

**Review of:**

**Technical Report: Kangaroo Management at Northern Lodge (NMIT),  
Eden Park, Victoria**

**Consultancy: EcoPlan Australia Pty Ltd**

**Author: Bryan Walters**

**Title: Zoologist**

**Performance: Shooting of Eastern Grey Kangaroos at Northern  
Lodge, NMIT, Eden Park, Victoria**

**VIC DSE: Due Diligence in Assessment & Compliance Assurance**



**This Review Prepared for: Australian Society for Kangaroos  
September 2011**



**MJADWESCH**

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**ENVIRONMENTAL  
SERVICE SUPPORT**

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This review has been prepared by Raymond Mjadwesch (BAppSci 1994), of Mjadwesch Environmental Service Support. As a Certified Environmental Practitioner the author has demonstrable competencies in his chosen areas of practice (wildlife consulting and impact assessment), and ethical obligations to provide the highest standards in environmental protection, ahead of any sectional or private interests.

The information contained herein is complete and correct to the best of my knowledge. I accept full responsibility for any errors or omissions, however this document has been prepared in good faith and on the basis that neither MESS nor its personnel are liable (whether by reason of negligence, lack of care or otherwise) to any person for any damage or loss whatsoever which may occur in respect of any representation, statement or advice herein.

Signed:

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**Cover:** *Dead Eastern Grey Kangaroo doe, subsequently autopsied (see Appendix 1) and found to have died from having been shot in the leg (photo courtesy N Sutterby).*

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## Limitations

Much of the interpretation of the attributes of the study area has been based on reading and analysis of the 2010 report on Kangaroo Management for Northern Lodge (NMIT), by Bryan Walters (Zoologist), of Ecoplan Australia Pty Ltd. Where Walters (2010) descriptions were inadequate, reference has been made to photos of the site and circumstances as communicated by Ms Nikki Sutterby and Ms Fiona Corke (Australian Society for Kangaroos) and supporting documentation (eg: veterinary autopsy reports, Google Earth images, DSE communications, articles in local newspaper etc).

The author of this review has not visited the site subject to the Walters (2010) assessment and report (Northern Lodge NMIT), but would be pleased to attend the site to conduct independent assessments of kangaroo numbers and vegetation condition, if required.

The author has not attempted to use *WildlifeDensity*, however review of the manual directing its use has formed part of the research which has informed this review.

## Background

The Northern Melbourne Institute of TAFE (NMIT) teaching facility, Northern Lodge, is located at Eden Park, approximately 40km north of Melbourne (Figure 1).

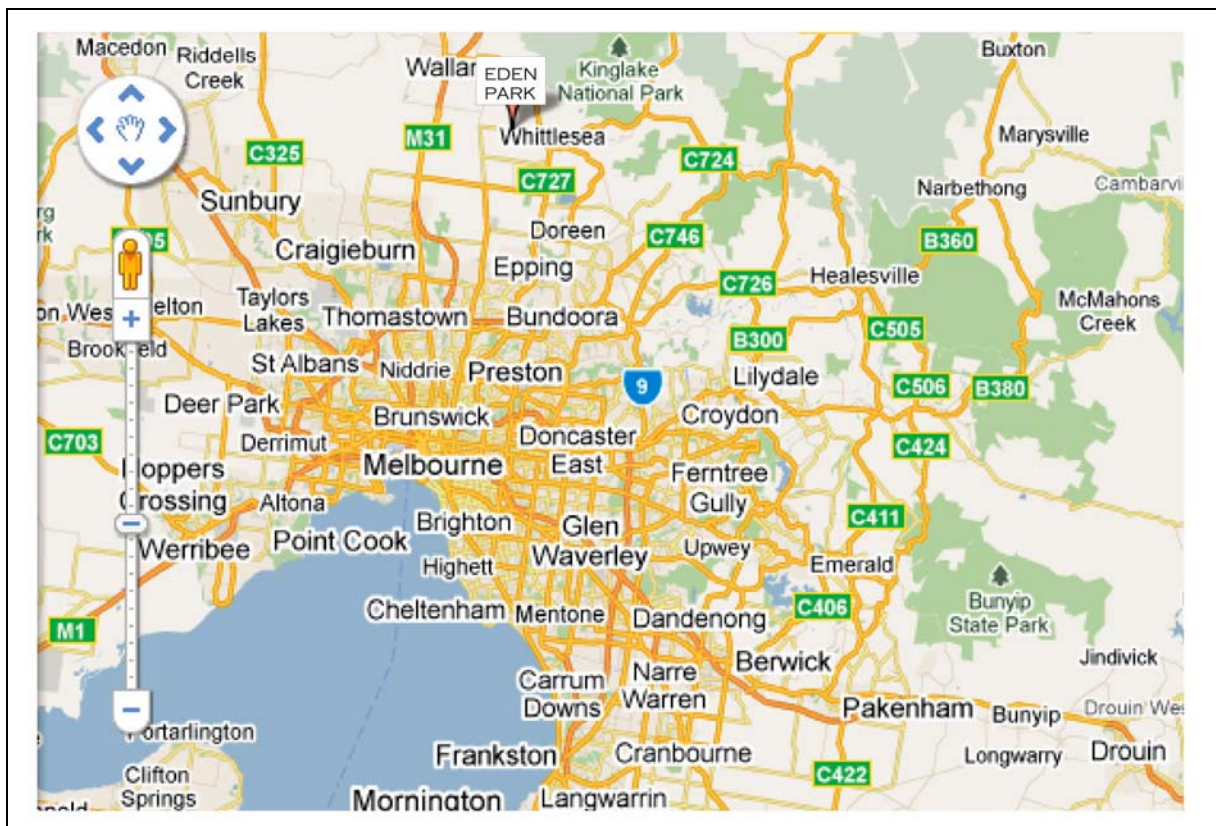


Figure 1. Eden Park Location (Google Maps 2011)

The site is dedicated to thoroughbred (horse) breeding and training, as an education facility attached to the Northern Melbourne Institute of TAFE. 60ha (of a total 320ha) has been prescribed for provision of lush pastures, a 1400m running track and sand roll, with dams, stables and associated equine husbandry, training and study infrastructure. The property has been given as having a value of \$4M (Walters 2010).

A secondary viticulture program is also schooled at the site, including 10ha of vineyards.

In 2010 NMIT sought to control / manage Eastern Grey Kangaroos (*Macropus giganteus*) at the Northern Lodge via application for a permit to destroy (shoot) 300 animals. Victoria's Department of Sustainability & Environment (DSE) subsequently issued an authorisation, and shooting is believed to have commenced in early 2011.

## Definitions & Comments

For the purposes of this review, the NMIT is the proponent; the "activity" is the destruction via shooting of 300 Eastern Grey Kangaroos.

Comments by the author of this review on the content, analysis and conclusions of communications pertaining to the NMIT Eastern Grey Kangaroo shooting program and associated DSE approvals are provided in this review as boxed text. Where additional explanatory information is inserted into cited material it is [bracketed with square brackets] to assist the reader.

## Planning

NMIT engaged Mr Bryan Walters (zoologist consulting as Ecoplan Australia Pty Ltd) in 2010, to conduct a count, and prepare a kangaroo management plan, to support their application to DSE for the destruction via shooting of 300 kangaroos at Northern Lodge.

The Walters (2010) report provides no details of the qualifications held by Mr Walters which would support his selection as a competent advisor to the NMIT, with regard to management of kangaroos at the site.

## Document Review: Walters (2010)

The (first) Background in the Walters report (pp 3) is copied directly from NMIT's web page, describing the attributes of Northern Lodge as they pertain to the keeping and training of horses, and the opportunities for equine studies there. The web site is referenced in text, but this reference failed to be included in the Walters (2010) reference list.

Map 1 on page 3, being captioned "The bushland of Northern Lodge in context with surrounding land use" was not included in the copy of the report provided to the author of this review.

Original text (ie: not copied text, as in the (first) Background on pp 3 discussed above) in the (second) Background (pp 4) of the Kangaroo Management document commences with a number of unsubstantiated statements.

In relation to paddocks which had previously been used for crop production, according to Walters (2010) pp 4:

*These paddocks have been abandoned due to pressure of grazing by kangaroos with no yields for stock for a number of years*

Quantifying the condition of ground-covering vegetation is necessary to substantiate claims such as this. Quadrat based assessment, with application of scores for species cover / abundance (such as Braun / Blanquett 1928) may have provided an appropriate measure by which to justify this statement.

No such justification, such as data over sequential years showing declining or impacted ground cover, is provided, nor is there even a baseline assessment, which could conceivably provide for conclusions that grazing by kangaroos has been detracting from the properties values for stock grazing, and/or cropping. Much less is evidence presented demonstrating long term de-vegetation of grasslands by kangaroos; in fact no evidence of impacts of kangaroo grazing are presented by Walters (2010) at all.

Evidence to support this claim would require studies including “kangaroo grazed”, “horse grazed” and “control (ungrazed)” survey quadrats, replicates of same, and described and repeatable methodologies for measurement of (for example) biomass, cover/abundance and/or species diversity, over time.

In relation to vehicle / horse / kangaroo collisions (according to Walters 2010, pp 4):

*Incidents of vehicle collision and horse / kangaroo interactions add a substantial risk to animals and riders alike*

It is accepted that vehicle / kangaroo collisions places (vehicle) drivers at (low) risk of death or injury, and places kangaroos at *high* risk of death or injury.

Within the Northern Lodge lands, vehicle speeds are unlikely to create a high risk of collisions with kangaroos, unless drivers are driving in a dangerous manner.

Around the Northern Lodge lands, there are advisory signs advising motorists that kangaroos are a potential risk at or around the Northern Lodge site, and the posted speed limit is variably 100km / hr and 70km / hr (*pers comm* F Corke). While placing kangaroo advisory signs and posting lower speed limits may be an effective strategy to reduce the risk to motorists driving in areas where kangaroos occur, this is not NMIT’s responsibility, it is the responsibility of VIC Roads and/or the local Council.

Nonetheless if little has been done to reduce the risks to motorists at the site to date, and if this has been identified as a valid concern, if non-lethal strategies have not been attempted, shooting animals as a first resort to reduce risk is not in accordance with DSE’s recommendations to attempt non-lethal risk management strategies first.

Additional kangaroo advisory signs, lower posted speed limits and driver education would be appropriate initial strategies, if kangaroo collisions with vehicles can be demonstrated to be an issue locally. Sergeant Michael Kayrooz from the Victoria Police driver-training unit provides the following advice for drivers, with regard to kangaroos on the States roads (<http://www.theage.com.au/national/hopping-mad-at-roo-joke-20110202-1aduf.html>):

*...drivers seeing a kangaroo should brake firmly, if you can, in a straight line, and if you can avoid the kangaroo, great.*

No incidents pertaining to vehicle collisions or horse / kangaroo interactions are cited by Walters (2010). As such the conclusion that there are “risks” to either “animals” (horses) or riders, in the absence of any reported incidents, are spurious.

In relation to detrimental impacts of kangaroos on biodiversity values, according to Walters (2010), pp 4):

*A noticeable reduction in natural biodiversity is evident throughout most of the bushland through the grazing of kangaroos*

Quantifying the condition of groundcover, via provision of data over sequential years showing declining or impacted ground cover values, would be necessary to substantiate claims with regard to impacts of kangaroos on vegetation, as a component within a biodiverse environment. Quadrat based assessment, with application of scores for species cover / abundance (such as Braun / Blanquet 1928) and comparative data on species diversity may provide an appropriate measure by which to justify this statement, however nothing is provided by Walters (2010) to this effect.

No such justification is provided, nor even a baseline assessment, which could provide for conclusions that there are any degraded natural vegetation values at the site, much less is evidence provided demonstrating that impacted natural values at the site (if any) are a consequence of kangaroo grazing. Evidence to support this claim in terms of vegetation as a component of total biodiversity would require studies including (but not necessarily limited to) “kangaroo grazed”, “horse grazed” and “control (ungrazed)” survey quadrats, replicates of same, and described and repeatable methodologies for measurement of (for example) biomass, cover / abundance, *and* plant species diversity, over time.

“Natural biodiversity” as referred to by Walters (2010) is a broader category, incorporating all organisms within the environment.

In the absence of the above (systematic and quantified vegetation survey), in the absence of comprehensive wildlife survey, and in the absence of invertebrate sampling (a combination of which may provide a measure of the sites total species diversity), Walters (2010) provides no baseline data on the sites natural biodiversity values, nor evidence of impacts or trends within the assemblages of species resident at the site, nor evidence of kangaroos contributing to impacts (if any) on the sites “natural biodiversity” values.

The Walters (2010) report notes (pp 4) that surrounding land uses (principally small-lot subdivision) has excluded kangaroos. The report goes on to state an unsubstantiated view that the population is:

*...a protected, concentrated and growing population of kangaroos associated with the refuge that the bushland bestows.*

The author of this review accepts that development surrounding the Northern Lodge lands will have excluded kangaroos from occupying many of the surrounding properties. The consequence of this is that the NMIT site is now likely to be supporting a population of effectively isolated kangaroos, which have little or no capacity for dispersal to concomitant habitat areas, other than a small continuation of remnant bushland and open country to the south (see Figure 2).

Enclosed populations however are in no sense “protected”. The Northern Lodge kangaroos remain subject to predation, with foxes being expected in a semi-rural landscape such as that as shown in Figure 2. Foxes have been found to contribute to as much as a 50% reduction in survivorship of emerging pouch young (Banks *et al* 2000):

*Almost half of the females in non-removal sites [this refers to study sites from which foxes were not removed] appeared to lose their young over the period when young were emerging from the pouch.*



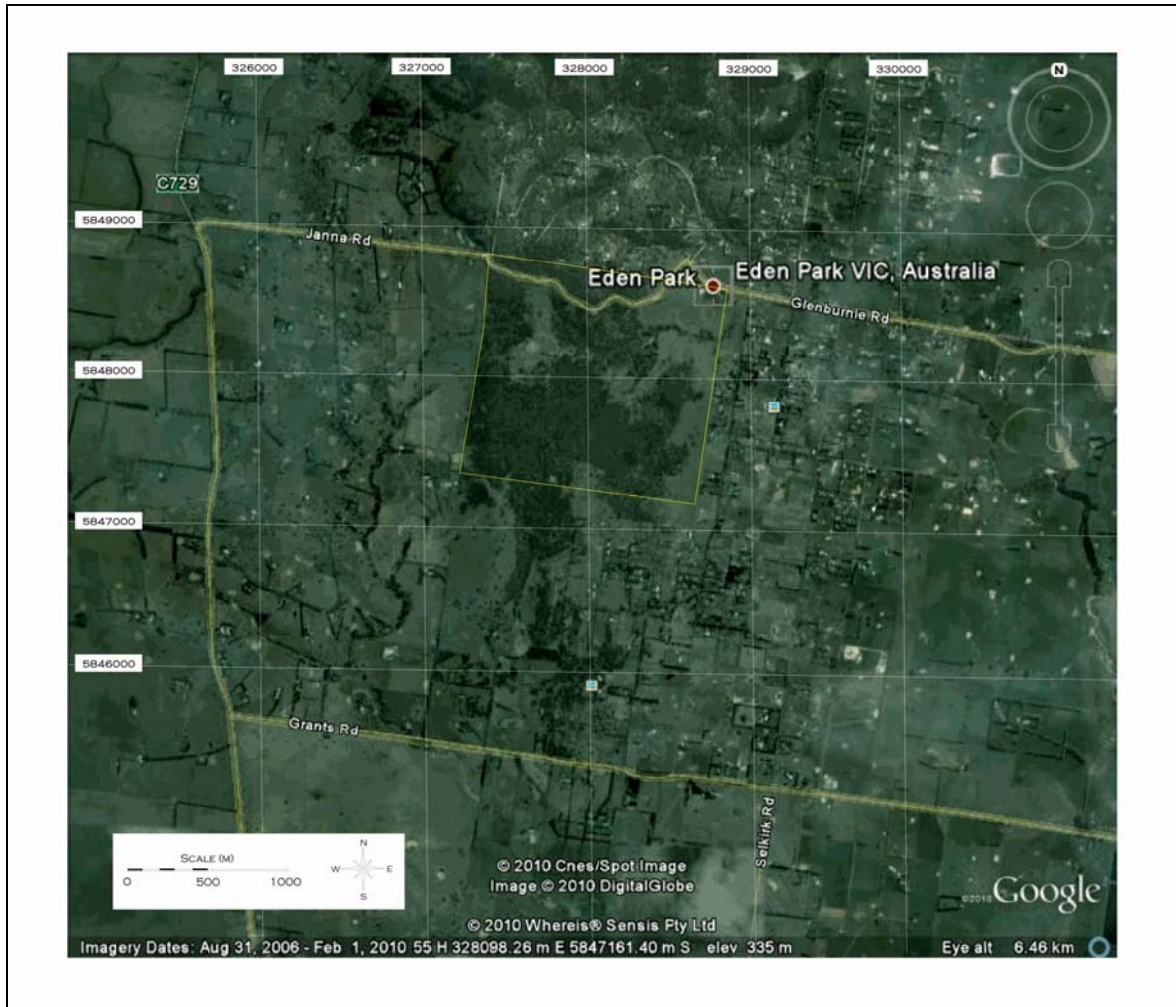


Figure 2. Northern Lodge (yellow outline) and surrounding land use (Google Earth 2011)

In addition fences and roads take a toll on animals which may be attempting to disperse from the Northern Lodge site, or to forage across roads or on the other side of a fence. It only take one error for a kangaroo to fall foul of a fence, and the authors experience with wildlife rescue suggests that being hit by a car, or suffering even a small injury from a misjudged fence crossing (such as a broken foot), almost always results in the death of the animal. Accounts of local residents hitting kangaroos with their vehicles on local roads were included in the community responses to the shooting program at NMIT (discussed below), and local wildlife care organisations would be able to give an account of animals taken from fences and found hit on roads locally.

“Concentration” of animals can occur where development encroaches on a population, and animals are “pushed” into increasingly smaller islands of undeveloped land. Given the development landscape (the study site is surrounded by increasing densities of residential development), it is possible that animals from the surrounding landscape have been increasingly concentrated into the study area.

The pattern of development locally has seen a gradually increasing density of residential dwellings. However land to the east of the Northern Lodge site was subdivided as early as the 1880’s, with residential dwellings allowed on “undersized” lots, subject to planning approval. In the early 1970’s, land to the north and west was zoned Landscape Interest A under the Whittlesea Planning Scheme, allowing 8ha Lots (*pers comm* D Turnbull). Land to the south remains partially wooded, and largely undeveloped.



Given the prior regional landuse being principally agricultural, it is expected that kangaroos occurring around the site (and excluding areas developed for residential purposes) would have been suppressed historically via traditional kangaroo management methods employed in agricultural areas (ie: shooting), as well as being subject to ongoing attrition via fatalities in fences and through vehicle collisions, and through predation by foxes.

In the absence of studies describing the surrounding lands as they have been developed, and quantifying the movement of kangaroos from developed sites into the Northern Lodge lands and the timeframe over which this migration occurred, any claim that the Northern Lodge kangaroo population is “concentrated” however, is made without validation.

Further Walters (2010) provides no evidence of the populations’ “growth” or trajectory. In the absence of detailed and competent counts over consecutive years, and in the absence of any studies of the kangaroo populations’ dynamics, this claim is completely unsubstantiated.

Finally Walters describes how kangaroos have been excluded via development from much of the surrounding landscape, so that they now occupy only a bushland “refuge”. This bushland is given to be unused by horses (Walters 2010 pp 4), and is described as managed for conservation by NMIT (Walters 2010 pp 18). Yet even in this last remaining “refuge”, representing less than 6% of the total area depicted in Figure 2, Walters (2010) recommendations would have the kangaroos destroyed by NMIT. This is an excellent example of how local extinctions can occur.

Walters (2010) goes on to state that:

*The normal means of population control in agricultural areas is through destruction permit issued by the Department of Sustainability and Environment, kangaroos being “Protected Wildlife” under the [VIC] Wildlife Act 1975.*

Given the description by Walters himself of the surrounding area being dominated by “small-lot subdivision” (pp 4), the site hardly qualifies as an “agricultural area”, where managers do often consider that shooting wildlife is an appropriate method of controlling it.

Consideration of the physiology of the surrounding area provides that this is indeed the case. The Northern Lodge site is adjoined in all directions by rural / residential development and small farm holdings (shown in Figure 2 above), and is no longer an area given just to agriculture. The area of lots, including those of 8<sup>th</sup> Street, 9<sup>th</sup> Avenue and 10<sup>th</sup> Avenue to the east of the Northern Lodge lands, are small (1 to 3 acre) holdings, the bushland to the north is dotted with residential dwellings.

The City of Whittlesea Council includes the Northern Lodge lands in their *DRAFT Green Wedge Management Plan* (2010), which, amongst other things, directs management and protection of plant and animal habitats, within the context of the Victorian Governments strategy for sustainable growth, *Melbourne 2030*. The *DRAFT Green Wedge* (2010) aspirational goal for biodiversity (a key theme of the Plan) is “*healthy and enduring ecosystems with a variety of habitats and native species*”. Given Walters (2010) description is of kangaroos contracting to the Northern Lodge “refuge”, protection and conservation of kangaroos in this location must be central to ensuring that a variety of native species, including kangaroos, are able to persist locally.

In addition, discharging firearms in proximity to residential development is irresponsible and poses a clear risk to public safety. Further, shooting wildlife in environments where injured wildlife could flee to sites where further shooting is impossible (unsafe), or to locations where the public (including children) could be exposed to the trauma of severely injured animals, is similarly inappropriate.

Again in this instance Walters (2010) makes reference to legislation, however again this reference does not appear in the reports reference list (pp 20).

Using an unquantified population descriptor (“high”) Walters (2010) concludes (pp 4) that there:

*...would need a substantial reduction to achieve some sort of land-use equilibrium*

The ACT’s Parks and Wildlife Service in 1997 sought to reduce a population of Eastern Grey Kangaroos in Tidbinbilla Nature Reserve, after “high” population densities and deteriorating environmental conditions (reductions in ground covering vegetation) were reported to have resulted in a high rate of mortality in the winter of 1996 (ACT Kangaroo Advisory Committee 1997).

Starting at a density of 367 kangaroos / km<sup>2</sup> in the Reserve, the ACT PWS resolved to shoot 850 kangaroos (interestingly considerably more than would have died as a result of natural mortality in 1997, as reported to have occurred in the winter of 1996), with a *target* density (ie: after shooting) being 200 kangaroos / km<sup>2</sup> (paragraph 100, pp 35 of 82).

Assuming that Walters (2010) population calculation of 710 (+/- 77) kangaroos occupying the Northern Lodge site was correct (which this review does not necessarily accept – see below), the NMIT population density *before* shooting would have been 222 kangaroos / square kilometre. This is proximate to the “target” population density for the ACT PWS kangaroo reduction program, which was derived to minimise mortality as a result of habitat degradation / drought conditions, and to ensure maintenance of biodiversity values in affected habitats, and as being equivalent to the measured density of Eastern Grey Kangaroos in other reserves of the ACT.

Against which measure Walters (2010) has determined that a density of 222 kangaroos / square kilometre is “high” is nowhere defined by Walters, and how Walters (2010) concludes that a “substantial reduction” is required to achieve a “land-use equilibrium”, is nowhere quantified, much less demonstrated as necessary, by Walters (2010).

It is also given (pp 4) that the management report would examine factors which would allow the determination of:

*...population limits for the long-term viability of kangaroos, native vegetation, and the objectives of the education facility.*

The long term viability of the kangaroo population will remain limited by surrounding land uses, and the consequences of a population being isolated from a metapopulation, where exchange of genetic material ensures the continued diversity and viability of the population. Nowhere are these or other factors “examined” by Walters (2010); the kangaroo management plan is uniformly devoid of any detail or analysis.

## Methods: Assessing the Kangaroo Population

Walters (2010) correctly identifies the fact that:

*...the small size of the study area was seen as problematic to using a transect assessment of the population*

Indeed this is the case. In fact the size of the Northern Lodge study area is small enough to conduct an *actual* count.



Using modern technologies, like cameras, GPS and binoculars, allows groups of kangaroos to be photographed, counted and mapped – this is better done at a distance. A large mob occupies Boundary Road Reserve on the outskirts of Bathurst, NSW (pictured) – at the time of a flora and fauna survey in 2008 (Mjadwesch 2008) the highest count of this mob numbered 70.

Using statistics to “calculate” a population introduces variables, which necessarily introduces uncertainty. There are not “710 (+/- 77)” kangaroos resident at Northern Lodge, there is a definite and quantifiable number of kangaroos occupying the site.

Walters consulted with D Morgan (University of Melbourne), and was advised that the proposed transect count methodology and use of *WildlifeDensity* would be appropriate, so long as “transects were assessed on different days” and that “the weather on assessment days would need to be similar” (pp 4-5).

There is no information provided on whether Walters provided to Morgan a plan of proposed transects, which overlap (see below). It would be interesting to find out from Morgan whether *WildlifeDensity* is designed to calculate population densities based on multiple counts of the same kangaroos along overlapping transects.

Again Walters (2010) provides reference in text to *WildlifeDensity*, however once again this reference does not appear in the reports reference list.

Walters (2010) went on to prescribe 3 transects, which provided a reasonably thorough coverage of the site, including a considerable margin of overlap (Transect 2 intersects both Transect 1 and Transect 3 – see pp 7). This has the appearance of a scientific method, with transect proportions having been

“calculated” to reflect proportionally open vs closed habitats, which are given as a ratio of 1:20, and transects being “extended into private land” to provide a sufficient sample size (pp 5).

Walters “team” subsequently did a point / distance count using a range finder, and described habitats.

Names and qualifications of field staff are not provided by Walters (2010). No dates or times of fieldwork are provided. These are simple and critical inclusions which are expected in reports on wildlife surveys.

In addition there are well known and accepted difficulties with conducting surveys of kangaroos on foot, particularly with animals which are not habituated to humans, when kangaroos may startle from distances exceeding 200m, even beyond the distance where the assessor is aware of the animals. From Southwell (1994):

*This problem of reactive movement seriously compromises attempts to estimate population size from [walked] transect counts. [Vehicle based counts are described as suitable]*

Walters (2010) nowhere discusses these factors, neither providing evidence that animals subject to the Ecoplan assessment were habituated to humans and therefore were not flighty, nor, if the kangaroos were not human-habituated, how the Ecoplan assessment ensured that their methodology took this factor into account.

J Baumgartner is given to have provided an application of a population density / modelling package called *WildlifeDensity*.

No details are provided describing Baumgartners’ qualifications or credentials; the reader is unable to determine the appropriateness of Baumgartner conducting said analysis.

#### Assessment of Ecological Vegetation Classes

Walters (2010) describes how vegetation was “checked against profiles given in DSE vegetation descriptions” (pp 6).

Habitat descriptions by competent practitioners generally include at the very least structural descriptions of vegetation encountered during studies, often including dominant species in canopy, shrub and ground cover layers, and in the better reports, including species lists based on quadrat based assessments.

A minimum description or Key to Map 3 should include:

EVC 22: Grassy Dry Forest  
EVC 23: Herb-rich Foothill Forest  
EVC 47: Valley Grassy Forest

A discussion of habitats should include photos of vegetation communities / habitats, and a discussion of the variance which defines the difference (if any) between the mapped (pp 8) “sandstone” and “mudstone” units (in the case of EVC 22), and “var b” and “var c” (in the case of EVC 47).

Walters (2010) does provide further discussion of ecological vegetation classes on pp 13 of his report; this is discussed below.

### Assessment of Land Modification

Walters (2010) describes a “the line of invasion” based on a “50-50 mix of exotic and indigenous plants” (pp 6), and defines exotic grassland areas in Map 4 (pp 9).

With reference to the “exotic grass invasion” which Walters (2010) maps, an indication of which species have invaded, and photos of the exotic grasslands, would provide a reader with some degree of confidence that the field staff were capable of differentiating between native and introduced grass species. No actual evidence of an “exotic grass invasion” is provided by Walters (2010).

With regard to the “50-50” mix, in the absence of species lists and quadrat based vegetation assessment detailing cover / abundance and species composition / diversity, Walters (2010) description as “50-50”, and mapping of an “invaded” landscape, is pure conjecture. Indeed failing to map the vegetation in the “older areas” (stated on pp 6) makes Map 4 completely useless to anyone attempting to appreciate or understand the sites natural vs introduced grassland values.

Walters (2010) pages 7-9 show air photos with assessment transects (Map 2), ecological vegetation classes (Map 3) and the “exotic grass invasion” (Map 4).

No grid references or datum, no scale, no keys and no acknowledgment of sources (for base photos) is provided. These are simple inclusions which are expected to accompany maps in scientific / environmental reports.

### Results

On the basis of observations of 259 kangaroos in the “closed” (bushland) habitat, and 17 kangaroos in the “open” (paddock) habitats, application of the *WildlifeDensity* package provided a couple of very scientific looking pages, with lots of statistical terms and references, including 95% Confidence Limits, Detectability and Conspicuousness Coefficients, Parameters, and an OLS Difference at Minimum.

Use of jargon is a common technique used by consultants, and often prevents members of the public from even questioning “scientists” or the content of “scientific reports”, for fear of appearing stupid.

To assist the reader:

**Confidence Limits** provide a measure of how much one may or may not be able to rely on a predicted or calculated “result” being correct. A 95% confidence limit is one of the most frequently used in statistics, and indicates that there is a 95% chance that the actual result (for example results from a static head-count of kangaroos) will fall within the defined (calculated) 95% confidence limits.

In this case (for example) in the open habitat an Estimated Density of 1.208 kangaroos / hectare is provided (pp 12), however to ensure that the researchers have a 95% chance of being “right” in their calculation, they have suggested that the real density is likely to lie somewhere between 0.632 kangaroos / hectare, and 1.928 kangaroos / hectare (in the “open” habitat). Note that the lowest estimate is *half* of their calculated estimate.



If their methodologies have sufficient rigour and have been applied correctly (which this review does not necessarily accept – see below), and if the *WildlifeDensity* package has been tested under controlled conditions and has been found to work properly (which is likely, given that the University of Melbourne has developed it) this would provide an adequately high degree of confidence in the density calculations. However given 95% confidence limits, in 5% of cases the predicted or calculated results will *still* fall outside of the actual density of kangaroos (for example) in the study area.

**Detectability Coefficients** refer to the visibility of an organism being subjected to research under prevailing conditions. Note that Walters (2010) provides very little with regard to detailed descriptions of conditions at the time of survey (pp 13), other than being “cold and windy”, with “occasional rain persisting” and “sunny breaks”.

**Conspicuousness Coefficients** define the closest distance under which a species starts to be overlooked in survey; *WildlifeDensity* provides a table of pre-allocated values for various species.

Walters (2010) applied variable Conspicuousness Coefficients to the closed and open habitats, being 15.000 and 20.000 respectively. Accuracy’s provided to three decimal places indicate that the researchers are very very very confident that the Conspicuousness Coefficient value for the Eastern Grey Kangaroo is 15 (in closed habitats), and 20 (in open habitats). It is not 14.823 or 15.397 in closed habitats, it is not 19.731 or 20.112 in open habitats, it is 15.000, and 20.000 respectively. This is an interesting application of *WildlifeDensity*, as the Manual does not provide separate Conspicuousness Coefficients for species based on habitat characteristics, nor does it recommend that users of the program apply different values for animals in different habitats. The Manual does provide a Conspicuousness Coefficient for the Eastern Grey Kangaroo however, of **16-23m (20m)**; this is discussed further below, under “Parameter anomalies”.

Walters (2010) correctly includes units (m) in the Table showing this figure for closed habitat (on pp 10), however he does not include units in the Table showing this figure in open habitats (on pp 12). This sort of inconsistency in a scientific report is confusing, and indicative of poor quality assurance.

**Parameters** are all the measureable (input) factors which in combination provide a package such as *WildlifeDensity* with the mechanics on which to base it’s calculations. In this instance these include input variables provided by the researchers, including the amount of time spent in assessment and the distance travelled, topographic factors (shown below to have been input incorrectly), the number of observations, detection / distance data (not provided in the copy of the report this reviewer has been provided), and a few “estimates”.

Recorder errors were introduced into the Walters (2010) data analysis from the start, for example with “Topography” being given as “approximately level” in the closed habitat. Photo 1 (pp 15) provided in Walters (2010) clearly illustrates that the physiology of the bushland sections is anything but “level”; other photos provided to the author by Ms Sutterby and shown in various Whittlesea Leader articles, and Google Earth images, illustrate the same, being a landscape of predominantly undulating to low hills.

Interestingly with parameters, if one input is incorrect (for example topography), this can invalidate the calculation. If multiple input parameters are incorrect, errors compound, and obviously incorrect results can be output. Software does not have a brain – it does what it is programmed to do; a program will not question the validity of input data, nor will it suggest that output data (results) may have been based on incorrect input data. Detecting errors in a methodology, and detecting anomalous results, is usually a job for the researcher.

OLS (Ordinary Least Squares) refers to statistical manipulation (squaring) of the error between model estimates, and actual observations, so that calculated results or extrapolations will “fit” the curve which is produced by graphing actual (observed) data. In this way, by producing an equation which is

“true” beyond observed limits, predictions of a quantity being the object of the calculation (in this case the density of kangaroos within the study area) can be made, by simply querying the total area (not all of which was subject to survey).

To relate this to the researchers work on the ground at NMIT, they observed 276 kangaroos sheltering around the edges of the bushland (259 in the closed habitat, and 17 in the open habitat), via a reasonably thorough inspection of the site. This included assessment of transects which overlapped each other (thereby almost certainly providing multiple counts of the same kangaroos at the same locations – see Figure 3), which data was “added”, and subsequently entered into *WildlifeDensity* calculations.

Application of the OLS allowed the researchers to smooth their errors, and extrapolate their observations of 276 kangaroos, to 710 (+/- 77) kangaroos.

The reader should note that the researchers walked in straight lines, they counted kangaroos when they moved off, and they counted standing groups as they were observed; kangaroos are quite visible, being large animals. The maximum detection distance in the closed habitat is given as 534.4m, meaning that in this habitat (roughly 95% of the site according to Walters (2010) 20:1 ratio of closed to open habitat) a strip up to 1km wide was inspected along each transect.

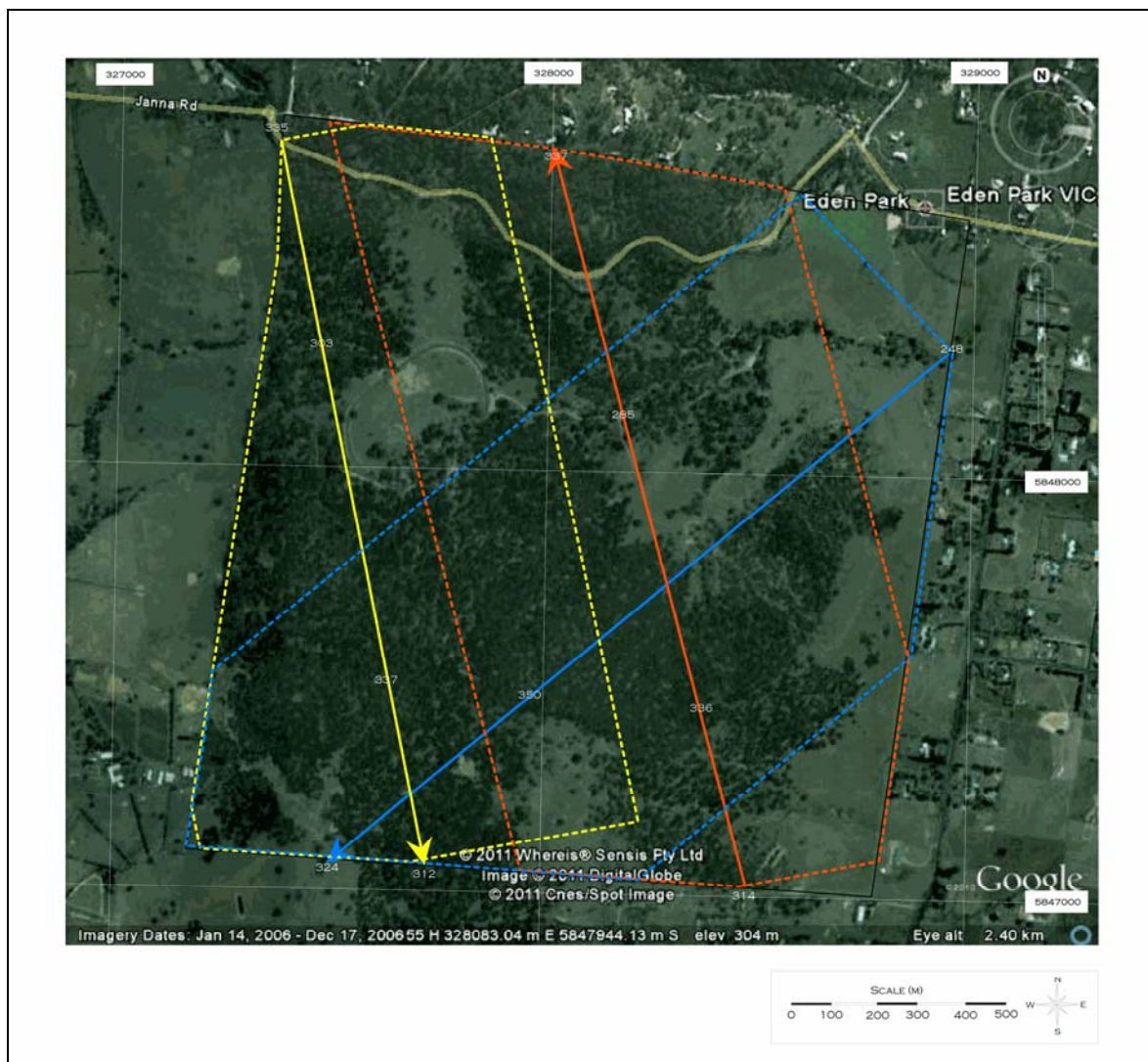


Figure 3. Northern Lodge Transects & Sight Distances (Google Earth 2011)

Dotted polygons in Figure 3 indicate the approximate sight distance to 500m on either side of each transect, shown in Red (Transect 1), Blue (Transect 2) and Yellow (Transect 3). The grid indicated by fine white lines is a 1km grid; start, finish, minimum and maximum altitudes along transects are indicated by white text (in metres).

This clearly shows that visibility to 500m either side of the transect, in habitat described by Walters (2010) as “approximately level”, would have allowed assessors to have visually inspected most of the site by running only Transects 1 and 3, with still a considerable degree of sight distance overlap between these two transects. Transect 2 almost completely overlaps with Transects 1 and 3.

If assessors sighted kangaroos effectively within their field of vision, and conducted their head-count carefully and competently, given the high degree of overlap between transects, it is likely that the 276 observed kangaroos may have even exceeded the total number of kangaroos which occupied the site prior to implementation of the shooting program.

The *Techniques Manual and Users Guide for Wildlife Density* (Melbourne University 2004) provides no clue as to whether it is all right to overlap transects, and add together multiple counts of the same animals for density calculations. The author of this review wonders what density would have been calculated by assessing 10 overlapping transects, “adding” results, and inputting 300 or so group observations of over 1000 kangaroos.

The Manual does provide that the run data presented by Walters (2010) contains many serious errors, however.

1. Both INPUT data logs indicate that observations came from “both sides of transect lines”; consider Figure 3 above.

Transect sight distances to either side of transects do not allow for valid sight distances to both sides of the transects, if a density assessment is being attempted for the Northern Lodge lands. Transect 3 particularly cannot include “west of transect” data for its northern run as anything other than “open habitat” outside of the study area (undoubtedly devoid of kangaroos, unless the researchers scared kangaroos out of the woodland into the adjacent paddocks).

Even as Transect 3 approaches the training track (from the north), the western fringe of bushland is still only 200m wide.

2. Transect sight distances provided did not allow for sampling within homogeneous habitat units; consider Figure 3 above.

Transect 2 started at the creek in the north-east of the site in “open” habitat, and headed south-west, ascending a ridge, and entering the closed forest habitat. Logged observer positions would have been described as “closed” habitat, while the view in a northerly direction was through 50m of trees into “open” habitat. This would have become a problem again towards the southern end of Transect 2, where open country occurs to the south of the transect, and along sections of the other transects.

3. For the “closed” habitat the Class Interval Width (CIW) is given as 15.0m, no Designated Distance Range (DDR) is provided; for the “open” habitat CIW is given as 30.0m, with a DDR of 0.0-800.

From the Manual:

*For radial [Walters prescribed this was used] and fixed point data, make the class interval relatively small, perhaps about a fiftieth of the distance range [eg 2.5 for a range of 125m, 25 for a range of 1250m].*

A “one-fiftieth” proportional interpretation of the 15m CIW (closed habitat) would provide a DDR 750m (closed habitat), only 50m less than that allocated by Walters (2010) to the “open” habitat, however substantially more than the maximum detection distance of only 534.4m.

A one-fiftieth proportion of the DDR for “open” habitat with a DDR of 800m provides a CIW of 16m; despite specific directions in the Manual to make the CIW small, Walters (2010) has almost doubled the recommended value to 30.0m (only one twenty-sixth, rather than one fiftieth), without explanation or discussion.

4. Population movement rate is given as INPUT data 5.0 m/min.

The Manual recommends using a figure for the population movement rate based on “previous behavioural studies” or “estimating it”. No previous behavioural studies are cited by Walters (2010) giving a kangaroo population movement rate of 5 m/min, therefore it is assumed that the Walters team provided this figure as an estimate.

The Manual provides an estimate for “*slow moving grazing mammals that graze on the ground or browse in trees*” as “under 5 (2.5m/min)”; kangaroo behaviour during the daytime is described as being largely sedentary, even stationary, unless disturbed. Walters himself describes them as “sheltering” at the time of assessment, and has provided no justification for why their density calculation was based on doubling the average movement rate for slow moving grazing mammals, and applying the highest possible value for this class of fauna.

5. Elevations were not measured.

Walters (2010) describes equipment used, including a range finder and binoculars, however no inclinometer, despite transects targeting the highest ground across the site. With an altitudinal range across the Northern Lodge lands of over 100m (248m-350m according to Google Earth 2011), this was a very lazy application of the recommended survey methodology.

6. The Manual provides “*If the ground surface is undulating or hilly and some distant individuals could be out of sight select **Topography undulating, obscures some wildlife** and enter the approximate minimum distance from the observer (rounded to the nearest metre) at which the target species starts to drop from view behind a ridge or hilltop*”.

Walters (2010) describes “ridge crests” and “gullies”, photos of the site show sloping hillsides, Google Earth clearly shows low hills and gullies and an altitudinal range across the site of over 100m. Walters does not select “topography undulating, obscures some wildlife”; Walters’ analysis instead uses the “approximately level” input.

Walters should seek experience working in western NSW, or the Hay Plain, where he may be able to learn the difference between “undulating” and “approximately level”, and how landforms affect sight distances, and the visibility of animals at-distance.

7. Number of Observations were insufficient

The Manual provides that “*80 or more observations are usually enough unless group sizes vary considerably*”. It goes on to discuss sample sizes of 15-80 observations as “small sample sizes”, but allows sample sizes of 5-15 observations, provided that the user “presets” shape parameters, however it concludes “*presetting shape parameters makes the estimates of their value in the output unreliable*”.

The number of (group) observations for “open” habitat is given as 6 (pp 12); shape parameters will have needed to be preset, and the “open” habitat calculations are necessarily rendered unreliable. Note that less than 80 observations is a **small** sample.

Only 95 group observations were made in the “closed” habitat, however no information on group size is provided by the Walters (2010) report, not even a reference to a “largest group”, while individuals counted provided 259 kangaroos (including at-foot joeys). Can the reader assume that 95 groups were uniformly comprised of 2.7 kangaroos each, or should the reader assume that groups ranged in size from small family groups or even individuals, to small mobs of 20-30 kangaroos? If the latter, a sample size of 95 group observations may not have been sufficient for a population comprised of widely variable group sizes.

#### 8. Parameter anomalies

From the Manual “*It is important that these [initial parameter values] are well chosen: if they are very inaccurate, the program may fail in its search for a minimum difference between observed and calculated frequencies*”

The Conspicuousness Coefficient is discussed here as a parameter, with the Manual describing it is the minimum distance at which an observer will start to overlook an occasional animal if it is “*stationary, quiet, or partly hidden*”. The Manual provides a Table, with the Eastern Grey Kangaroo being ascribed a value of 16-23 (**20**).

Walters (2010) provides that they used a Conspicuousness Coefficient of 15.000m for the Eastern Grey Kangaroos in the closed habitat (pp 10), even *below* the lowest value indicated by the range of 16-23 for the species, and 25% less than the recommended Conspicuousness Coefficient of **20** for Eastern Grey Kangaroos.

In the absence of any explanation for why Walters (2010) applied such a low Conspicuousness Coefficient, the reader can only assume that this is an admission by Walters that his “team” struggles with kangaroo identification at a distance of 15m, or that they applied such a low value in order to deliberately skew the data towards a positive bias. The Manual recommends if a user is uncertain about this parameter, to make the “*estimate higher rather than lower than the suggestion given*”. Indeed a Conspicuousness Coefficient of 15 is recommended by the Manual for the Green Rosella, Swift Parrot, Yellow Wattlebird and Red Wattlebird – birds less than 40cm long.

Estimates for Lateral Vegetation Cover are provided by Walters (2010) as 0.0077 (closed habitat) and 0.0010 (open habitat). Preset Tables in the Manual do not have a value for any “closed” habitat occupied by ground foraging mammals; the Manual does provide values for “open woodlands 0.003-0.008 (**0.005**)” and “woodlands 0.010-0.011 (**0.010**)”, and “grassland with ground feeding species, eg: kangaroos 0.000 (**0.000**)”.

In the absence of any evidence of vegetation survey, or reference to material upon which the Walters (2010) values have been based, and given that cover proportion is described by the Manual as having a large affect on the final population density calculation, it is astonishing that Walters has varied from the recommended values, without any explanation or discussion.

No value for Walters initial (pre-assessment) “guesstimate” of population density is provided; this would normally set the height of the frequency distribution curve. Walters (2010) looks like it has provided these figures (boxed tables on pp 10 and 12), however the figures given as “Estimated Parameter Values: Estimated Density (D)” are simply the calculated values from pp 13.

The Walters (2010) report purports to have had Detection Distance Graphs (pp 11), however they do not appear in the copy provided for this review. Do these graphs appear in copies of the report held by NMIT or DSE? If these graphs show a calculated curve corresponding to observations, the reader should understand that simply manipulating the “parameters” allows the correlation of calculated to observed data curves.



*If the fit is poor...the data set may be too small [true], or the true parameter values are really much higher or lower than the starting values you entered [true], or the cluster sizes varied greatly as well [likely to be true], so that random resampling of the data produced some atypical frequency distributions that made curve fitting difficult.*

The Manual goes on to cite a likely reason for this, being the parameter estimations shown in the .results file were less than the number actually set.

*The number of observations and the amount of variability in group sizes are the main factors that determine how many parameters you can estimate from a set of data. Other factors, such as a large difference between observer and population planes, or restrictions on the range of distance data analysed, may also have an effect.*

The Manual goes on to describe presetting or varying parameters to create a better fit, but it warns:

*Preset parameters with care. Very inappropriate values can produce some bias in the density estimate.*

Many of the parameters Walters (2010) provides are wildly wrong (“open” habitat CIW of 30, 15 Conspicuousness Coefficient for Eastern Grey Kangaroos, Lateral Vegetation Cover in grasslands of 0.0010 and 500 Parameter Estimations, for example). Many other parameters are not provided by Walters (2010); the reader can only speculate as to what other preset or estimated parameters were used in the density calculation.

The instructions conclude:

*If you really need more data, be prepared to collect it!*

The reviewer has no confidence in any results coming from such a flawed application of the prescribed methodology, nor in an interpretation by persons who have not demonstrated any competency in application of a rigorous scientific method or analysis.

After processing by *WildlifeDensity*, kangaroo densities of 2.713 kangaroos / ha and 1.208 kangaroos / ha were reported in the “closed” and “open” habitats respectively (pp 10 and 12). 95% Confidence Limits provide ranges of 2.145 – 3.355 kangaroos / ha in “closed” habitat, and 0.632 – 1.928 in “open” habitat.

Would a more proper analysis run *WildlifeDensity* against the data from each of the three transects separately, and average the results? While transects may be “short”, with even smaller sample sizes (thus introducing a wider range of possible densities within 95% confidence limits, and a higher standard error), this would have eliminated the problem of double or even triple counting of kangaroos along the overlapping assessment transects. The calculated densities for the three transects could then be averaged to give a best estimate.

Walters (2010) describes weather conditions as being cold and windy, with occasional rain, and sunny breaks during assessment of Transect 3 (pp 13)

Given that developers of the *WildlifeDensity* package instructed the “researcher” to conduct assessments under similar weather conditions, it was negligent of the “team” to not record temperatures, wind speeds, and periods of and quantities of rainfall, and duration of sunny breaks to

demonstrate that conditions were comparable on the different days of the survey. The inadequate description of conditions provided by Walters (2010) nonetheless indicates that conditions were *dissimilar* on the days of survey, particularly when Transect 3 was assessed. The Detectability Coefficient (discussed above) may have varied considerably between assessment periods.

Walters (2010) describes kangaroo behaviour as being predominantly seeking refuge within the margins of the bushland area (pp 13).

Kangaroos are “crepuscular”, meaning that they move about, if undisturbed, primarily around dawn and dusk, though they generally forage throughout the night (Dawson *et al* 2004). Walters (2010) observations of their behaviour (sheltering along forest edges) is what would be expected during day time assessments, making the species, at such a small site, one which could readily be head-counted directly.

In addition groups and individual kangaroos display a degree of site attachment, meaning that they can often be found at or around a point within their home range, which is given for Eastern Grey Kangaroos as being as little as between 12.7 and 36.8ha (average 20ha), as observed over a period of 3 years (Jaremovic 1984 and Croft 1991). Note that each kangaroo does not require its own home range; individuals within a group occupy overlapping home ranges, and other studies have recorded larger home ranges (eg Moore *et al* 2002, which provided an average home range of 62.3ha for female Eastern Grey Kangaroos).

Again, this behaviour makes it relatively easy to do static counts of kangaroos, particularly in a study area as small as the Northern Lodge site.

On the basis of density calculations and an area of 268.64 ha, a total population is provided by Walters (2010) of 710 kangaroos with a standard error (SE) of 77 kangaroos, within the Northern Lodge (NMIT) bushland and immediate surrounds (pp 13). The summary of calculations, highlighted, provides:

*The estimate of the kangaroo population at Northern Lodge bushland and its immediate surrounds is 710 +/- 70 [+/- 70 differs from the SE: 77 provided immediately preceding this, discussed below]*

The Boundary Road mob of 70 animals in Bathurst (pictured above) live on a reserve which is 76ha in size – this mob is very conspicuous. 710 (+/- 77) kangaroos is ten times this number, on a property only four times larger. 2.71 kangaroos / ha is more than double the density found at Boundary Road Reserve. Given this, one would expect on inspecting the Northern Lodge site, to see numerous large groups of kangaroos, bounding off in all directions.

If distributed spatially across the site, each of 9 hypothetical groups of 70 kangaroos in a site of 320 ha would be separated by no more than 500 metres, with the remaining 90 kangaroos occurring throughout in intervening spaces as smaller groups. That is, at any one time just by looking around, the researchers should have been able to see 70 kangaroos. Considering these sort of numbers distributed spatially across the study area, and visibility given as “500m”, numbers counted along each transect should have been close to:

Transect 1: 350 kangaroos  
Transect 2: 420 kangaroos  
Transect 3: 280 kangaroos

Nowhere near these numbers of kangaroos were reported to have been observed during the site assessment; indeed only 276 kangaroos were observed, being only 26% of what would have been expected to be observed of such a large population, along the transects described.

A competent assessor would certainly provide photos of such an abundance of kangaroos in any management report, to illustrate and justify the need for a culling program. In fact no kangaroos – not even small numbers - are even visible in the background of photos which Walters does provide (pp 15 and 16). Walters (2010) provides no evidence of a high density of kangaroos, and given the numbers reported to have been observed, and the high degree of overlap between transects, the calculated population of 710 (+/- 77) kangaroos is simply not credible.

In addition, Walters first provides a population of 710 kangaroos (SE:77), yet the very next and concluding sentence with regard to the sites Kangaroo Population Estimate provides that there are 710 +/-70 kangaroos. What happened to the other +/-7 kangaroos? For the purposes of this review, the original SE: 77 figure has been retained.

Walters (2010) correctly identified that:

*The relatively low number of observations in open habitat [given as 17 animals] made the model fit for open habitat a little uncertain*

Simply put, open paddocks are not Eastern Grey Kangaroo habitat.

In fact clearing of forests in Tasmania was identified as a principal cause for the decline of the Forester (*Macropus giganteus tasmaniensis*), the Tasmanian subspecies of the Eastern Grey Kangaroo, with a contraction to only 5.4% of its pre-European distribution (Tanner & Hocking 2001). In 1974 the Forester was listed as the second highest priority species of 13 species identified as requiring habitat preservation in Tasmania (Burbridge 1977), and over 13,000 ha of forested habitat has since been purchased and gazetted as National Park in Tasmania, to stop the subspecies from going extinct.

The Eastern Grey Kangaroos common name historically was the “Scrub Kangaroo”, descriptions include colloquialisms of it as a “forest species” (Ellis 1979). Numerous papers exist describing their grazing habitats being most strongly correlated to distribution of cover, not grassland.

Walters (2010) in this was correct; 17 kangaroos was not a sufficient number of observations on which to base statistically rigorous calculations of kangaroo density in the Northern Lodge “open” habitat, nonetheless the Walters (2010) report went on to do so.

### Ecological Vegetation Classes

Walters (2010) pp 13-14 provides a brief discussion of aspects of the five vegetation classes mapped on pp 8.

Nowhere does Walters (2010) include descriptions of species dominating each of his mapped units. In the absence of comparative species lists against which to assess congruence with EVC types as described in DSE’s *EVC / Bioregion Benchmarks for Vegetation Quality Assessment* (2004), communities identified and mapped as occurring at the Northern Lodge site in Walters (2010) can be considered to be nothing more than guesswork on behalf of the assessors.

With regard to EVC 23 (Herb-rich Foothill Forest):

*One was the Herb-rich Foothill Forest (EVC 23) to the north of Glenburnie Road that had little sign of kangaroos, but had a prolific herb, orchid and Joycea ground flora.*

Interestingly an area comprising an estimated 10% of their study area (based on a visual assessment of the proportion of NMIT land lying to the north of Glenburnie Road in Figure 3 above) is described as having “little sign” of kangaroos. This suggests that indeed no kangaroos may have been observed in this unit.

Crossing roads is inherently dangerous for wildlife, and kangaroos crossing to the north would soon want to return to their reported 710 (+/- 77) companions to the south (kangaroos are highly gregarious and social animals). A fragment of habitat bracketed by a road and residential development (to the north) would be little used by kangaroos, and those which did use it would be subject to an increased probability of being struck by cars, or becoming entangled in fences.

Given that Walters (2010) calculated densities were applied to an area of 268.64ha (pp 13), and that this included the lands to the north of Glenburnie Road in which there was “little sign” of kangaroos (pp 13), this means that the calculated population total also has a high probability of error. The area occupied by kangaroos at the Northern Lodge should have been reduced according to the following calculation:

320ha – 45ha (horse paddocks) – 15ha (other equine infrastructure) - 10ha (vineyards) – 32ha (north of Glenburnie Road) = 218ha

This simple adjustment would proportionally reduce the population “calculated” (as unlikely as the calculated population of 710 (+/- 77) kangaroos is) by around 20% to only 560 (+/- 63) kangaroos.

In addition, describing a “prolific” ground flora without providing an account of the species observed means only that Walters has read the heading of the community on the EVC descriptions (DSE 2004), which includes the descriptor “Herb-rich”, not that there has been any capable or qualified assessment or description of the ground flora in this vegetation unit. Further “prolific” is the exact opposite to how the vegetation has been described elsewhere, as being everywhere “impacted” by kangaroos.

*The other was the Ridge-crest community denoted on Map 3 as EVC 22 Grassy Dry Forest / Sandstone?*

Looking at photos and Google Earth, from which the topography of the site can be determined to be undulating to low hills is one way to give the lie to the input Topography data of “approximately level” (pp 10). Walters (2010) description of a “Ridge-crest” community is another.

*On this site a floristic community similar to that described by Frood (2010) of a *E. mellidora* (Yellow Box), *E. macrorhyncha* (Red Stringybark), woodland with a sparse, diverse, woody understorey, particularly of Acacias, notably *A. implexa* and *A. paradoxa*. *E. polyanthermos* (Red Box) was present, but in low numbers.*

Of the five named species identified as occurring at the site, listed in this single sentence, Walters (2010) misspells 2 of them – it is *E. melliodora*, and *E. polyanthermos*.

Habitat modification (pp14)

Walters (2010) describes “modified” areas, and provides photographs of same on the following pages. Walters (2010) describes windrowed material as having been pushed up during construction of new tracks, and clearing of track verges, and fence lines.

This sort of language misuse is not appropriate in a scientific report; vegetation has not been “modified”, it has been “cleared”. Clearing of native vegetation is listed as a key threatening process under Commonwealth and State environmental protection legislation. Walters (2010) provides conjecture that this clearing was for “fire mitigation”, however nowhere provides evidence of correspondence with NMIT regarding this supposition, or any justification on behalf of NMIT explaining their clearing of native vegetation.

Walters (2010) goes on to suggest that this clearing will “increase the invasion of exotics” and provide “an additional food supply for kangaroos”.

In the first instance, kangaroos evolved in Australia consuming native grass and forb species, in vast forests. Suggesting that “increasing” exotic species via clearing of native vegetation will provide “additional food” for kangaroos is not necessarily correct.

As discussed above, cover (forests and woodlands) is essential habitat for kangaroos, not grassland.

While Walters may consider that clearing the entire site will improve condition for kangaroos even more, his view that clearing provides “additional food supplies for kangaroos” is completely contrary to fact. Consideration of the factors affecting the landscape illustrated in Figure 2 provides that no kangaroos will persist in the surrounding (cleared) landscape – kangaroos are likely to persist locally only in the remnant bushland “refuge” associated with the Northern Lodge lands.

With regard to rabbits, windrowed piles of logs from clearing of vegetation is described by Walters (2010) as “new harbour for rabbits” (pp 14), and two photos of this are provided on the following pages as evidence.

It is an interesting approach to take, to put in two photos of “rabbit harbour” in a report about kangaroo management, but to not include any photos whatsoever of kangaroos, or their reported impacts.

*Rabbits were seen in low numbers on all transects. In the gullies, particularly where tunnel erosion had formed channels, rabbit sign and warrens were observed. Ongoing rabbit control will be necessary.*

Piled timber is described as “rabbit harbour” according to Walters (2010); a strategy commonly enacted to control rabbits in the agricultural sector is to burn piled woody debris. Walters (2010) identification of the piles as “rabbit harbour” is likely to prompt NMIT, in their ignorance, to burn these piles, if they weren’t planning to already.



Far more lizards, snakes, frogs and invertebrates – even marsupial mice such as Antechinus and Sminthopsis, occupy piles of woody debris, than do rabbits. Rabbits actually live in burrows and are essentially unaffected by the burning of piles of timber.

In fact decomposing logs are a fundamental building block of a functioning ecosystem. Loss of woody debris is a key threatening process, listed under both state and federal environmental protection legislation. Removal of woody debris at the NMIT site will have direct consequences on biodiversity values far exceeding the unquantified impacts of kangaroo grazing described (but not proven) by Walters (2010).

Further with regard to Walters (2010) in his views on rabbits requiring “ongoing” control, depletion of rabbits (with the release of Calicivirus), following the loss across Australian landscapes of the small mammals (bandicoots, hare wallabies, bilbies etc), has been identified as a contributive cause in the decline of raptors, particularly the Little Eagle. This species has subsequently been listed as VULNERABLE under threatened species legislation in NSW (NSW Scientific Committee 2010) and the ACT.

Walters (2010) advice to NMIT may be a danger not only to kangaroos, but to all species occurring at the Northern Lodge site. The DSE needs to prevent ill-informed advice from being provided to otherwise ignorant land managers, which has here been shown to have potential to result in significant impacts on biodiversity, and conservation values.

Again reference to “gullies” is inconsistent with previous descriptions by Walters, of topography across the site, being variously “undulating” (open habitat) or “approximately level” (in closed forests). Walters has applied no due diligence or rigour in his attempt to use *WildlifeDensity*.

## Discussion

Walters (2010) describes the distribution of kangaroos as occurring largely within (from pp 17):

*...a 200 metre [wide] margin at the forest edge, with about equal numbers in clear land and in the forest itself. There were particular concentrations in forest areas where exotic grass had invaded and formed a dominant proportion of the ground layer. Few kangaroos were observed on the rocky hill-crests and the vegetation reflected this in its vigour and diversity.*

Walters’ descriptions of the population occurring in varying densities within units described as uniform habitats (being “open” and “closed” units), provides that the application of software, which cannot differentiate forest edges, and which makes no allowance for varying densities within defined units, was completely inappropriate.

In order to apply an accurate methodology Walters would have needed to identify three units for input into the *WildlifeDensity* calculations, being “open” habitat, “forest edge” habitat, and “closed forest” habitat. Given that the assessors may have gone on to count the same kangaroos two or three times in any event, this would have been unlikely to have improved their performance.

Stating that “equal numbers” of kangaroos occur in the cleared land (given on pp 12 as 17 animals) and in the forest itself, means that apart from around the forest edges, the assessors saw very few kangaroos through much of their transect lengths (the closed forest habitat). However density calculations, including possibly frequent observations in “forest edge” habitat (unquantified in terms of Walters’ 20:1 ratio of “closed” vs “open” habitats), were subsequently applied across the *whole site*, even though much of the site (the closed forest areas away from forest edges) is here given to have

contributed very few observations to the observed totals. This can have only resulted in a significant positive skew to the population calculation.

Also given that “few” kangaroos were observed on the “rocky hill-crests”, there are further refinements to the classifications of habitat which Walters should have incorporated into his density modelling. Additionally, given that Walters (2010) previously describes “most of the bushland” as having a “noticeable reduction in natural biodiversity” (pp 4), why weren’t these “rocky hill crests”, with their “vigour and diversity” mapped? Providing these sort of details would have been useful for DSE in assessing the validity of the application to shoot animals, and the reader could assess the proportion of lands purported (but not demonstrated) to be affected by kangaroo grazing.

And again, what are “hill-crests” doing in a unit described as “approximately level”?

*The land managers at Northern Lodge have a responsibility under the Catchment and Land Protection Act 1994 to protect and maintain land (soil, water, native vegetation and fauna)(s20 (1).*

Walters (2010) documenting evidence of NMIT clearing native vegetation, with descriptions which include the statement that this will encourage invasion by exotic grasses, clearly shows that NMIT are failing to comply with their obligations under this Act.

Their approach of incrementally clearing native vegetation, followed by their commissioning and accepting an at-best incompetent report on kangaroo “management” is further evidence of their failure to responsibly manage the land and conservation / flora / fauna values which they are custodians of.

An unclosed bracket is another example of the lack of quality assurance which is a theme through the entire Ecoplan document.

*In the EVA’s identified, there is a strong likelihood that listed flora exists on the study area and an independent flora assessment should be considered to identify such species or communities.*

A “strong” likelihood would provide grounds for NMIT to be investigated for their activities which are impacting the site: clearing, pasture improvement, planting of vineyards, training facilities etc could have removed or impacted on threatened species populations. Again these activities do not comply with provisions of the *Catchment and Land Protection Act 1994*, and given Walters (2010) views that there may be threatened species values at the site, the NMIT may be in breach of the *Wildlife Act 1975*.

*Some land use practices do not appear to have been informed by native vegetation retention guidelines. Further, the conversion of forest margins, track margins and training facilities have expanded the area available for the invasion of opportunistic plants, particularly exotic grasses, thus supplying an increased annual nutritional pulse coinciding with a known peak in pouch exits around November each year.*

More language misuse. Clearing of native vegetation along forest and track margins, and to accommodate training facilities, is not “conversion”, it is “destruction”.

With regard to kangaroo pouch emergence, Eastern Grey Kangaroos give birth between October and March; permanent exit from the pouch occurs around 319 days later (+/- 18 days) according to

Dawson (1995) based on studies conducted at Fowlers Gap Research Station in western NSW. Based on these figures emergence then occurs from August to January. Conversely the ACT Kangaroo Advisory Committee (1996) suggest that:

*The interpretation of winter data is made difficult due to permanent pouch emergence occurring at this time and the potential for high juvenile mortality over the span of a month or two.*

Walters would do well to provide a reference supporting his statement that there is a “known peak in pouch exits” in November, so that readers of his report can learn what the situation is in Victoria (as opposed to the situation in NSW and the ACT described above), rather than making an unsubstantiated statement.

*A rapid reduction of the kangaroo population will have an accelerating effect on the proliferation of exotics, where they can form mature seed following a reduction of grazing pressure. The answer to controlling seed production or biomass reduction does not lie in the introduction of a further grazer to replace a reduced kangaroo population.*

Walters (2010) provides no references to back up these statements. Additionally, surely with a reduction of kangaroo numbers there would be a biomass *increase* (rather than “reduction” as given by Walters above). Nonetheless, if removal of kangaroos will proliferate weeds, why has Walters recommended it? And what is Walters’ “solution” to controlling exotic species proliferation and seed production, if introduction of another grazer is not the answer? He provides none.

*The balance point for site management lies in the ongoing care and enhancement primarily of the native vegetation in the bushland, secondarily to the protection or maintenance of the agricultural asset being part of the educative equestrian facility.*

The kangaroos at the site were already contributing to “balancing” the native vegetation in the bushland, and with only 17 animals observed in the “open” habitat, with kangaroos being described as occupying the bushland, with the horses in the paddocks, Walters’ report sounds like the site was already being managed for conservation of native vegetation in bushland areas, with interests in horse science, training and husbandry being confined to facilities devoted to these activities.

In the absence of any evidence, Walters has chosen to describe the kangaroos at the site as having a negative impact on vegetation and biodiversity values, while simultaneously describing NMIT’s activities as contributing to removal of native vegetation, promoting proliferation of exotic species, and increasing bushfire risk. How “ongoing care and enhancement” can occur, in the absence of any demonstrable care to date, eludes the author of this review. Indeed the *opposite* of care on the part of NMIT has been described by Walters.

### Population Reduction

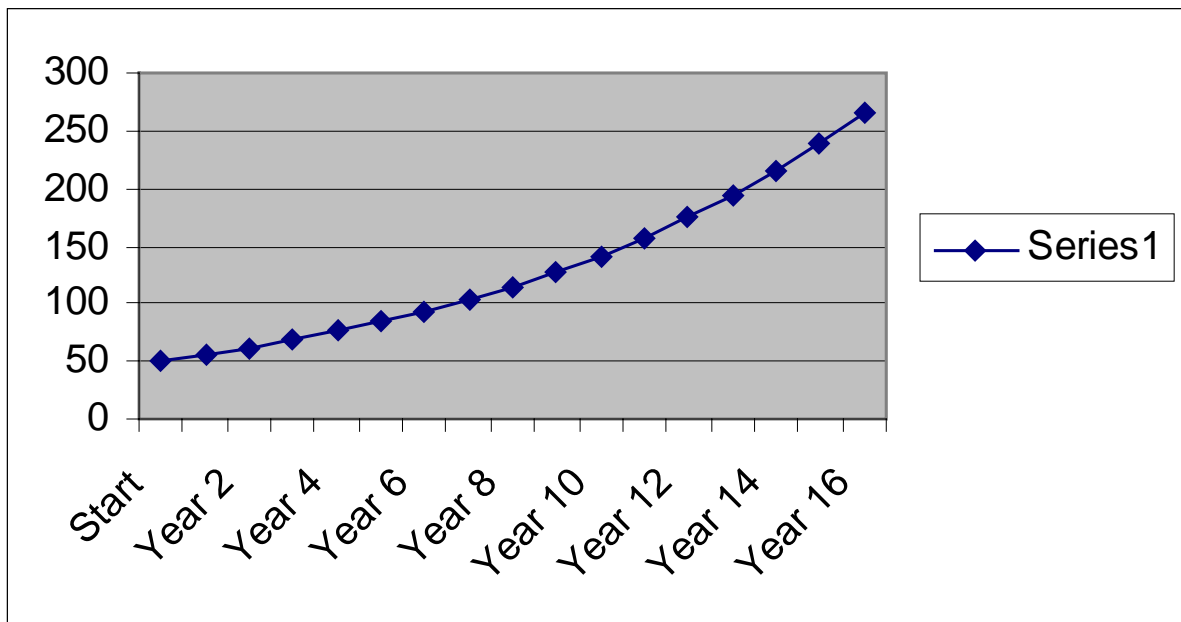
*It is recommended that the kangaroo population be reduced initially over a period of three years to a population of 250 kangaroos.*

How was this figure determined? Usually a researcher would justify a target population / density by citing pertinent research, relating to grazing pressure, and demonstrating that impacts (if any) on ground cover were attributable to kangaroos.

Given problems with the population assessment methodology and density calculations discussed above, it seems likely that 250 animals may have been around the figure occupying the site prior to conducting shooting in early 2011.

*Thereafter, the population is to be maintained within two limits, the upper limit being 250 animals (approximately one kangaroo per hectare) and a lower limit of 55 animals (approximately one kangaroo per 5 hectares), determined by prevailing medium term weather conditions.*

How have these limits been determined? Usually a researcher would justify a target population / density by citing pertinent research. If the population were to be reduced to only 50 animals, very little would be able to be done to restore the population to 250 animals. Low rates of replacement, given as 11% pa in artificially reduced populations (Arnold 1991), provides that 50 kangaroos would take 15-16 years to re-build to a population of 250 animals, according to the following graph.



Good weather would not significantly improve this rate of recruitment (though removal of foxes would, according to Banks *et al* 2000), and Walters (2010) completely fails to identify any means to increase numbers of kangaroos toward 250 animals, if “weather conditions” were optimal.

In addition “medium term weather conditions” is a strange determinant on which to base a target population. More typically less fickle factors such as groundcover biomass are used, with accompanying qualified quadrat based research to justify management actions which may be implemented to vary a population, such as by shooting.

*From demographic structures known in other eastern grey kangaroo populations in Victoria, it can be expected that the current population of 710 kangaroos will increase by approximately 120 animals by January 2011.*

What “demographic structures” are known of Eastern Grey Kangaroos in Victoria? Why does Walters consistently fail to provide references to back up his assertions?

Various studies on macropods have provided data on population growth rates, there is a whole paper which could be written on this point alone, but to summarise, consensus makes it around 11% pa, in populations which have been “reduced”. In a natural system, population reductions generally occur as a consequence of drought, or fire.

Amongst other things, Arnold *et al* (1991) “reduced” a population of about 200 Western Grey Kangaroos at Bakers Hill in Western Australia by shooting 85 of them, and then monitored the populations recovery. After returning to around the pre-shooting population total over a period of 6 years, the populations growth rate trailed off, and the population remained relatively stable thereafter (over a further period of 15 years).

An 11% population growth rate takes into account the fact that a doe will generally only have her first young in the wild at between 3 and 3.5 years of age (Dawson 1995), one young is produced per year (twinning is extremely rare and survivorship of both is unlikely), and the fact that juvenile mortality of 75% appears to be not uncommon, with rates to 90% mortality or even higher during periods of drought. For comparison, goats, which reach independence and are sexually receptive at 8 months, and often produce twins, are given to have a population growth rate of 50% per annum (DEWHA 2008).

A study of kangaroo populations in the ACT has provided that populations remain relatively stable if they are not interfered with (Banks *et al* 2000), which corresponds to Arnold *et al*'s (1991) observations of the Western Australian kangaroo population reaching an equilibrium with their environment.

In addition most studies of Eastern Grey Kangaroo population dynamics count a doe with a young at foot as a single animal (eg Banks *et al* 2000). Walters (2010) methodology (pp 5) states that “Pouch young were not counted”, and that binoculars were used to “verify group numbers”, indicating that care was taken to ensure that in the Northern Lodge study, young at foot *were* counted as individual animals.

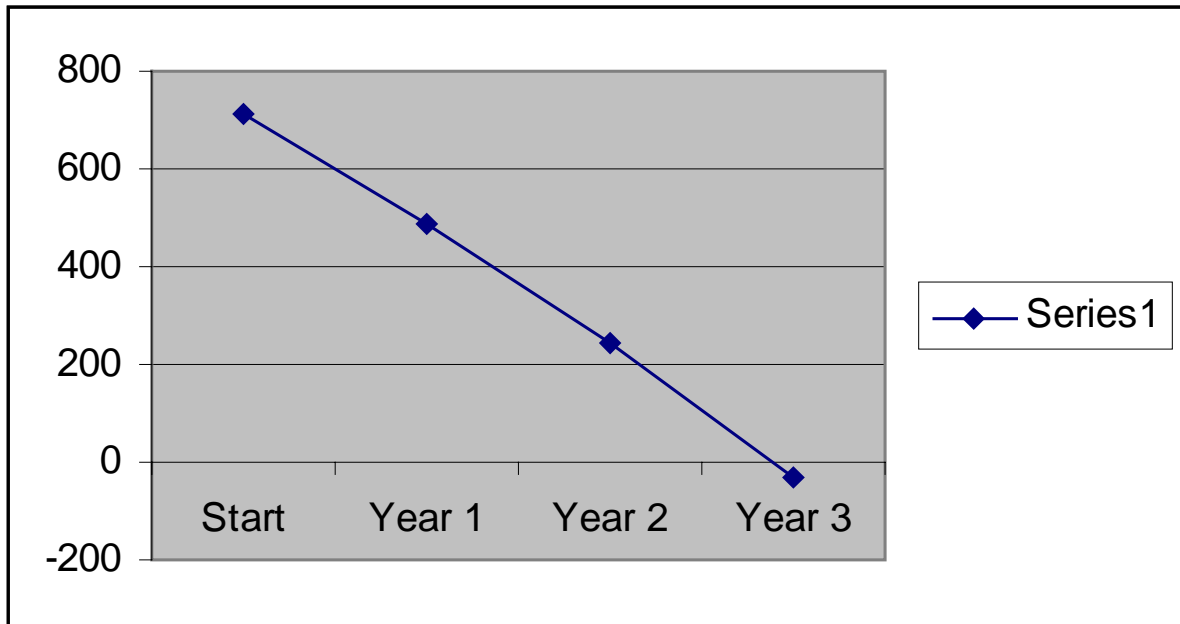
A joey remains dependant on its mother, continuing even to suckle from its own dedicated teat in the dams pouch (“dam” in this sense is a scientific term for “mother”), even with another smaller sibling developing in the pouch. Walters (2010) suggesting that just because 120 joeys may permanently emerge from the pouch during this period, and insinuating that this is a population increase, does not reflect the fact that just because joeys emerge from the pouch, they do not necessarily reach adulthood. At-foot joeys *will not* reach adulthood if their mother is shot; Banks *et al* (2000) describes pouch young emerging between August and January as only becoming fully independent of their mothers by May or June.

Aside from the “current” population of 710 (+/- 77) kangaroos, a growth rate of 16.9% (in 4 months) as described by Walters (2010) with his predicted additional 120 animals “by January”, is biologically impossible. If emergent juveniles did create the impression of a population pulse because an assessor was incorrectly counting a doe with her at-foot joey as two animals, longer term studies of the population would see this smoothed out.

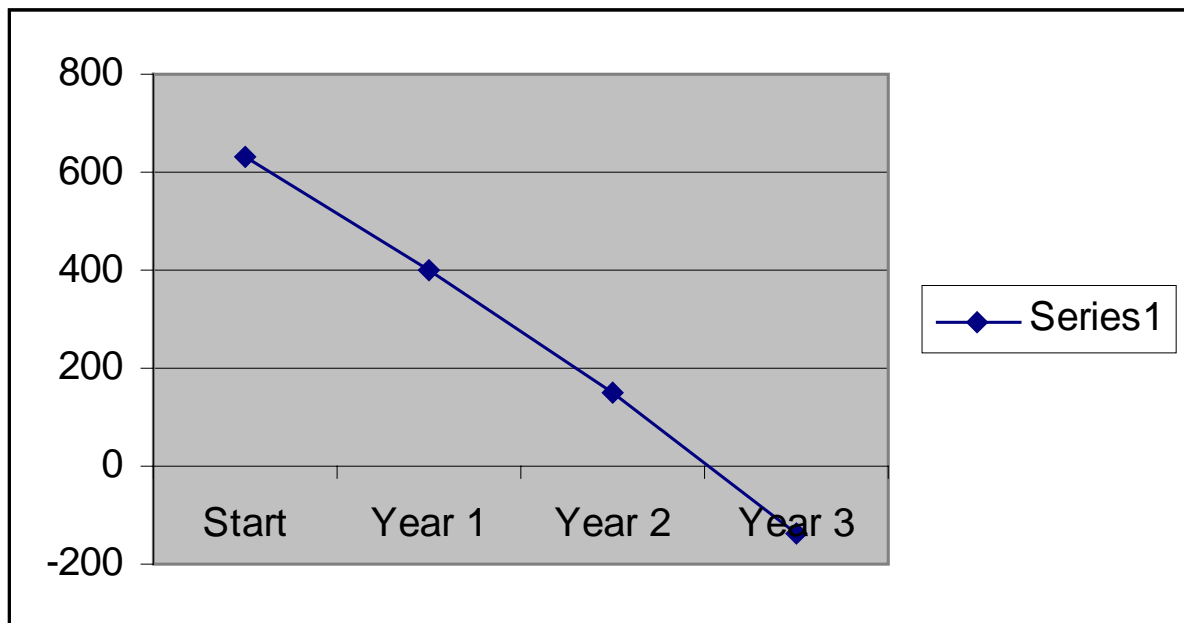
Even accepting Walters (2010) figures, consideration of the lower end of their predicted population, being (710-77) 633 kangaroos, would provide, applying a proportional reduction (rather than basing the emergence figures on more applicable biological considerations) that an additional 108 joeys may have emerged. These young would remain subject to the mortality factors discussed above.

A reduction to the recommended limits over three years will therefore require the destruction of approximately 300 animals per year, with the effects of population reduction monitored annually in June or July to verify the population trend. Thus, planning for the succeeding years' application for a DSE destruction permit can be made on the basis of the trend.

The graph below shows what would happen to a population of 710 Eastern Grey Kangaroos, if you shot 300 of them each year, for three years, given a population growth / replacement rate of 11% pa.



This shows extinction of the population in 3 years. Taking the lowest population provided by Walters (2010) 95% confidence limits, being (710-77) 633 kangaroos, extinction of the population would occur in 2.5 years, if 300 animals were shot per annum, according to the following graph.



If the calculated 560 (+/- 63) kangaroos is closer to the correct population (based on Walters (2010) description of “little sign” of use of the area to the north of Glenburnie Road, discussed above), a minimum population of only 497 kangaroos would suffer a population reduction of 60% if 300 animals were shot. Continuing the recommended program of destruction of 300 kangaroos per year would render the population extinct in less than 2 years.

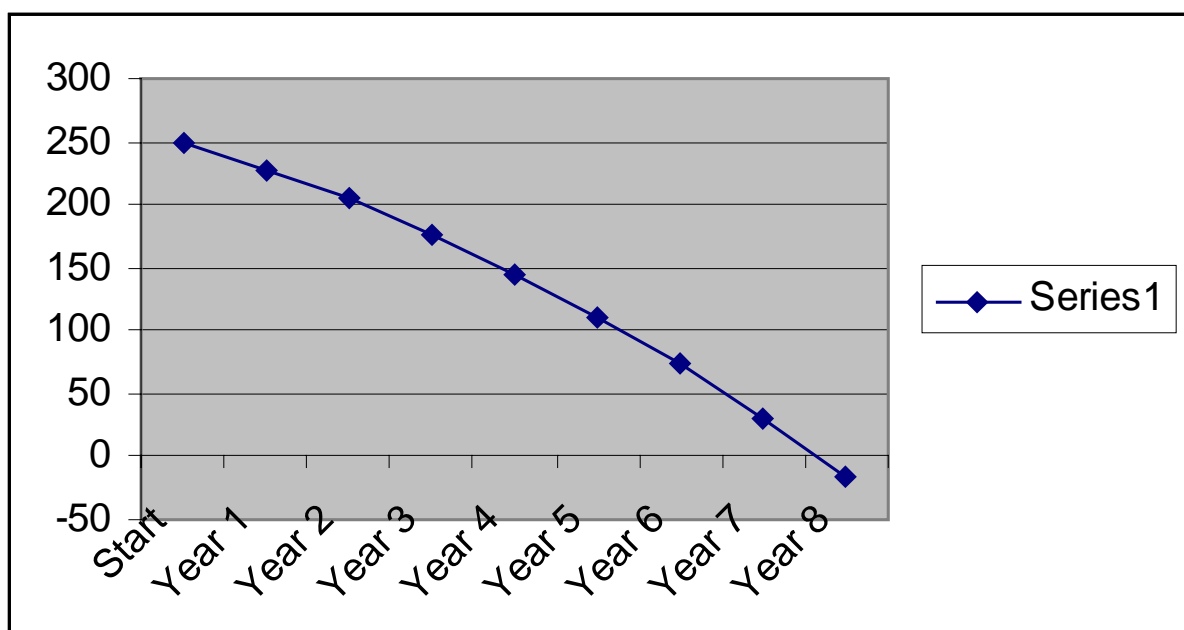
Further why do annual counts need to be done in June / July? On what basis does Walters provide for this recommendation? Did not Walters do his count in September? It is hard to tell, as dates of the Walters (2010) assessment are not included in his 2010 report. Interestingly and completely contrary to Walters’ recommendation on this, the ACT Kangaroo Advisory Committee (1996) recommends:

*...summer survey would give a better longer-term measure of kangaroo abundance.*

*In the long term (year three and beyond) however, the size of the managed population will be determined by measures of the green vegetation biomass. At a population of 250 animals, an off-take of approximately 50 animals per year may be required.*

Finally on page 18 (of 20) Walters mentions measurement of biomass as a means to determine and quantify grazing impacts of a herbivore. Again, this is the sort of study that should have been used to quantify impacts on vegetation and biodiversity values (if any), which may have provided a justification for a reduction in numbers of kangaroos, if other non-lethal control measures had been shown to have failed to provide a solution.

Ignoring the graphs above and the implied local extinction by Year 3 (or sooner), and presuming that NMIT’s management after three years of shooting has somehow retained a population of 250 animals, Walters still recommends killing 50 animals / year. That is, for a species which replaces itself at a rate of 11% pa, Walters recommends that 20% should be killed per annum, to maintain the population within “acceptable” limits. Consider another graph, this one showing an initial population of 250 animals with a replacement rate of 11%, being subject to destruction of 50 animals per annum.





Extinction by Year 8. A static allocation tends to do this, as, if numbers are decreasing, continued off-take of the same number of animals, from a lesser population, will increase the rate of decline, illustrated by a steepening curve in the graph above.

Even the various State authorities overseeing the “harvest” allocations in other states provide quotas which are based on a percentage of the total population. Unfortunately they too allocate a percentage (generally 15-17%) which exceeds the capacity of kangaroos to replace losses, and which has in all likelihood contributed, in combination with drought, to the halving of population numbers between 2000 and 2009 in NSW (DECCW 2009).

Walters (2010) goes on to discuss four “parameters” at Northern Lodge (pp 18), which interact, being:

- *the productivity of vegetation* [unquantified in any way by Walters (2010)]
- *grazer off-take* [unquantified in any way by Walters (2010)]
- *the land managers requirements* [Walters (2010) provides that equestrian pursuits must be limited to existing altered lands, otherwise bushland must be managed for conservation] and
- *the manipulation of the above* [ostensibly to provide “some level of fire-fuel management”]

Walters advises that it remains the responsibility of the landholder to “protect, maintain or enhance” the natural values of the site, and that no matter how many kangaroos they shoot, kangaroos will always “preferentially seek” their (non-existent) crops, and they should erect kangaroo (and rabbit) fences, “possibly with an electrical component”.

It is difficult to understand how Walters came to the conclusion that NMIT should be shooting their kangaroos, on the basis of no evidence of impacts on vegetation or biodiversity values. It is even harder to understand how Walters came to the conclusion that kangaroos need to be shot, because they were identified as occupying the forest verges, not the paddocks, and are therefore not in competition with horses, or detracting from the NMIT interests pertaining to equine studies.

We are now nearing the end of the Walters (2010) report, where he identifies that fire / fuel issues are also pertinent. Yet Walters (2010) is still recommending that the kangaroos should be shot, even though he advises against replacing their grazing with some other grazing (pp 17), and the kangaroos are obviously providing a service to NMIT, in reducing herbage, and reducing bushfire risk in the bushland areas.

Walters (2010) provides that it is NMIT’s responsibility to “protect, maintain or enhance the natural values of the site”. Are not kangaroos themselves natural values? Are they not providing ecosystem services, and even valuable fuel reduction services, in bushland that cannot be otherwise modified, unless by NMIT’s incremental clearing of native vegetation?

The solution to the conflicting statements and advice provided by Walters (2010) lies in Walters’ statement that no matter how low kangaroo numbers are, they will always remain a “problem”.

Walters has provided NMIT with a plan which will see kangaroos rendered extinct at the site, if not in one year by destruction of 300 kangaroos (possibly exceeding the total number of resident kangaroos, given the large and obvious errors in Walters’ assessment and density calculations), then in three years via shooting of 300 kangaroos per year. If not in three years, then by 8 years thereafter, via continuous shooting of 50 kangaroos per year.

Walters (2010) suggests that management according to the limits recommended will ultimately determine the productivity of the sites vegetation (pp 18), and goes on to recommend that vegetation plots at three locations be biomass assessed, four times per year.

*Trends in biomass levels and kangaroo population can thus be compared.*

Apart from the fact that this is the type of research one would have expected to have been used to justify a cull in the first place, Walters' recommendation remains completely inadequate.

Having only three assessment plots does not allow for comparison between (but not necessarily limited to) different vegetation communities and soil types, various aspects, altitudes and landscape positions, alternative grazing regimes (none, kangaroo and horse), and replicates of same.

Walters has failed to design a monitoring program of adequate rigour to satisfy even a rudimentary peer review.

*The grazing population will be correct for any year if a proportion of native grasses and herbs are able to complete their life-cycle through to seed liberation.*

Walters (2010) has provided no evidence that this was not the case prior to the shooting of kangaroos in 2011, nor any mechanism by which this could be monitored / quantified in future.

*Values between 40 and 100 kilograms of green biomass per hectare could be expected.*

Reference?

Nonetheless 40 to 100kg per hectare seems a bit low, based on above ground biomass measurements for grassland providing totals (for 8 species in a 1m<sup>2</sup> plot) of 2,500 kg/ha (Tilman *et al* 2001). Ground cover biomass in grassy forest ecosystems may well be less than this, but in the absence of any references or evidence from Walters, this remains unquantified.

Walters (2010) discusses fire behaviour in a rudimentary way, suggesting that fine fuels play a part, with grass biomass being a contributing factor, but not a determining one.

*The manipulation of grazing pressure to control vegetation is an additional advantage, but the ultimate determinant of grazer pressure at this site should remain the protection and maintenance of site biodiversity.*

Walters continues to a conclusion that all of the objectives for the sites management can be achieved, in terms of the "parameters" discussed above, via "manipulation" of the site's kangaroos.

By far the most important factors in fire behaviour are weather condition, vegetation type and fuel load and structure. The fact will remain however, that removing the primary herbivore from the Northern Lodge bushland will *increase* bushfire risk at the site and surrounds, by increasing fuel loads. It is interesting that the risk to life and property posed to surrounding landholders and residents, by increasing fuel loads at the site by removal of kangaroos, is less important to Walters, than maintenance of the sites biodiversity values.

Walters has in no sense demonstrated that kangaroos are impacting on the sites biodiversity values as discussed above, nor that their “manipulation” will be an effective mechanism by which this can be managed.

*A comparison of the effects of grazing can be demonstrated by the erection of four grazer exclusion plots of 12 metres x 12 metres at three locations in the bushland. These locations should represent the EVC communities. (pp 18)*

Again – this sort of study should have taken place prior to providing any advice that animals should be shot. Providing advice to shoot kangaroos in the absence of evidence of impact was negligent and reckless, and given review of other material (discussed on following pages), this has already resulted in the cruel and unnecessary deaths of many animals.

Walters (2010) identifies that various Acts apply to the carrying out of a shooting program (pp 18), and identifies problems with shooting, including raising concerns with regard to public safety. Walters recommends that NMIT engage a “specialist” company, with experience in peri-urban population reduction (pp 19).

It is unclear if NMIT took this advice. Review of the performance of the shooter (below) suggests that perhaps they did not. Indeed a review of the performance of the shooter suggests that NMIT increased the risk to the public by engaging their shooter, even beyond the concerns raised by Walters.

*The destruction and removal of 900 kangaroos over three years equates to removal from the site of approximately 27 tonne of nutrient, a serious reduction of nutrient in the thin soils of the Silurian sediments of the site. Deep burial is not recommended because of the effect of nutrient / salt scald. And shallow burial will offer a nutrient source, particularly to foxes. (pp 19)*

Kangaroos were providing another valuable ecosystem service, being nutrient cycling. Not only does grazing promote growth in grasses, the kangaroos dung fertilises the landscape. Walters recognises that the animals are themselves “nutrients”, however fails to make any connection with the fact of their function in native bushland remnants and forests, while simultaneously identifying the fact that their loss will be to the detriment of the bushlands fertility.

Perhaps Walters has put his finger on something here, though. Maybe it is the “thin soils of the Silurian sediments” that account for what he has perceived as poor biodiversity values. Maybe instead, and not mentioned by Walters, (unquantified) poor cover values may have been influenced by drought. Instead Walters (2010) overlooks all other possibilities, simplistically blaming the kangaroos for something which he has otherwise failed to quantify or describe in any way.

*Two options are worthy of consideration. The first is the removal and conversion of carcasses to produce blood and bone for recycling back on site. The issue of commercial use, a potential restriction of the Wildlife Act 1975, might be circumvented on the grounds of native vegetation protection. To eliminate the possibility of commerce, a way may be found for the land manager to carry the cost of the conversion as part of the permit conditions – an offset, if you like. (pp 19)*

It is extraordinary that Walters considers it to be his role to advise a client how they may “circumvent” legislative constraints on the use of carcasses.

*Secondly, the natural decomposition of some carcasses may be possible above ground, if moveable steel, mesh and fly-proof cages are placed over them at selected sites. In this way, no nutritional advantage would be available to the fox of fly populations. (pp 19)*

As NMIT have not implemented any non-lethal measures to reduce (unquantified) damage, it seems unlikely that they will go to the expense of having “fly-proof” decomposition cages constructed. NMIT seem to want to limit their expenditure on “managing” their kangaroo “problem” to the engagement of a consultant (Walters), and a shooter.

What is a “fox of fly” population?

Walters (2010) final conclusion is that his report should accompany any application to destroy animals, recommending that 300 animals be destroyed per year for three years, with monitoring of the kangaroo population, and the “quality and quantity of the native vegetation”, thereafter (pp 19).

The monitoring of the kangaroo population, and the quality and quantity of native vegetation, should have occurred prior to the shooting of any kangaroos.

Walters’ report accompanying the application to destroy animals provided no grounds on which to approve the shooting – no baseline data on condition of vegetation, no evidence of impacted or declining biodiversity values, no evidence of impacts on fences, pasture, grapes, cereal crops, pasture / water fouling etc, and no charts describing the growth or other trajectory of the kangaroo population.

## Recommendations

Walters (2010) finishes with a summary of his recommendations:

- *Reduce the population over a period of three years, then allow the population to fluctuate between 50 and 250 animals depending on seasonal conditions (pp 19)*

Even if kangaroos were not rendered locally extinct by a three year eradication program, Walters does not appear able to decide if the population should be managed thereafter on the basis of scientific vegetation assessment and biomass measurements, or on fickle weather conditions. Seasonal conditions may trigger breeding, however they will continue to produce only one young per year, and given “lush” conditions and no quantified evidence of a food shortage, juvenile mortality at the site is also unlikely to significantly vary, with corresponding variations in recruitment to the population, on account of varying weather conditions.

As discussed previously, Walters has provided no reference describing how any target population or population range was determined. Further if the population was reduced to only 50 kangaroos, this would take 15 to 16 years to return to 250 animals, unless Walters were to provide some strategy to improve population growth rates, such as removal of foxes, which Walters did not provide.

- *The most straightforward population reduction will be by shooting. This has inherent difficulties due to the terrain and the proximity of occupied land. Contract a specialist to write and carry out a shooting protocol that satisfies the responsible authorities. (pp 19)*

Is NMIT able to produce a specialists report / plan which satisfies the reader that they took the recommendation that there were issues with public safety seriously? Given evidence of mis-shot animals (see below), it seems unlikely that NMIT implemented the activity with due consideration for public safety issues raised by Walters.

- *Ensure that designed off-take matches the actual population by re-counting along the set transects each June or July (pp 19)*

In no sense is 300 animals / year a “designed off-take”. There is absolutely no basis in evidence provided on which Walters (2010) recommended this figure, it seems to have been plucked from thin air, rather than “designed”.

Additionally there are references provided in this review contrary to Walters’ recommendation, which suggest that June or July surveys are *not* appropriate for long term survey.

- *Investigate means by which re-cycling of off-take nutrients can be made back on site, including through decomposition cages. (pp 19)*

Can NMIT provide evidence that this recommendation was followed up? What method of carcass disposal was implemented?

- *Reguate the off-take by using the maturation of a one quarter to one third proportion of native plants reach sexual maturity (pp 19)*

Recommendations are not the place to start providing figures for measurement; any target “maturation” rate for vegetation should be justified in text, and backed up with references, which Walters (2010) once again fails to do.

“Reguate” is not a word; the author of this review presumes that Walters meant “regulate”; otherwise the sentence is badly mangled and incomplete, grammatically.

- *The grazing population will be correct for any year if a proportion of native grasses and herbs are able to complete their life-cycle through to seed liberation.(pp 19)*

Apart from the spacing issue between this recommendation and the one above it, and the different font, this recommendation is a cut and paste from the body of the report (pp 18 in bold).

In a sense this recommendation seems to be just a less concise version of the recommendation preceding it.

- *Fence any productive paddocks that are within or close to the edge of the bushland to kangaroo and rabbit proof standard (pp 20)*

Introduce the concept of fauna friendly fencing, and fencing becomes a reasonable non-lethal control for situations where kangaroos and crops are in conflict (categorically not demonstrated by Walters to be the case at Northern Lodge).

In the cases of kangaroos and rabbits, fences will need to be around 8” high, with fine mesh, and dug in. In the authors opinion, NMIT implementing Walters’ first and second recommendations will preclude the need for construction of kangaroo fences.

- *Establish three kangaroo enclosures as a means of measuring grazer impact as well as providing protected sites for vulnerable native plants. (pp 20)*

It is illegal to contain kangaroos in enclosures without a licence. Perhaps Walters (2010) meant to suggest establishment of kangaroo **exclusion** enclosures, which would allow measurement of biomass / vegetation diversity in a non-grazed environment. Again this sort of study should have informed any decision to reduce the population of kangaroos – it should not be recommended after the shooting has already been conducted.

VULNERABLE is a term which has a legal definition. Walters (2010) has identified no vulnerable native plant species at the site, and NMIT introducing protection measures in this regard is impossible in the absence of such species.

## References

Walters includes 2 references to back up his work (pp 20)

Walters (2010) fails to include in this reference list even material which he has referred to in his report, and which has formed the fundamental basis on which his work was produced (importantly *WildlifeDensity*).

Further to this Walters has provided nothing in the way of references to studies on kangaroos, their biology and ecology, their grazing impact, or in fact anything at all to do with kangaroos. This is beyond extraordinary for a document purporting to be a kangaroo management plan.



## Reviewers Summary Statements

Walters opens his report stating that:

*The ideas, techniques and strategies outlined in this report remain the intellectual property of Ecoplan Australia Pty Ltd and are provided for use solely by the client. Any use outside this designated purpose, including the publishing of material, must only be carried out with the written consent of Ecoplan Australia Pty Ltd.*

The author of this review has not sought Ecoplans written consent to conduct this review. Nonetheless given the numerous deficiencies therein, the author of this review assures Ecoplan that no use will be made of their “ideas, techniques and strategies”, and that Ecoplans “intellectual property”, such as it is, remains their own.

As a general summary:

The Walters (2010) report has failed on numerous counts against which a scientific report is usually measured.

No details of qualifications of research staff, no dates / times of fieldwork, no details on conditions during assessment (eg, temperature, weather conditions etc), maps lack datum, scale and bearing. Errors such as the topography input data (approximately level) will have invalidated the analysis; incorrect and lazy application of the survey methodology, and invented parameter estimates (eg: a conspicuousness coefficient of 15m for Eastern Grey Kangaroos in “closed” habitat), are also factors likely to have created a significant positive skew to the calculated population. Incorrect conversion of the calculated standard error of “SE: 77” to “+/-70 kangaroos” was also very careless.

Fundamentally, the report does not provide any basis whatsoever on which to provide a recommendation to destroy animals, such as evidence of impacts, based on rigorous and repeatable methodologies, which have been demonstrated to be a consequence of kangaroos. Walters fails to consider other factors which could be influencing a perceived (but unquantified) low groundcover cover / abundance / diversity, such as drought, or other climatic or seasonal conditions, however he does describe soils as being poor and unfertile, without discussing the implications of this in terms of vegetation and its diversity.

No consideration is given to the worst case population estimate within the prescribed 95% confidence limits, which according to Walters (2010) would be only (710-77) 633 kangaroos. Assuming that the population calculation was correct in the first place (which this review does not necessarily accept), shooting 300 animals in this instance would indicate that there would be close to a 50% population reduction in Year 1 of the proposed shooting program.

In addition the report contains no pertinent references to studies which would normally back up statements and conclusions with regard to kangaroo management. Where the report does contain references, these often fail to appear in the reference list, and the reference list itself does not contain a single reference to kangaroos, their ecology and biology, nor their management.

Further, frequent spelling mistakes, including the misspelling of botanical names of plants, grammatical errors and other inconsistencies and mistakes, provide that the report is unlikely to have been subject to a qualified or even any peer or other review. It is extraordinary that this report could have been relied upon to inform an application to destroy protected native wildlife in Victoria.

It is a poor reflection on Victoria's consulting industry as a whole, if work like this is deemed acceptable. It is a poor reflection on DSE, that their "assessment" of this report, which supported the NMIT application to destroy protected fauna, failed to detect how completely inadequate the report was, and on the basis of this report provided an authorisation to shoot 300 kangaroos at the Northern Lodge, which with implementation was to the extreme detriment of the kangaroos subject to the authorisation.

DSE should conduct an internal review of their assessment and approvals process; further DSE should also be independently skills audited. Clearly they are completely incapable of assessing the merit of work being conducted in Victoria by environmental practitioners, and as such they are not a fit and appropriate organisation to oversee the management, welfare and protection of Victoria's kangaroos and other wildlife.

## Further Correspondence

15<sup>th</sup> December 2010

NMIT (Mr Peter Christie, Director Corporate Services) response to Ms Fiona Corke, directing that a Freedom of Information request, accompanied with a cheque for \$23.90, was required for NMIT to proceed with processing Ms Corkes' request for information pertaining to the application to cull Eastern Grey Kangaroos at Northern Lodge (NMIT).

Subsequently the fee was waived (*pers comm* F Corke) , and the Walters (2010) management plan and the authorisation permit were provided.

### Undated

DSE (Ms Kristy Aiken, Project Officer Freedom of Information) response to Ms Fiona Corke (ASK), providing a copy of the NMIT Application Form (Authority to Control Wildlife), dated 14<sup>th</sup> October 2010 (applicant name censored as "irrelevant").

The NMIT application for a permit to shoot kangaroos is a document central to the inadequacy and misinformation which informed the authorisation to destroy wildlife, which was granted to the proponent.

The application form includes as its first page measures discussing non-lethal management of native wildlife. With regard to wombats and kangaroos damaging fences:

*Destroying the animals causing damage to the fence will not prevent further fence damage by other individuals, and may, in the case of wombats, lead to increased damage when the new occupant of the territory makes its own holes in the fence (it will not necessarily use existing holes). The solution in both cases is to install a gate to protect your fence, permit the movement of the kangaroos or wombats, and prevent the escape of livestock.*

The application form goes on to provide designs for a Wombat Gate and a Kangaroo Gate.

In the first instance, Victoria's DSE have shown an uncommon and surprising lack of understanding of wombat ecology. Wombats have been shown to live in a semi-social sense, with multiple wombats occupying overlapping "territories", and with a single wombat "visiting" up to a dozen or so burrows, and ranging up to several kilometres, in a single night (Woodford 2001). Their social interactions in this environment remain poorly understood, however the DSE premise that shooting one wombat will necessarily mean that another wombat will "take over" the dead wombats "territory" is not based in fact.

This point is irrelevant to the matter in hand, which pertains only to the Eastern Grey Kangaroos subject to the proponents shooting program.

In this regard NMIT in their application provide no evidence that non-lethal methods to mitigate damage to fences via inclusion of kangaroo gates has been attempted, despite the Northern Lodge property being valued at \$4M, NMIT having an annual income of around \$150M, and very modest costs associated with such modifications.

Average wage for staff member in 2009: \$122 424; NMIT accumulated surplus of more than \$65M; NMIT total equity of over \$250M. Yet NMIT have made no move to construct kangaroo gates, for a few hundreds or at most a couple of thousands of dollars, instead electing to pay Walters thousands of dollars to write something that fails every test as a scientific document, and a shooter thousands of dollars to shoot the animals.

With regard to kangaroos competing for food:

*Balance your domestic stock density to accommodate some kangaroos. Improve pasture. Control weeds and grazing by rabbits to provide shared food source for stock and kangaroos.*

Walters (2010) states that only 45ha of the property, being “previously cleared land” is dedicated to grazing for the NMIT horses, and that the remaining area [c. 260ha] is bushland in which “grazing by horses...” “...does not conform with native vegetation practice...” and “is not a land use practice.”

Walters (2010) goes on to cite:

*A noticeable reduction in natural biodiversity is evident throughout most of the bushland through the grazing of kangaroos*

Note, this statement identifies that the kangaroos are occupying the bushland (from which horses are absent), not the cleared horse paddocks. This being the case, kangaroos and horses are categorically *not* in competition for food resources in the bushland area (simply on account of the reported horse’s absence from this area).

Nowhere does Walters (2010) provide details or evidence of impacts of kangaroos in the “cleared” horse paddocks, which NMIT Northern Lodge’s own website describes as “lush” ([http://www.nmit.edu.au/studyareas/equine\\_studies](http://www.nmit.edu.au/studyareas/equine_studies)). Further Walters (2010) provides observations of only 17 kangaroos in “cleared” habitat (pp 12), compared to 259 kangaroos observed in “bushland” habitat (pp 10).

“Dry Stock Equivalent” (DSE in this box) is a measure by which grazing pressure of various animals can be compared. A light horse is given to have a DSE of 10. The NMIT horses, being highly trained and heavily exercised animals however, would probably be more properly classed as horses in “heavy work”: the Department of Primary Industries (NSW) provides a DSE for horses in this situation of 18.6 (Prime Facts 2009).

By comparison the DSE for kangaroos has been revised downward from 0.7 in recent years, variously by different researchers, to 0.2 (Grigg 2002) and (based on captive research) 0.48 (Dawson & Munn 2007).

If the lowest DSE score is applied to the horses (10) and the highest DSE score is applied to kangaroos (0.48), the 25 horses which are housed on-site provide the grazing equivalent of (25x10x2) 500 kangaroos.

If the higher end of the scale is applied to the horses (working horse DSE 18.6) and DSE 0.48 is applied to the kangaroos, the 25 horses on site are equivalent to (25x18.6x2) 930 kangaroos.

If the higher end of the scale is applied to the horses (working horse DSE 18.6) and Griggs (2002) DSE 0.2 is applied to kangaroos, the 25 horses on site are having a grazing equivalent to (25x18.6x5) **2325** kangaroos.

Given that the 25 NMIT horses are applying *at minimum* an equivalent grazing pressure of 500 kangaroos within the Northern Lodges to only 45ha of “lush pastures” (NMIT’s own website description), it seems a ludicrous position for Walters (2010) to posit that grazing pressure from 710 (+/- 77) kangaroos, spread across an area of 260ha, could be having impacts on the sites vegetation or biodiversity values.

Further, given that 25 horses could be exerting as high an equivalent grazing pressure as 2325 kangaroos in the “open” habitat, against an observed 17 kangaroos in this habitat, the issue of kangaroos providing significant competition for feed resources in the lush “open” habitat is clearly ridiculous. 17 kangaroos against a horse grazing pressure equivalent to over 2000 kangaroos is in no way significant (0.7% is not significant statistically).

Additionally Walters nowhere describes or considers grazing pressure from other herbivores which may occur at the site. No species list is provided, however Walters does identify rabbits as occurring. Hares are also likely, as are other species of macropod, and the reviewer has been told there is also a sheep, and possibly deer at the site (*pers comm* F Corke). In the absence of any discussion of other herbivores and their contributions to total grazing pressure, in the absence of any evidence that Eastern Grey Kangaroos may be responsible for an (unquantified) poor condition of vegetation / groundcover / biodiversity, and in the absence of any consideration of other factors which may have a bearing, such as drought, any conclusion that any “impacts” are a consequence of kangaroo grazing is without basis in fact.

These facts indicate that negligible, if any, competition for feed between the kangaroos and horses at Northern Lodge exists, and this can in no sense be cited as a justifiable cause for the destruction of 300 kangaroos.

Pople & McLeod (2000) and Olsen & Braysher (2000) both reviewed studies of competition for feed between kangaroos and sheep, and both concluded that competition seldom occurs, either because food is not limiting, or because food choices or feeding sites differ.

The NMIT site appears to be well grassed at the time of this review, based on photos of the site provided by Ms Sutterby, it would seem to be the case that feed is not a limiting factor at Northern Lodge.

In the absence of any contrary evidence, or quantified reductions in groundcover demonstrating that kangaroos are in fact competing with horses for feed on behalf of NMIT or their “expert”, and in the light of the conclusions of Pople & McLeod (2000) and Olsen & Braysher (2000), conclusions that state that in fact kangaroos and stock rarely compete for feed, this “reason” for shooting to alleviate “damage” is unjustified.

In fact with regard to shooting kangaroos for the purposes of damage mitigation, Olsen & Low (2006) state:

*The discontinuation of damage mitigation as grounds for harvesting is in many ways a more honest approach to kangaroo management, given that damage is difficult to monitor, predict, or even prove empirically to be an issue...*

and that:

*...New South Wales has rationalised its approach, rejecting damage mitigation as a justification for management [shooting] in part because it was not being audited, and it would be impractical to do so. Indeed there is little convincing evidence of substantial damage by kangaroos to crops, pastoral production or rangelands, except in a few localised areas.*

And indeed claims that kangaroos have and continue to damage fences, as indicated by the ticked “Kind of Problem Being Caused” box on the permit application, remains unproven in the material reviewed.

Ms Sutterby has provided photos of steel rail fences which bound the horse paddocks, which could not be damaged by kangaroos in any event, as well as photos of decrepit and old boundary fences. NMIT do not appear to have spent money maintaining the old boundary fences since taking over the property in 1993, so while kangaroos may still be occasionally strung up in fences, they can not be charged with causing significant damage to this infrastructure, given the ongoing neglect on behalf of NMIT.

#### 7. Non-lethal methods of control currently used

The applicant has ticked the “Yes” box indicating that they are currently using non-lethal methods to reduce the problem, then citing “Fencing and Scaring”.

Neither “fencing” nor “scaring” are recommended as non-lethal control measures for kangaroos on the application to destroy form, however exclusion is recommended when DSE advise that persons should attempt non-lethal controls, on the approved authority.

NMIT have provided no evidence that they have attempted exclusion fencing for kangaroos, indeed their rail fencing could be said to be a good example of fauna friendly fencing, which would not impede kangaroos, nor cause a risk of entanglement or injury.

Scaring in the context of the ATCW principally refers to use of deterrents such as gas guns or artificial predators used to frighten birds away from crops, such as grapes, and is not something that is recommended for kangaroos.

As discussed above, Northern Lodge have done nothing to reduce “damage to fences” via inclusion of kangaroo gates in their fences, and in any event the steel rail fences cannot be damaged by kangaroos, and boundary fences are in a poor state of repair from years of neglect, rather than demonstrably from interference by kangaroos.

This being the case the applicant cannot be said to have been using non-lethal control measures at the time of their filling out the application. Their ticking the “Yes” box can be taken to have been provision of deliberately false and misleading information, assurance against which the application requires the applicant to sign at 12. on the application form.

#### 8. Method of Wildlife Control Sought

This section includes the directive that:

*Non-lethal methods of control should be attempted before lethal methods*

The applicant has ticked the “Destroy” box.

As discussed above, there has been no attempt by NMIT to control the “problem” via non-lethal methods.

## 10. Kind of problem being caused

The applicant has ticked the following boxes:

- Trampling crop
- Eating fruit crop (including grapes)
- Eating pasture
- Damaging fences
- Eating germinating cereal crop
- Eating trees
- Fouling pasture, crops or water

As discussed in the review of Walters (2010) and above, neither the Walters report nor anything NMIT have produced provides evidence of any of these “problems”. To address each point:

Trampling crop: NMIT have no crops, Walters (2010) specifically refers to “crop production” (pp 4), and states that:

*These paddocks have been abandoned due to the [unproven] pressure of grazing by kangaroos with no yields for stock for a number of years*

Walters (2010) goes on to provide observations of only 17 kangaroos in the “open” habitat, however nowhere describes kangaroos impacting, via trampling, “crops”.

NMIT ticking this box was deliberately false and misleading.

Eating fruit crop (including grapes): This option on the application form is provided for primary producers who are being affected by birds which are eating their fruit crop: kangaroos are not known eat grapes. If this is happening at the Northern Lodge, Walters or NMIT need to provide photographic evidence of this; this would be an important contribution to science and our understanding of kangaroos.

NMIT ticking this box was deliberately false and misleading.

Eating pasture: Walters (2010) gives that kangaroos and horses occupy different areas of the Northern Lodge lands, NMIT provides that they have “45 ha of lush pasture”, in which up to 17 kangaroos may have been observed, competing with a horse grazing equivalent of up to 2325 kangaroos. Controlling an animal which is only shown to be consuming less than 1% of the pasture, on the unreliable advice provided by Walters (2010), is hardly justifiable.

Additionally research has shown that kangaroos do not compete for feed with stock where the amount of food is not a limiting factor. “Lush” is not limited, and Walters (2010) nowhere provides evidence that kangaroos are having any impact on pasture.

It is accepted that NMIT, acting on the advice of Walters (2010), may have ticked this box on the basis of incorrect an unsubstantiated advice.

Damaging fences: This has been discussed above. Rail fences cannot be damaged by kangaroos; there is no evidence presented by Walters (2010) that kangaroos have damaged other fences at the site; their poor state of repair is more likely a consequence of ongoing neglect on the part of NMIT. NMIT have made no attempt to build kangaroo gates to minimise impacts of kangaroos on fences, if indeed this is occurring.



It is accepted that NMIT, acting on the advice of Walters (2010), may have ticked this box on the basis of incorrect and unsubstantiated advice.

Eating germinating cereal crop: No evidence is provided that Northern Lodge has a germinating cereal crop – all descriptions of the site describe only “lush pasture”, “bushland” and “viticulture”.

NMIT ticking this box was deliberately false and misleading.

Eating trees: While during bad winters Eastern Grey Kangaroos have been observed to strip bark off eucalypts (Dawson 1995), kangaroos are grazers (they eat grasses and forbs), not browsers (like wallabies, which are known to eat grass, and to browse on foliage, including on occasion planted trees). Nowhere is there evidence that NMIT have planted trees (which could be susceptible to wallaby browsing); the suggestion that kangaroos need to be shot because they “eat trees” is absurd.

No evidence has been presented anywhere in the paperwork pertaining to the shooting of kangaroos at Northern Lodge, that kangaroos have been “eating trees” at Northern Lodge; NMIT ticking this box was false and misleading.

Fouling pasture, crops or water: No evidence of this is presented by Walters (2010), in fact it is not even mentioned. Kangaroo droppings are nowhere discussed as contributing a significant percentage to ground cover, indeed in the EVC 23 area Walters (2010) states there is “little sign of kangaroos”.

There is no evidence presented that kangaroos occur at the site in such abundance that they are fouling pasture, (non-existent) crops, or water, and in fact no droppings at all are visible in the photo provided on pp 16, in which the foreground clearly shows where “edge clearing” has opened up, according to Walters, additional habitat (food resources) for kangaroos.

No evidence has been presented anywhere in the paperwork pertaining to the shooting of kangaroos at Northern Lodge, that kangaroos have been “fouling pasture, crops or water” at Northern Lodge; NMIT ticking this box was false and misleading.

Given that NMIT **know** that they do not have cereal crops however, and given that they ticked the box that kangaroos have been eating their (non-existent) cereal crop, s. 25A of the *Wildlife Act 1975* applies, ie:

*25A.. Mandatory cancellation of licences*

*(1) The Secretary must cancel a licence issued under this Part if the Secretary is satisfied on reasonable grounds that the holder knowingly provided false or misleading information with the application*

Again, NMIT **do not** have cereal crops – they obviously know this, describing the site only as lush pasture, vineyards, bushland and training facilities. NMIT’s ticking this box was irrefutably known by NMIT to be false and misleading, and the Secretary has no option but to cancel the licence.

### Landowner Land Management Self Assessment

NMIT provides unsubstantiated claims that:

*Eastern Grey Kangaroos are eating out recently renovated pastures, and existing pastures, [and] damaging boundary and internal fencing on property*

No evidence of this is provided, certainly not by their consultants report (Walters 2010).

With regard to non-lethal measures which the application requires the applicant to describe, NMIT admit to:

*Scaring them, by driving around paddock tooting horn*

In the first instance this is not an acceptable non-lethal management option for kangaroos. Indeed scaring kangaroos in this way creates animal welfare and cruelty concerns, where panicked animals may be frightened into or over fences, where entanglement, injuries or death can occur, and at which point at-foot joeys can become separated from their dam (mother). In this way NMIT themselves are more likely to cause damage to fences through their actions, than kangaroos in their daily activities, carefully negotiating known routes across the site, and through fences.

In the second instance these activities are in breach of the Victorian *Wildlife Act 1975*, to wit:

*s. 58. Molesting and disturbing etc protected wildlife*

*(1) Any person who*

*(a) wilfully molests or injures protected wildlife or wilfully causes protected wildlife to be molested or injured*

*(b) wilfully disturbs, chases or herds protected wildlife or wilfully causes protected wildlife to be disturbed, chased or herded*

*(c) wilfully separates protected wildlife from its young or causes it to be separated*

*shall be guilty of an offence against this Act.*

*Penalty: 20 units*

Given this voluntary disclosure with regard to “scaring” animals, provided by NMIT on their application to destroy wildlife, and the high likelihood of this action resulting in the separation of at-foot joeys from their mothers, the fact of NMIT’s breach in this seems incontestable.

With regard to management of plant pests, NMIT provide that they have been:

*Spraying undesirable weeds and species annually*

The correct spelling is “undesirable”. This from an institution of learning is a minor matter of concern, given their other inadequacies as discussed herein.

29<sup>th</sup> December 2010

DSE (Mr Simon Smith, Acting Executive Director, Biodiversity & Ecosystem Services) response to Ms Fiona Corke, “re-examining” the approval, and validating it, on grounds that:

*The ATCW issued for the NMIT Eden Park campus is aimed at providing for a sustainable kangaroo population in the area and for the negative impacts on biodiversity values to be minimised. At the same time, impacts on NMIT's enterprises at the site will also be reduced.*

As discussed above, the Walters (2010) report does not provide any evidence of impacts of kangaroos on biodiversity values at the site, nor does the Walters (2010) report detail any impacts of kangaroos on NMIT enterprises at the site.

The DSE, in approving this application to shoot Eastern Grey Kangaroos at Northern Lodge, on the basis of the Walters (2010) report and a bunch of ticked boxes (with no evidence to support claims of damage), have failed to provide any evidence of due diligence in assessing the validity of the application to shoot.

Further:

*...there are no viable options that would reduce the current population without simply displacing the problem to adjoining land owners, who have also expressed concern over kangaroo numbers*

DSE has provided no evidence that they have investigated or recommended alternative non-lethal management measures which may be suitable for the Northern Lodge, nor have they insisted on any other (non-lethal) management options for the Northern Lodge (NMIT) Eastern Grey Kangaroo population.

The Department has provided no details of communications from nearby residents expressing concern over kangaroo numbers.

The author has therefore relied upon the Whittlesea Leader for comment on how the local community has responded to the shooting of kangaroos at the Northern Lodge (NMIT) site. Some abbreviated community comments are reproduced in Appendix 2 (from the Whittlesea Leader).

The authors count of responses to 11 items published in the Whittlesea Leader follow:

Against Culling:	144
For Culling:	16
Irrelevant:	3

The author accepts that some people will have provided comments on more than one occasion – this is true for both the “Against Culling” and the “For Culling” camps.

If DSE are going to make statements that the local community is concerned about kangaroo numbers, DSE need to provide evidence that they have consulted the local community, that the community concerns are valid (ie: provide evidence that numbers are unacceptably high), and that the prevailing view is that the kangaroos should be shot.

Options such as translocating excess animals (if it could have been proven that there were in fact excess animals) to de-populated environments (for example areas where the 2010 fires may have caused declines in wildlife numbers) is nowhere considered or discussed.

An authorisation is attached (Authority No: 13915799). The authorisation goes on to list conditions of the authorisation to shoot animals, including:

2. Kangaroos (including wallabies) and wombats shall be destroyed only by a centre fire rifle, fitted with a telescopic sight. Rifle must have centre fire case capacity of at least .222 Remington. Ammunition shall have an expanding projectile (soft or hollow point) of not less than 3.24g (50 grains).

5. Wherever possible mammals should be killed by a single shot to the head.

9. Wounded animals (including birds) must be tracked down immediately and killed humanely. In the case of marsupials, young in the pouch must be killed immediately by destroying the brain, and young at heel must be located and killed humanely.

A .222 rifle is a high velocity weapon (with muzzle speeds exceeding 3000 fps), designed (if used appropriately and competently) to cause the instantaneous death of the target animal.

*The .222 Remington is a fine varmint cartridge out to about 225 yards*  
([http://www.chuckhawks.com/22\\_centerfire\\_cartridges.htm](http://www.chuckhawks.com/22_centerfire_cartridges.htm))

Evidence of mis-hit animals has been presented to the author of this review, including photos of dead animals, and a veterinarian's autopsy report (attached as Appendix 1). The autopsy report describes a dead animal, which on examination, in the vets opinion, had died as a consequence of having been shot in the leg. On the evidence of a considerable quantity of faeces around the dead animal, the vets conclusion was that the kangaroo had taken a considerable amount of time to die an agonising death. This animal had obviously not been "tracked down immediately and killed humanely".

The leg of a kangaroo is a long way from its head. Other animals found dead at the site and reported by Ms Sutterby are described as having been shot in the body (*pers comm*); photographs of the corpses provide evidence of this. It is clear there have been non-compliance issues with conditions 5 and 9 of the licence.

Additionally the agent authorised to "control" (shoot) the wildlife (given as Mr Craig D Draper on Authority No: 13915799) has obviously not demonstrated competency in carrying out his duties. With nearby and surrounding residential dwellings, incompetent use of a high velocity weapon has placed the public in considerable danger of being struck by mis-directed projectiles.

NMIT, DSE and the shooter are fortunate at this stage that they are not dealing with something more serious than issues surrounding an inadequate planning and assessment process, dereliction of care in the approvals process, dereliction in enforcing compliance, and allowing and causing cruelty to affected animals.

***NB: THE DESTRUCTION OF WILDLIFE SHOULD BE USED ONLY TO REINFORCE OTHER, NON-LETHAL MEANS OF REDUCING DAMAGE BY WILDLIFE, SUCH AS SCARING OR EXCLUSION.***

The author of this review presumes that the reason that the department has capitalised this recommendation is because DSE think this is an important point that they would like to reinforce with potential applicants. For the readers information, "scaring" refers to use of gas guns or other bird deterrents, not chasing after kangaroos in cars, "tooting the horn".

Nonetheless the DSE authorised the killing of 300 kangaroos, without NMIT or their agent (Walters) providing any evidence that in fact *any* non-lethal measures had been attempted to manage the

(unquantified) “problem”. In fact the only measure which NMIT did describe (ie: “scaring”), was clearly in breach of legislation with regard to wildlife management (see above).

*THE SHOOTER MUST ENSURE THAT HE/SHE IS COMPETENT TO UNDERTAKE THE HUMANE DESTRUCTION OF WILDLIFE*

Again capitalisation indicates that the DSE considers this to be an important point. The veterinarians autopsy report (included as Appendix 1 in this report) shows that the shooter has failed to demonstrate competency in the humane destruction of wildlife.

10<sup>th</sup> January 2011

Letter from Ms Fiona Corke to Mr Mark Winfield (DSE Manager Biodiversity), asking for a response to 14 questions. 14 answers are attached (undated on the copy provided to the reviewer).

*Answer 1: ATCW can be issued where wildlife is damaging any building, vineyard, orchard, crop, tree, pasture, habitat or other property, or to support a wildlife management plan. Each assessment of an ATCW application considers damaged [reviewers correction] caused by wildlife and the use of non-lethal methods of control, such as fencing. In this case, fencing of cropped areas is not feasible due to practicality and expense.*

No evidence is provided by NMIT, nor in their supporting documentation (the Walters 2010 report) of damage to anything. The “wildlife management plan” provided by NMIT in support of their application (the Walters 2010 report) fails at every stage to satisfy the reader that it was prepared by a qualified and competent practitioner. No non-lethal measures to address the (unquantified) “damage” have been attempted. There are no “cropped areas” at NMIT, and kangaroo abundance within the “lush” horse grazing area is shown by Walters (2010) to be extremely low (17 kangaroos, against an equivalent grazing pressure of horses equal to over 2000 kangaroos).

The “feasibility” of exclusion fencing is nowhere considered, itemised or quantified.

*Answer 2: The use of non-lethal methods of control at the NMIT site has not been effective and additional methods would be ineffective at reducing the population of kangaroos.*

No non-lethal management has been attempted at the NMIT site, no documents providing evidence of failed attempts at non-lethal management have been provided by NMIT. No impacts of kangaroos have been quantified at the site, nor has any spurious claim of degradation been proven to have been caused by kangaroos. No evidence was provided to the DSE that support claims that the population needed to be reduced.

*Answer 3: The statement “the destruction of wildlife should only be used to reinforce other, non-lethal means of reducing damage by wildlife, such as scaring or exclusion” applies to all species of wildlife*

The reviewers interpretation of the *Wildlife Act 1975* suggests that “scaring” of native wildlife is a breach of s. 58 (1)(b) of the Act. The reviewers understanding of “scaring” as referred to on the permit application, is that this refers to use of gas guns and artificial predator deterrents in orchards

and vineyards, to scare birds. The author of this review would welcome Mr Winfields further clarification on whether it is appropriate and acceptable to chase kangaroos in cars, tooting the horn.

*Answer 4A: The ATCW balances the need to provide for a sustainable wildlife population in the area, minimise the detrimental impacts on biodiversity values, and the impact on other important assets.*

The authorisation provided does not provide balance or sustainability at all. In fact the destruction of 300 kangaroos at the Northern Lodge places at risk of extinction the population of kangaroos residing there. The proposal in their “management plan” to destroy 300 per year for three years, followed by 50 per year thereafter makes this a certainty. No evidence was provided to DSE of impacts on biodiversity values, or other “important assets” at the site.

Indeed given that Walters (2010) at times describes areas of the Northern Lodge lands as showing “little sign” of kangaroos (north of Glenburnie Road), and otherwise that vegetation on ridge crests is vigorous and diverse, with few kangaroos, there is ample evidence that in fact kangaroos *are not* having a deleterious impact on vegetation / natural biodiversity values.

*Answer 4B: ATCW permits are issued for specific parcels of land. Consultation with neighbouring landholders is not required by section 28A of the Wildlife Act 1975. However, a special condition was attached to the NMIT permit requiring notification to neighbouring landholders.*

Why then did DSE bother in previous correspondence (discussed above) to attempt to use their view of responses from the local community where they had “*expressed concern over kangaroo numbers*”, as a justification for approving the destruction via shooting of 300 kangaroos?

*Answer 5: The kangaroo management plan states at paragraph 2 on page 4 that there is “a noticeable reduction in natural biodiversity... throughout most of the bushland through the grazing of kangaroos”.*

Indeed this is the case, the Walters (2010) report does make this claim. It also fails in every sense to provide any evidence to support this statement, and it fails to discuss other factors which may contribute to deteriorating or degraded biodiversity values (if any such deterioration or degradation could be proven).

DSE should not have relied upon the unquantified claims provided in Walters’ “kangaroo management plan” when they approved the destruction of kangaroos at Northern Lodge, given the reports obvious and numerous deficiencies, including a complete lack of evidence supporting a theory of impact from kangaroo grazing, and contrary to evidence supplied by Walters, of areas with “little sign” of kangaroos, and descriptions of areas where vegetation is vigorous and diverse, with “few kangaroos”.

*Answer 6: The kangaroo management plan did not recommend an independent ecological flora survey*

From page 17 of the Walters (2010) report:

*In the EVC’s identified, there is a strong likelihood that listed flora exists on the study area and an independent flora assessment should be considered to identify such species or communities.*

Winfields response in this instance brings into question whether the office authorising the destruction of kangaroos at the site even carefully read the documentation supporting the NMIT application to destroy native wildlife.

*Answer 7: An independent flora survey was not deemed necessary*

A flora survey, quantifying vegetation and biodiversity values and demonstrating impacts of kangaroos, should have informed the decision to shoot the kangaroos in the first place. Walters (2010) comes to a conclusion to destroy animals in the absence of any such consideration.

DSE obviously agree with Walters that evidence based decisions are not a requirement in authorising the destruction of protected native wildlife.

*Answer 8: The ATCW and agreement with the permit holder will not result in a rapid reduction in the kangaroo population. The destruction of kangaroos will be limited to a short period at the commencement of each quarter, with a re-assessment of the number of kangaroos after each period.*

Interestingly Walters (2010) refers to what will happen under the Ecoplan plan (from pp 17):

*A rapid population reduction...*

Implementing a shooting program over a “short period” (DSE’s term), where an approval provides that 300 kangaroos can be destroyed in a reported population of 710 (+/- 77) kangaroos, must be accepted to have potential to result in a rapid population reduction, counter to DSE’s position on this.

This point notwithstanding, nowhere in the material provided to the reviewer is there evidence of an “agreement” with the permit holder to limit numbers shot, or to conduct shooting “at the start of each quarter”, or to “re-assess the number of kangaroos after each period”. Have 300 tags been handed over? If so, how does DSE intend to ensure that their (unseen) “agreement” conditions will be complied with?

In addition Ms Corke’s question illustrated the point that NMIT destroying kangaroos would in fact increase proliferation of exotic species at the site, a point made in NMIT’s own “kangaroo management plan” (the Walters 2010 report). Mr Winfield completely fails to address this aspect of the actual question.

*Answer 9: The ATCW permit takes into account overall land management practices at the NMIT property. All species of deer are recognised as wildlife under the Wildlife Act 1975.*

The question as framed by Ms Corke in this instance was inquiring as to why the NMIT were attempting to destroy kangaroos as a first step in improving vegetation / biodiversity values, instead of addressing other issues which may be affecting the conservation values at the site such as erosion, rabbits and possibly deer. Mr Winfield has completely failed to answer this question.

*Answer 10: The kangaroo management plan seeks to achieve a sustainable population of kangaroos, taking into account current land uses at the NMIT site and local biodiversity.*



The Walters (2010) “kangaroo management plan” seeks no such thing. It contains no reference to studies on kangaroo impacts or their management, it seems to have plucked figures for the cull out of thin air, and without any consideration of the biology / ecology of kangaroos at all, it has recommended three paths to the destruction of the entire population. Nothing about the sites “biodiversity”, or reported impacts by kangaroos on biodiversity values, is quantified.

*Answer 11: Every application for an ATCW requires a current estimate of the number of wildlife causing damage. The kangaroo management plan recommends re-counts along the designated transects each June or July to ensure the off-take is in line with the current population.*

So many errors found their way into the Walters (2010) population estimate, that the calculated population of 710 (+/- 77) kangaroos simply has no validity. Ecoplan recommending “re-counts”, in “June or July”, given their absolute failure to competently do this in the first place, provides no confidence in their capacity to deliver sound science in any future assessments, and their recommendation to conduct counts in winter is directly contrary to recommended long-term kangaroo population survey methodologies.

*Answer 12: Every application for an ATCW requires a current estimate of the number of wildlife causing damage.*

As this is the same answer as that given to Question 11, the same response applies.

However the questions themselves were different questions. Mr Winfield did not specify whether any future counts would need to address or quantify issues pertaining to damage to crops or biodiversity, as inquired on the part of Ms Corke.

*Answer 13: The kangaroo exclusion plots are recommended to allow an assessment of grazing impact and to protect native flora species. These plots are not referred to in terms of excluding kangaroos from cropped areas.*

Walters (2010) does not recommend “exclusion plots”, in fact he specifically recommends “kangaroo enclosures” as a means to measure grazer impacts on native vegetation (pp 20). While Walters may have meant to recommend “exclusion plots”, he did not, and DSE were not correct in their interpretation of the Walters (2010) report to assume this. DSE should have directed Walters and NMIT that “kangaroo enclosures” are not permitted.

*Question 14: The Wildlife Act 1975 prohibits the commercial use of wildlife destroyed under an ATCW.*

Did DSE advise Walters and NMIT of this fact? Have DSE taken any measures against Walters for recommending that NMIT may be able to “circumvent” these restrictions?

## Conclusion

It is astounding that to kill native wildlife in Victoria, all an applicant needs to do is tick some boxes. There is no onus upon the proponent to provide proof of damage, evidence of abundance, or anything. There is no independent or qualified site or population assessment by DSE, there are no compliance checks, there is no safety assurance.

Indeed, the reviewer has very serious concerns based on the review of the EcoPlan material - these can be summarised:

- The Walters report has not in the opinion of the reviewer been produced competently – the poor standard in form and content is less than would be expected from a capable undergraduate student; it is an extremely poor example of what would be expected from a practicing zoologist. The EcoPlan report demonstrates no scientific method, no data, no considered analysis, and no evidence, and as a consequence of these fundamental failings, the reviewer can have no confidence in the “results” or conclusions.
- It appears to the reviewer that Mr Walters has advised his client that they may be able to “circumvent” provisions of wildlife protection legislation, and has otherwise played a facilitatory role in enabling the destruction of native wildlife. The balance and non-bias that is expected of a scientist is completely lacking from the material reviewed; the approach taken by Mr Walters has been more in the capacity of an advocate (to shoot them), which is completely inappropriate when informing a program for management of the states native animals.

Further to this, when a “management plan” has been prepared to justify the destruction of native wildlife, even if it has been prepared without any scientific rigour, in a format which completely fails to comply with the scientific process (including even incorrect application of software, and with a complete lack of supporting references to back up conclusions and recommendations), it seems to ensure provision by the Department of an authority to destroy. DSE’s review of the NMIT application and supporting documents in this instance smacks of negligence and/or incompetence.

The skills base at DSE needs to be audited, and the procedure for the assessment and destruction of protected native wildlife in Victoria, and the provision of licences to consultants to practice in the area of wildlife management in Victoria, clearly needs to be reviewed in light of these conclusions.

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## Appendix 1. Veterinarians' Autopsy Report.

Hi Fiona

On March 26th, 2011, I examined the body of a dead female eastern grey kangaroo, found at NMIT Eden Park. The kangaroo was in a state of decay, with a very heavy loading of maggots. A large hole was evident in her ventral abdomen. The abdominal contents (intestines) were missing. There was no evidence of injury to the head, thorax and arms. The left femur (thigh bone) was fractured.

The head, body and thighs of the kangaroo were subsequently x-rayed. No damage to bones was noted in the head, neck, thorax and abdomen. The right femur was intact. The fracture to the left femur was confirmed. The fracture was classified as a comminuted fracture (the bone is fractured into many small pieces), typical of a high velocity injury. Radiodense objects were also noted on the xray of the left femur. These were located mostly in the caudal musculature of the thigh. It is my opinion that these radiodense objects are bullet fragments.

It is my opinion that the fractured femur is the result of bullet injury. No entry wound was noted on the animal, but due to the positioning of the bullet fragments and the larger bone fragments, I suspect that this kangaroo was shot from in front, with the bullets ending up in the left thigh.

She would mostly likely have died as a result of complications associated with the bullet injury. On the video provided, a large amount of faeces was present at the exact location where she was found, indicating that her death would not have been instantaneous, rather, her death would more likely be slow and agonising.

Yours sincerely

Alistair Brown BSc, BVMS, CertFHP, MACVSc

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## Appendix 2. From the Whittlesea Leader – Community Comments

Totals from 11 Whittlesea Articles reviewed:

Against Culling:	144
For Culling:	16
Irrelevant:	3

Abbreviated and uncorrected examples are reproduced below, with permission.

### Against Culling:

**Lisa:** What an absolute disgrace. As an Eden Park resident and an Australian citizen, I am outraged and embarrassed of the DSE. We all know now that they obviously don't give a damn what the NMIT are doing with their illegal killings. I am not going away DSE or NMIT, I will fight you on my own if I have to only to save my wildlife!

**Brian M:** Mr. Smith has supported the party line, absolutely no conscience or respect for wildlife, pity. The Council are doing a great job, against a formidable group of business only interested parties.

**Lyn:** DSE will stick by the easy option - shoot to kill. It will not matter how many are gutshot and die in agony or how many joeys are orphaned and left to die. Nor will it matter that the whole population could be wiped out so that NMIT can save on fencing for their grapevines. Why should they care? This is DSE's way of 'managing' native fauna, and there is nothing anyone can do to stop them.

**Carola Anstis:** No matter which party is in government, no Environment Minister ever stands up for our wildlife. The answer to any perceived wildlife problem is always to kill. Suggestions made by informed and experienced wildlife rescuers and groups to solve any perceived problems with wildlife and which would cost the government nothing to undertake, are flatly ignored.

**Alistair:** Where is the evidence that there is an overpopulation of roos at Eden Park? Why did it take the minister a month to respond to the council if there is clear evidence that a cull needs to happen?

**James:** For wildlife to survive, the gene pool needs to be able to function via the natural dispersal of males, for this to happen we need to stop killing them and we need safe connected habitat.

**Suzanne Lawton-Clarke:** The government seems to be either out of touch with what the community wants, or just plain doesn't care. Anybody paying attention, or do you only want to hear from shooters - kangaroos, ducks, sorry you don't seem to have any worth!

**Elizabeth:** ...and slaughtering healthy kangaroos and pouch young in this manner is 'ethically cruel'.

**Cienwen Hickey:** The 'shoot' as she calls it was not done quickly and secretly, the culling so far has been undertaken by a shooter who doesn't seem to know where the head of a Kangaroo is and has repeatedly shot these animals in the body causing an agonizing death. Her comment "or else nutters would be running around trying to take bullets for poor female kangaroos and their babies" is biased and disparaging it is a poor attempt to bring discredit to those who are trying to save the Kangaroos at Eden Park who happen to be the residents.

**C Steven:** You'd think the Environmental Minister would come back with a more informative response, and possibly some information and evidence regarding the merit and justification of the cull which has not been made public, and is exactly what the Eden park locals have the right to see, and understand.

**Lisa:** For too long these sorts of organisations have been a 'law unto themselves' and have to answer to NO ONE! Keep fighting for the protection of the kangaroos and the exposure of animal cruelty. And anyone that supports such horrors to be inflicted upon such a beautiful animal as the kangaroo - shame on you!

Now how on earth do I explain to the children who adored having the kangaroos in their back yard that they are now all dead? This is a total disgrace and the NMIT must be held accountable!

**Louise B:** The minister is certainly showing that he is inexperienced when it comes to wildlife management. He is following the DSE logic of no wildlife is good wildlife. There is no need for this cull.

Not only do we have shooters in the close vicinity of our homes, but they are dangerously bad shooters. I guess it will just be a matter of time before some of these poor cull victims make it to our backyards. It is a really disturbing thought. We will have to either manage horribly injured kangaroos or have dead kangaroos on our property attracting foxes. I just hope my kids don't find them first. This whole thing is a mess. NMIT need to be stopped.

**Frank N:** Whittlesea Council you have come up against the worst of the worst, please keep trying, we all want to know what is behind this totally unnecessary destruction of our kangaroo population, we are starting to believe that only want target practice, they certainly need it.

**Daniel J:** Mr. Smith, Environment Minister, what a disappointment you have aligned yourself with the spineless wall of evil that wants nothing better than to wipe out our national emblem any way they can, no matter how cruel. Mr. Smith there is no need for this cull, have you been to the area? The few kangaroos left will displace themselves to the adjoining landowners naturally and will be welcomed. Leave them alone, if a problem arises, review the situation.

**Karl W:** Your explanation for the poor shooting and subsequent cruel and horrible deaths of many of the kangaroos is laughable, they are hopeless shots and should not be let loose with guns, especially when there are houses nearby.

**Gemma:** I think that the councils idea to form a collective voice against the approval process of Authority to Control Wildlife permits in semi-rural municipalities is a fantastic idea. The current permit system is so heavily flawed.

**Paul Turner:** All of the letters written by residents and council ask for evidence of the need for the cull...no one can answer them!

**Nicole B:** To say that they need "eye witnesses to the shooting of these kangaroos" to come forward before action can be taken is quite scary. Do they expect the residents to be on the scene with video cameras as kangaroos are being killed?

**Tina:** Has any one thought through that the Kangaroos are here for a reason other than to be target practice for shooters, maybe they are here for the environment and how the Eco System ties in all together.

**Brain M:** What a dreadful situation, animals suffering so badly. NMIT must have no idea of kangaroo management.

**Francis G:** How can crime, violence and use of firearms be controlled in Victoria while government departments allow the bloodshed of innocent wildlife? Where's the RSPCA?

Interestingly, when the new Liberal government replaced Brumby's, Mr Baillieu promised a transparent government. How is this shooting "transparent" when the residents have objected, and council too? The DSE need to be closed down.

**Vivkay:** Kangaroos are totally misunderstood and hated in their own country, and these attitudes show the fabric of "white" environmental ignorance.

**Kim:** DSE just like WA's DEC have absolutely NO CONTROL over whether kangaroos are shot humanely. And they still come out with blanket statements to try and save their 'image' instead of facing up to the fact that they either, "just don't bloody care" or they have "dropped the ball" on wildlife welfare.

**Ted White:** This is really disturbing as a resident of the area. Not only are our kangaroos being needlessly culled, we now know that they are also dying slow agonising deaths. NMIT should be ashamed of their actions and these shooters should be ashamed of their lack of ability to shoot straight.

**Jason S:** The NMIT can pack up their bags and take their robotic horse and leave.



**Karen of Eden Park:** Margaret, the kangaroos do not menace anyone and the land that NMIT is leasing IS the kangaroos home.

**Joe:** NMIT are clearly working against the majority of the residents of this community.

**Trevor S:** We need a government body who care about wildlife, obviously we don't have one now, when caring people are forced to recourse to such drastic action. Hope their is some positive help for the kangaroos SAP.

**Zoe:** Great work guys. I am a resident of Eden Park and fully support you. It is sad that it has come to this. I hope that the Minister for the Environment steps in soon and does what is right - Stops the killing.

**Sonja de Sterke:** Thank you so much to those activists looking after the Roo's. It's so upsetting and unjust to see these original inhabitants of Oz killed. Very gratefull that people are standing up for these guys.

**Victor:** Awesome work guys! Somewhat like Sea Shepherd but for the Eden Park kangaroos. I hope they are successful.

**Maree:** Why is it that DSE and NMIT are not accountable to anyone - do not answer questions coming from the public and refuse to justify their position on culling of kangaroos

**Joy B:** As a resident of Eden Park I am so pleased with the councils support of the community and their efforts to take action on the behalf of the community. However, I am disgusted with how poor our state government departments have performed in this situation.

**Lindsay K:** We do hope for the sake of the community residents and the helpless wildlife that the Council will have success in stopping this dreadful and unnecessary destruction of the kangaroos.

**Lyn Faull:** This is how our government protects protected wildlife.

**Diana Palmer:** Why do governments hate our wildlife so much? Native animals are being killed by DSE decree at such a rate and in such cruel ways that Victoria and the rest of the country will be a sterile place soon, against the wishes of the majority of residents.

**Maryland Wilson:** Hunters and shooters rule in Victoria. What a sad commentary for our 'pretend to be civilised' state. Mobs of kangaroos gunned down by DSE paid shooters, and ducks salughtered on our wetlands.

**Vivienne:** "That is a matter between police and the permit holder," he said. This is not true. The kangaroos are not common pests to be exterminated, like swatting flies! They are our iconic native animals that are part of the bushland, and our heritage. They are not "overgrazing" or causing environmental damage. They evolved here over millions of years, and belong to everyone. The audacity of the DSE has no boundaries, and the residents are just being ignored. The kangaroos need to be protected, and that's what the council and residents want.

**Aaron C:** It IS madmen with guns. Cull or illegal shooting, its murder of the Australian national icon. I'm from New Zealand, and make no mistake, you are painting your people as redneck gun-toting hillbillies

**Direct neighbour of NMIT:** If you can't shoot the kangaroos then lets chase them around on motor bike. Thats what is happening today (Thursday). Maybe they are chasing them over the other side to start shoot again?

**Richard:** As an Eden Park resident of close to 12 years, I am sickened by this slaughter taking place at my doorstep. The 35 questions that have been raised by the Leader newspaper must be answered. What are they trying to hide? Shame on you DSE and NMIT.

**Fay:** Margaret, perhaps you didn't read the article properly? The kangaroos WERE in these peoples yards and they LIKED having them there, that is the whole point!!!. Thats why they are upset!!!

**Ellen:** I have lived in Whittlesea for nearly ten years, uptil the bushfires I always had many kangaroos on my property, now I rarely see them, I miss them very much, they were a joy to have around.

## For Culling

**Annoyed:** There is a lot of sensationalised crap when it comes to articles about roo culls, but this is the worst I have read in a long while. The emotive headline, followed by the barely related story is clearly aimed at heightening emotions, rather than conveying the truth behind the story.

I wonder if any of the Eden Park residents considered why a kangaroo might be shot near the area? I might be taking a leap here, but usually when there's an overpopulation of kangaroos, you get increased road mortality and starvation. I wonder if any of those shots were a mercy bullet, perhaps?

And OF COURSE the DSE and NMIT aren't gonna tell you when they cull begins. Then you get idiot protesters accidentally being shot as they try to interfere.

**Rod Bridges:** Kangaroo numbers need to be reduced from time to time, especially in good seasons.

Professional hunters should be used, and the carcasses frozen for use in the meat trade.

Roo meat is the healthiest type of meat available as it has virtually no fat.

There are many recipees available to cook it. ENJOY it when you can.

**Hannah:** Seriously, people. Too many roos means overpopulation and starvation for many more than 300. Everywhere that supports roos already has large populations so relocation is no good. Good rain and lush pasture has resulted in huge populations and when they move onto farm land they do farmers out of their livelihood. (And remember we need farmers because they supply us with meat AND vegetables.) They had to do the shoot quick and secretly or else nutters would be running around trying to take bullets for poor female kangaroos and their babies. It's not nice, but it is necessary. I'm a vet nurse, study animal science, am a wildlife rescuer and occasionally have to go and shoot a roo that's been hit by a car. I love animals but even I can see that this is necessary to ensure the good survival of the many and prevent more accidents as animals cross roads looking for more food. If people would not run around crazily protesting, the DSE would be able to spend more time finding better hunters who could take their time and make good kills.

**Margaret:** I believe that these people were trespassing on NMIT land on the pretext of looking for kangaroos. They know that they were trespassing by the way that they ducked down on the video when vehicles sent past. It is these people who should be prosecuted.

**Tony:** If these greenies think that the situation is so dangerous, why have they got their kids there? They are looking for the sympathy vote that's all! I'm not sure that NMIT have contracted the right shooters for the job though. If the reports are correct and there are wounded roos around as a result of this cull, the shooters are not good enough. One shot one kill is the only way. The tragedy is that the government wont allow the use of the animals for meat. A real waste of life unfortunately. These animals are not endangered species so culling is a legitimate way of controlling numbers if done proffessionally.

**Margaret:** These looney so called wilddelife activists have forgotten one thing in all of this. The NMIT property is a working educational farm, it is not in suburbia. Pack up and go home to Fitzroy and your inner city homes. The kangaroos are a menace, the numbers need to be culled. The kangaroos cannot be relocated. If the people of Eden Park want to look at or after them, then they should build seven foot kangaroo proof fences on their properties to keep them on their properties and not let them roam onto NMIT or any other farmer's land where they are a menace with the damage that they cause.

**Don Teichelman:** Re the kangaroo cull in Eden Park.

I agree with this cull only because I have hit several of them in my cars. They cause alot of damage!! and thats very expensive.

Now if the City of Whilltesea would cease planting trees on the shoulders of roads maybe I could see these lovely animals and avoid an expensive collision.

Also the COW should remove existing vegetation that is there.

KIND REGARDS DON

### Appendix 3. Qualifications & Suitability for this Review

Mr Raymond Mjadwesch (BAppSci 1994 - Environmental Technology) is a consulting ecologist.

After 2 years as a technical officer contracted to the NSW National Parks and Wildlife Service, Ray started his own consulting business in 1999. Trading as Mjadwesch Environmental Service Support, clients include conservation departments and organisations, Councils, research establishments, developers, industry and the public.

Specialising in flora and fauna survey, impact assessment and threatened species management, and practicing as a Certified Environmental Practitioner, Ray provides tailored solutions in wildlife and environmental management. Contracts have included the largest development projects in NSW, management plans for iconic conservation and tourism assets, planning and implementation of sensitive threatened species management programs, as well as projects focussed on achieving sustainable outcomes, and informing the NSW legislature. Ray has performed services informing the NSW Land & Environment Court on five occasions.

A strong commitment to the highest standards of environmental protection has created a reputation for extreme rigour in environmental assessment, and while some clients have been upset by contrary findings (which have put their investment opportunities at risk), Rays capabilities in assessment and analysis, and the quality of reports produced, removes doubt from the approvals and regulatory processes.

With regard to this review, Ray is a wildlife ecologist and researcher, who has culling in his toolbox. Ray has himself shot more kangaroos than most people, though never without a solid animal welfare justification (for example animals smashed up on the side of the road, or irrecoverably injured in fences).

In a country where 99% of people can look out of their window and not see a kangaroo, in a landscape riven by roads, covered in houses, complicated with hundreds of thousands of kilometres of fencing, and filled with hostile farmers holding guns, kangaroos may not be doing as well as they once were. In the days of Mitchell, one of the first Europeans to penetrate to the interior, he described his observations of kangaroos almost daily, even “swarms” of them, between 1836 and 1839.

Ray may have a different perspective on how kangaroos are faring under modern development than do most of his contemporaries, however this is not bias, it is a view based on an intimate understanding of kangaroos, their history, ecology and biology, and the environment, and mans impacts upon it.