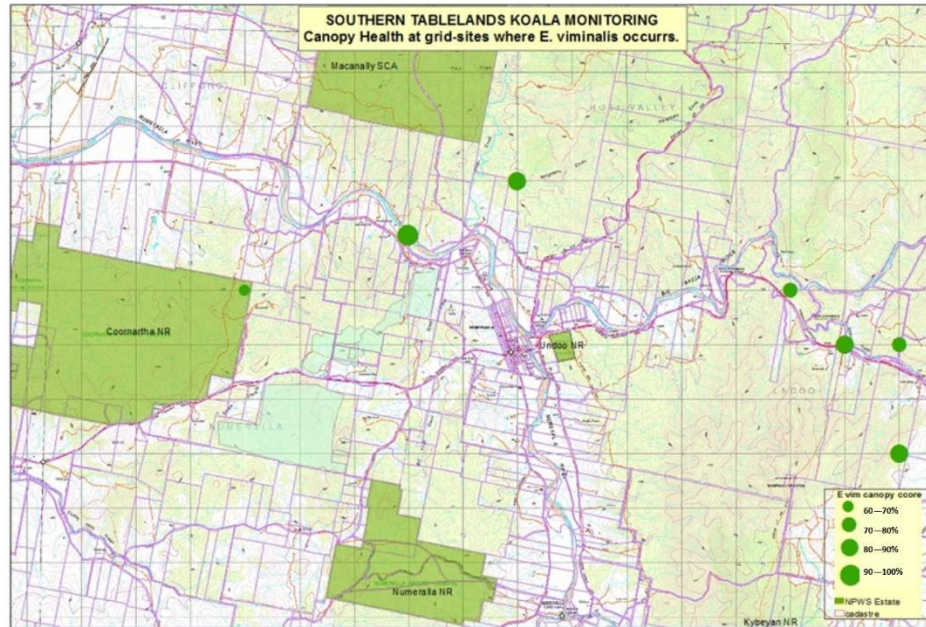


Table 2: shows the canopy health score of *E. viminalis* at each of the grid-sites where this species occurred, expressed as a percentage of the highest possible score for that species at each site. Significant levels of defoliation and dieback of *E. viminalis* was observed at three of the seven grid-sites highlighted below.

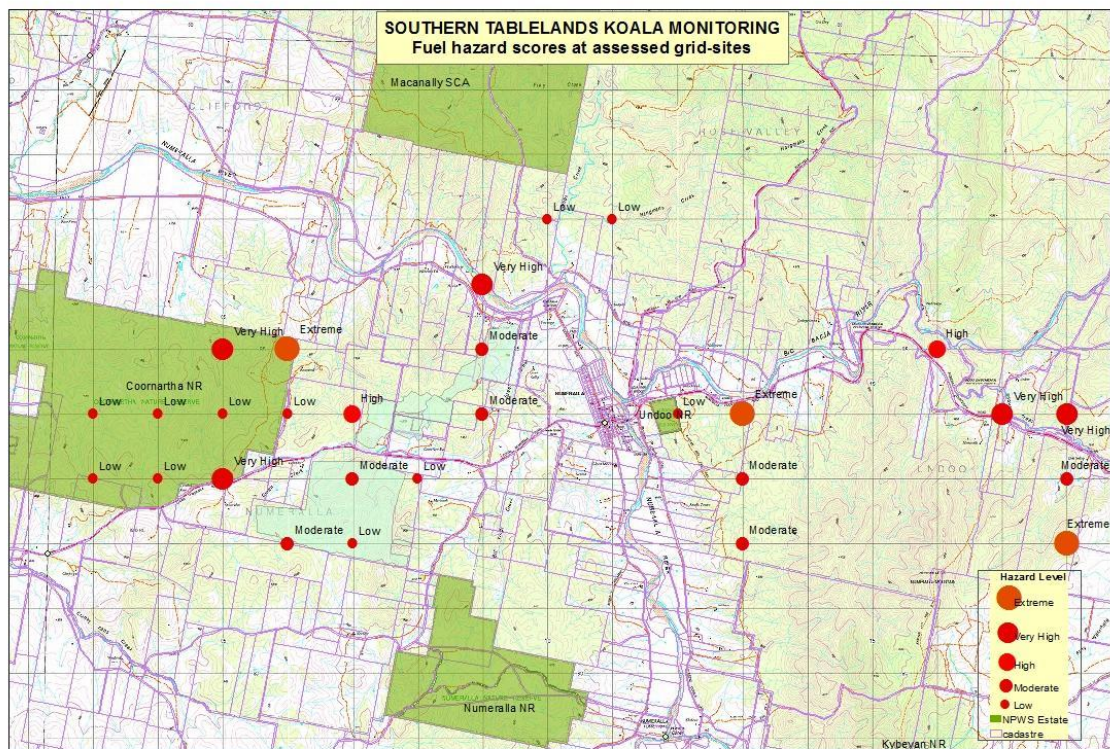
ID	Planned Easting	Planned Northing	Activity level	# Trees Sampled	Total Canopy Score	% Score
373485	709000	5996000	0	30	147	98%
377491	718000	5992000	20	29	125	86%
377528	717000	5994000	0	30	128	85%
373487	711000	5997000	13.33	4	17	85%
376491	718000	5994000	20	5	19	76%
376490	716000	5995000	10	18	68	76%
377526	706000	5995000	13.33	17	57	67%

Figure 4 shows the canopy health score of *E. viminalis* at each of the grid-sites where this species occurred, expressed as a percentage of the highest possible score for that species at each site.



Fuel Hazard results

Figure 5 maps the fuel hazard results at the grid-sites assessed.



DISCUSSION

Number of grid-sites assessed

The Environmental Trust-funded component of this project committed to assessing 20 grid-sites. In fact 24 sites that were assessed in 2011-13 were reassessed in this program. A further five new grid-sites were assessed, primarily to inform fire management planning processes. This was enabled by additional funds from the Office of Environment's Saving our Species program and OEH staff and volunteer assistance.

Given the above the estimated cost of \$500 per grid-site that was estimated in the funding application to Environmental Trust's is insufficient when calculating the true cost of the monitoring program.

Arrangements have been made with the Enhanced Bushfire Management Program to undertake an assessment of additional 20 grid-sites in the areas burnt since the 2011-13 assessment to help inform the monitoring program.

This report will be updated once this fieldwork has been completed.

Additionally provisional arrangements have been with the OEH volunteer program to undertake grid-site assessments in the Black Range/Mt Clifford area, approximately 15 km north of the Numeralla area, in September 2016.

Site selection

Site selection was not entirely random. We did not gain permission from some landholders and so were unable to access some grid-sites that could have been included in the site-selection process.

Additionally we targeted grid-sites where we know that *E. viminalis* occurred. Notwithstanding these factors we did achieve a good geographic spread of sites that were representative of the 2011-13 grid-site activity results.

Occupancy rates and average activity levels

The occupancy-rate of 75% remains unchanged in the two assessment periods, and there is no statistically significant difference in grid-sites activity levels results for these periods. At this stage we are not able to ascertain what the level of confidence can be attributed to these results. However, given that occupancy rates are the highest recorded in SENSW, and that they continue to be so high in this second period of assessment, suggests that the population in this part of the study area is stable and remains one of the most important habitats sustaining the Southern Tablelands population. Given that only one locality has been sampled within the broader study area.

Data will be re-analysed once the additional grid-sites are assessed by the NSWRFs and this report will be updated to include these results.

Ongoing monitoring

Martin and Phillips (2015)¹⁰ recommended the koala monitoring program undertake the re-assessment of >50 grid-sites every three years. However, a preliminary analysis of the SENSW coastal forests koala dataset by Gruber and Aalmack¹¹, which correlates confidence levels with numbers of grid-sites assessed and changes in occupancy by period, suggest that the assessment of 50 grid-sites per annum may be insufficient to gather sufficient data to confidently inform the koala monitoring program as to occupancy trends. Further analyses of both the Southern Tablelands datasets are being undertaken, including the results from grid-sites in both study areas that have been re-assessed. At this stage of the analysis it appears that the reassessment 100-150 grid-sites every three years would be an appropriate target.

In this regard, it may be easier in terms of securing ongoing funding, to develop an annual program that assessed >50 previously-assessed grid-sites each year. In such a program, the study area could be divided into three sections (north, central and south –see Figure 6) with a focus on one section each year. This approach would facilitate the planning, fieldwork logistics and community engagement components of the project.

As was the experience with the monitoring program reported here there will often be a case to undertake grid-site surveys in areas that have not previously been assessed. This is because the study area extends over >100,000 ha and the grid-sites that have been assessed are scattered in clusters across the study area, so there are many parts where little is known about the population and where where management decisions could be informed by grid-site data. Additionally, slowly augmenting the pool of assessed grid-sites will enable greater levels of confidence to be achieved through the monitoring program.

For this reason we should aim for the capacity to assess an additional 10 grid-sites each year, giving a benchmark aim of assessing >60 sites per annum.

The most likely option for funding at least a major part of this program is the NSW Office of Environment and Heritage Saving Our Species program, which is currently considering a budget proposal for monitoring Southern Tablelands koala population. Additionally, the continued contribution by both the NSWRFs and community volunteers to the programs, and the key roles the

¹⁰ Martin and Phillips (2015). Cooma-Monaro Comprehensive Koala Plan of Management (CKPoM).

¹¹ Gruber and Aalmack 2016. *Sampling effort for the Koala monitoring*

agency and community plays in the management of fire in koala areas, would enable the continuation of this important partnership.

Dieback

The results from this study, and anecdotal reports received from local residents in the course of the study, suggest the following:

1. Some *E. viminalis* that are stressed through defoliation have attempted to respond with epicormic growth but these new shoots have died, suggesting that these trees are unlikely to survive.
2. the extent and severity of defoliation, stress and dieback of these trees, though generally only occurring in small patches, is greater than at any time in living memory.
3. These symptoms are worse on the western side of Numeralla than the east.
4. In some areas, particularly along riverine areas the species there is no evidence for tree stress or dieback.

Although we cannot be certain that our observations indicate that the phenomena known as the *Monaro Dieback* has extended into the heartland of koala habitat, the evidence above suggests this is the case. If so, this poses a significant threat to the Southern Tablelands koalas. Although the significance of this species for koalas may sometimes be over-rated there is no doubt that it is one of the most important for this population and its loss could be catastrophic for the population.

In contrast, we also observed stands of *E. viminalis* that were in excellent health and this may indicate a resilience in some patches to the processes that are driving this dieback phenomenon.

Ross and Brac¹² concluded that the dieback did not appear to be associated with fire or grazing regimes, but perhaps with long term climatic trends. That the phenomenon has continued to extend despite the relatively mild and wet seasons that have occurred in the region recently only heightens concern about its long-term potential impacts.

A key recommendation therefore that arises from this study is that the CKPoM Steering Committee convenes a workshop to which its members, Landcare representatives, members of the Aboriginal community, ANU researchers, Greening Australia and NSW agency and council staff are invited. The workshop could address the following:

1. Pooling available information on the causes of the *Monaro Dieback* and current management responses
2. Developing a monitoring program that updates information and reports annually on its extent and severity
3. As a component of 2) above, developing a *Community Watch* program that encourages local landholders to carefully observe and report on the condition of stands of *E. viminalis* and facilitates the efficient recording and mapping of this information.

Fuel load measurement

Fuel-hazard levels at the grid-sites were highly variable (see Figure 5). As expected fuel-hazard tended to be highest at sites that had a high proportion of *E. viminalis* or where a dense shrubby understory was established. Conversely, fuel-hazard levels at most of the gridsites where *E. rossi* and *E. mannifera* predominated were either low or moderate.

The Snowy-Monaro Bushfire Management Committee is currently undertaking a review of the Bushfire Risk Management Plan during which the delineation of Strategic Fire Advantage Zones to

¹² Ross & Brack (2015). *Eucalyptus viminalis* dieback in the Monaro region, NSW.

the west and north of Numeralla will be finalised. The koala survey and fuel-hazard data collected in this study will assist decision-making as to the appropriate location of these zones.

References

- Alison Martin and Dr Stephen Phillips (2015). Draft: *Cooma-Monaro Comprehensive Koala Plan of Management* (CKPoM).
<https://www.cooma.nsw.gov.au/421/DRAFT-Comprehensive-Koala-Plan-of-Manage>
- Bernd Gruber and Aron Aalmack (2016). Draft: *Report to inform the sampling effort of the Koala monitoring programme around Bega*. Institute of Applied Ecology. Canberra University.
- Chris Allen (2015). *Cooma-Monaro Local Government Area. Koala Habitat Study*. Towards a Comprehensive Koala Plan of Management for North East Monaro. Office of Environment and Heritage. PO Box 656 Merimbula NSW 2550.
- Catherine Ross & Cristopher Brack (2015). *Eucalyptus viminalis* dieback in the Monaro region, NSW. Crossmark. DOI: 10.1080/00049158.2015.1076754 pages 243-253. Publishing models and article dates explained Accepted: 11 Jun 2015. Published online: 16 Sep 2015.
<http://www.tandfonline.com/doi/abs/10.1080/00049158.2015.1076754?journalCode=tfor20>
- Department of Natural Resources and Environment (1999). Overall Fuel Hazard Guide (Edition 3) 1999. Department of Natural Resources and Environment, Fire Management Branch 250 Victoria Parade East Melbourne, Victoria 3002.

Addendum: Grid-site data sheet example

KOALA SURVEY USING REGULARIZED GRID-BASED SPOT ASSESSMENT TECHNIQUE (RGB-SAT)										
Recorder	Chris Allen	Date	20/05/2016		Location ID	#N/A	Photo #'s			
Study Area	Southern Tablelands	P-easting	716000		P-northing	5918000				
Tenure	Reserve	S-easting	715992		S-northing	5918000				
Designation	oo Environmental Res	A-level %	10.00	GPS error	5	Soil				
Landholder	Trust	# Koalas	0	Datum:	GDA94	Soil type	Sandy Loam			
Team Members	James Fitzgerald, Mark Lems, Rob Summers, Chris Allen					Soil depth	Moderate			
Access difficulty	Easy	OTHER FAUNA: Pellets; Digs; Observation;				IMPACTS				
Site difficulty	Moderate	Nest; Call; or Mound				Severity 0-3	Est Decade	Obs Type		
Plot radius (m)	25	Macropod	Pellets	BT Possum	Pellets	Fire	0			
Grid (m)	1000	Wombat	Burrow	RT Possum	Pellets	TSI	0			
		L.N Ban'coot		Lyrebird		Intensive log	0			
Crown cover %(>5m)	30	L.N Potoroo		Bell minor		Selective Log	0			
Euc crown cover %	30	YB Glider		Goat	Pellets					
Shrub cover % (<5m)	20	Rabbit	Pellets	Deer	Pellets	% OF CANOPY TREES				
Ground cover %	20	G.Glider		Canine		Dead	20	Mature	70	
Exposed rock %	10	Other				Senescent	0	Regrowth	10	
Overall Condition	Moderate	No of Bandi/Potoroo digs within 5m of CT				Not Myrtacace	0			
Fuel Hazard	Surface Fine Fuel	Near-Surface FF %	SFF& NSFF Combined		Elevated	Bark	Overall			
	Moderate	50	High		Low	Moderate	Moderate			
Trees recorded clockwise on N bearing from centre tree					If uncertain of euc species, sample buds/caps/leaves & photograph					
Tree no.	Tree Species	DBH (mm)	# Stems	Koala Pellets Present?	Pellet age	Tree Health Score	Greater Glider Pellets	Bark Chewing	Comments on tree	
1	Evim	525	1	Yes	Old	4	No			
2	Ediv	184	1	No		3	No			
3	Ediv	533	3	No		5	No			
4	Erub	340	1	No		3	No			
5	Evim	510	1	No		3	No			
6	Evim	461	1	No		5	No			
7	Evim	250	1	No		3	No			
8	Epau	180	1	No		3	No			
9	Epau	470	1	No		3	No			
10	Evim	189	1	No		4	No			
11	Evim	378	1	No		4	No			
12	Evim	221	1	No		4	No			
13	Evim	205	1	No		4	No			
14	Evim	714	1	No		4	No			
15	Evim	687	1	No		4	No			
16	Evim	339	1	No		3	No			
17	Evim	896	1	No		4	No			
18	Epau	279	1	No		1	No			
19	Evim	703	1	Yes	Fresh	4	No			
20	Evim	301	1	No		4	No			
21	Evim	1098	1	No		3	No			
22	Epau	288	1	No		5	No			
23	Ediv	202	1	No		2	No			
24	Evim	189	1	No		3	No			
25	Epau	361	1	No		3	No			
26	Evim	520	1	No		4	No			
27	Epau	218	1	No		4	No			
28	Evim	475	1	Yes		4	No			
29	Epau	234	2	No		4	No			
30	Ediv	790	1	No		2	No			