The following analysis was provided by Frankie Seymour, co-founder and scientific adviser to the Animal Protectors' Alliance, October 2017.

ANALYSIS OF DOCUMENTS RECEIVED IN RESPONSE TO FOI REQUEST BY THE DISTRICT BULLETIN, 2017

Part 1: key points of summary analysis of released hardcopy documents

1. Summary of key points

- There is still no plausible evidence that kangaroos in the ACT are having a deleterious impact on any aspect of the condition of ACT grasslands.
- The data so far collected by the ACT government has been structurally incapable of providing credible insights into the impact of kangaroo densities on the environment.
- The ACT government's assertions of an ideal kangaroo density of one kangaroo per hectare is not supported by any plausible evidence.
- The CSIRO evaluation report confirms the above points.
- Several of the proposed reports from the ACT government research into the relationship between kangaroo densities and the condition of the environment remain outstanding.

2. Documents requested

The FOI request was primarily aimed at obtaining any documents detailing the government's decision-making processes in reaching the conclusion that kangaroos in the ACT need to be 'culled'.

The request was made because no plausible (independent) evidence that there are too many kangaroos, nor that they are damaging the environment, has been provided to date in either:

- any online published documents; nor
- in the course of three ACAT hearings.

As well as formal papers and reports, the Bulletin asked for relevant documentation of internal communications such as emails, minutes and briefs, in the hope that these might shed some light on the government's thinking. None of these documents were released, and no reason was given for withholding them.

3. Documents released

3.1.Online Documents referenced

These documents had already been examined by the Bulletin's scientific advisers prior to the FOI request. The absence from these documents of plausible independent evidence that kangaroos need to be " culled" was the reason for the Bulletin's FOI request.

3.2.Hardcopy documents released (in date order)

Essentially four hardcopy documents were released. They were not noted in date order on the release summary and several other documents were listed in the release summary as separate documents which seem to have in fact been attachments to the four.

(1) 2009-2012: Interim analysis of relationship between vegetation condition and kangaroo density in grassy ecosystems of the northern ACT:

- This document states that kangaroos need to be 'managed'. This assertion is made before any analysis of the data pertaining to this issue begins.
- Limitations in the usefulness of the data compiled in this Interim Analysis are explained in the CSIRO evaluation report (see summary of CSIRO findings below).

(2) 2013: Project Plan – kangaroos and conservation:

- The objective of this document and its attachments is to provide a plan for a project for developing a measurable relationship between kangaroo population densities and the conservation impacts of kangaroo grazing pressure.

- The research project is inherently incapable of achieving its objective because:
  - there are no baseline data on what either the pre-European settlement or pre-"culling" relationship looked like;
  - the study is far too short-term in nature; and
  - there is no conceivable way of controlling the study to account for climatic factors, especially long-term climatic cycles.
- These flaws and several others are explained in detail in the CSIRO evaluation report (see summary of the CSIRO findings below).
- The Project Plan proposes a final scientific evaluation of the project will be provided by 2015. Presumably this report took the form of the CSIRO evaluation (see below).

(3) 2013: CSIRO Plant Industry Final report for ACT Environment and Sustainable Development Directorate: Relationships between vegetation condition and kangaroo density in lowland grassy ecosystem of the northern Australian capital territory: Analysis of data 2009, 2012 and 2013.

The CSIRO report aims to analyse the field data on kangaroo densities and vegetation condition collected by the ACT government in 2009, 2012 and 2013. The key findings from the CSIRO analysis are:

- There was no discernible relationship between kangaroo densities and native species richness at kangaroo densities above 2 kangaroos per hectare.
- The study could not identify any upper limit of kangaroo densities beyond which vegetative richness and condition declines.
- The study could not identify an optimal kangaroo density that maximises vegetation richness, diversity and condition. But richness and diversity were highest where some kangaroos were present.
- There were considerable changes in vegetative structure and composition between years, perhaps associated more with prevailing climate conditions than kangaroo densities.
- Most statistically significant relationships between kangaroos and vegetation condition had wide confidence intervals, and varied across years and plant communities. There was a high level of uncertainty in site-level predictions at high kangaroo densities.
- It was difficult to isolate effect of kangaroo grazing from influence of other factors such as land use history, and presence of other animals.

This CSIRO report made a number of suggestions on the how the research project design might be improved in the future.

(4) 2015: Project Design for Research on kangaroo impacts in Canberra Nature Park:

- Virtually none of the CSIRO suggestions for future research have been accommodated in this Research Project Design.

- Additionally, this document:
  - asserts that the research has validated the government policy to control kangaroo grazing pressure, but still fails to cite any such evidence;
  - makes it clear that kangaroo killing will be based only on green herbage mass and kangaroo population growth rates, without regard to impacts of either kangaroo grazing or kangaroo 'culling' on any other plant or animal species or on the general condition of biodiversity and ecosystems;
  - proposes a progress report for 2015 and a final report for completion by June 2016, neither of which appear to have been produced.

Part 2: Detailed analysis of documents

1. General comment

The FOI request was primarily aimed at obtaining any documents detailing the government's decision making processes in reaching the conclusion that kangaroos in the ACT need to be 'culled'. The request was made because no plausible evidence that there are too many kangaroos, nor that they are damaging the environment, has been provided to date in either:

- any online published documents; nor
- in the course of three ACAT hearings.

As well as formal papers and reports, the request asked for relevant documentation of internal communications such as emails, minutes and briefs, in the hopes that these might shed some light on the government's thinking.

No documentary records of internal communications were included, leaving the requester of the information none the wiser in terms of how the documents already online, and those that have now been provided in hardcopy, were used to contribute to, argue against, or in any way modify the government's decisions on either:

- how to collect and evaluate data on this subject; or
- whether to continue killing thousands of kangaroos on an ongoing basis.

Fourteen hardcopy documents were listed for release. Several of these do not appear under the headings provided in the FOI list of released documents, and appear to have been included as attachments to Document 2. Another six documents were not included in the hardcopy release because they are available online.

The following analysis will deal first with the online documents, followed by the hardcopy documents in date order rather than in the order by which they are numbered in the FOI release. The release includes several undated documents all of which appear to be

attachments to Document 2. These documents are therefore included in this analysis following Document 2.

2. Online Documents

These documents include KMP 2017 but also five other documents, none of which add anything not covered in KMP 2017. These documents have already been considered by two NGOs, Regional Friends of Wildlife and the Animal Protectors Alliance in the context of submissions provided during the KMP 2017 consultation period.

KMP 2017 references many scholarly papers, several of which show that the Eastern Grey Kangaroo is a species which, left unmolested, forms dynamically stable populations that are in equilibrium with the other species of plant and animal which share their environment (ie their birth rate equals their death rate). Several of these cited works also establish that EGKs are a keystone species critical to maintaining the ecosystem on which the plants and other animals in the ecosystem depend.

In defiance of these scholarly sources, KMP 2017 bases its decision to reduce kangaroo populations in the ACT on only eight papers (one of which does not even mention kangaroos). These papers are all works jointly written by a very small group of routinely collaborating authors, none of whom can be considered entirely independent of either ACT government or 'pest' animal industry influence.

KMP 2017 and its associated published documents therefore provided no plausible scientific validation of the ACT government's kangaroo killing program. Hence RFW's request for further documentation.

3. Hardcopy documents released

2009-2012: (released as Document 7) Interim analysis of relationship between vegetation condition and kangaroo density in grassy ecosystems of the northern ACT

The executive summary of this document reads more like a foreword. It includes assumptions, as yet unsupported by any data or evidence, that 'within the ACT kangaroos often occur at high densities' and that some sites in the ACT 'require active management of kangaroos populations in order to maintain a range of values within these landscapes'.

In its introduction it claims to aim to improve the knowledge base for managing grazing systems from the relationship between kangaroo population growth rates and green herbage mass, while (merely) monitoring the condition of high quality grassland, not, apparently, for the purpose of improving the knowledge base for management of grazing systems.

The section on methods for surveying floristic condition states outright that it considers the presence of 'rare' species a more significant indicator than species richness. This reveals a serious flaw in ecological understanding. A rare species may well be more politically significant than any number of more common species, but it is the ecological role of species (not whether or not it is common) which determines its ecological significance.

Specific monitoring of rare species might be a valid and appropriate sideline for the monitoring project, but it has no place in any assessment of ecological health unless the rare species also happens to be a keystone species.

Other limitations in the usefulness of the data compiled in this Interim Analysis are explained in the CSIRO evaluation report (see below).

*2013: (released as Document 1) Project Plan – kangaroos and conservati*on

This document is undated but its Attachment A sets it around May 2013. It might be a preliminary version of Document 2 (Project design for research on kangaroo impacts in Canberra Nature Park Jan 2015). Its objective is stated as to "improve the scientific basis for the management of kangaroo populations in ACT nature reserves. A measurable relationship will be determined between kangaroo population densities and the conservation impacts of kangaroo grazing pressure".

The Plan claims that it will do this by setting cages that exclude kangaroos (some of which also exclude rabbits, others of which will not) from a number of plots and comparing them with kangaroo grazed areas, in terms of kangaroo densities, quantity of herbage eaten, small animal species richness and floristics and pastural structure.

The data to be collected are:

- Kangaroo density: direct counts; sweep counts; and fresh faecal pellet counts
- Herbage mass (kangaroo off-take): herbage mass inside and outside cages
- Small animal richness (presumably meaning number of species and number of each species): reptile richness only to be measured
- Vegetation parameters (presumably means the same in this context as the "floristic and pasture structure" used above): vegetation species richness (presumably meaning number of species and number of each species of plant); percentages of bare ground, litter, perennial native and perennial exotic species; sward height and variability.

The analysis of these data will be used:

- to develop an equation for the relationship between kangaroo population growth and pasture growth;
- to identity different vegetation parameters for different kangaroo densities for different sites and years; and
- to report different optimal grazing regimes of different reptiles.

The Plan admits that operational limitations will prevent the reporting of all attributes on all sites every year.

The Plan states that a full data report will be completed by 2014 and a final scientific evaluation of the project will be provided by 2015.

Presumably the evaluation report is the CSIRO evaluation of 2009, 2012 and 2013 data provided as Documents 8, but the 2014 data report does not seem to have been provided. Possibly it was never produced.

<u>Attachment A: Research Design: kangaroos and conservation</u>

This document, designated 'Attachment 1' has been attached to the Project Plan but does not seem to be mentioned in it.

This document includes: aims (same as in the Project Plan); a glossary of terms; a table of risks (mainly financial) for the proposed research; assumptions and strategies underlying the monitoring design; monitoring methods; references; and an addendum concerning previous monitoring.

The assumption and strategies section claims that "the program aims to measure ecosystem processes, not just biodiversity losses and gains". This is a laudable aim but, in fact, the proposed project was incapable of doing any such thing, primarily because:

- ecosystem processes could only be measured in the context of baseline data (which does not exist, either from the time of European settlement nor from before the commencement of the ACT government killing program); and
- ecosystem processes in Australia's variable climate of long droughts and 'flooding rains' cannot be measured other than by longitudinal studies which allow time for monitoring ecological changes throughout these routine climatic cycles.

Point 6 of the assumptions and strategies section enunciates the government's necessary catch-all for ensuring that the killing of kangaroos continues throughout however many years are needed for the collection of data: the presumption that kangaroos are damaging the environment before there are any data or evidence to support such an assumption. This is the government's standard abuse of the Precautionary Principle.

It assumes that kangaroos are damaging the environment and their numbers should therefore be reduced, in the absence of any supporting evidence that they are damaging the environment, while failing to consider that the damage that might be done by reducing the numbers of this keystone native species to well below the numbers needed to provide keystone ecological services.

The Assumptions and Strategies section also repeats the government's often stated belief that removal of herbage, even by a native, keystone species, is likely to reduce biodiversity - despite several million years of evidence to the contrary.

Other flaws in the design of the project and the data compiled under it are explained in the CSIRO evaluation report: 'Relationships between vegetation condition and kangaroo density in lowland grassy ecosystems of the northern Australian Capital Territory (2009, 2012, 2013)'.

2013: (released as Document 8) CSIRO Plant Industry Final report for ACT Environment and Sustainable Development Directorate: Relationships between vegetation condition and kangaroo density in lowland grassy ecosystem of the northern Australian capital territory: Analysis of data 2009, 2012 and 2013:

Summary of the Executive Summary:

- The CSIRO report's aim is to analyse the field data on kangaroo densities and vegetation condition collected by the ACT government in 2009, 2012 and 2013.
- It does not address relationships between vegetation structure and composition, and fauna other than kangaroos.
- A positive relationship existed between kangaroo density of 0-2 per hectare and native species richness in some sites in some years. There was no discernible relationship between kangaroo densities and native species richness at kangaroo densities above 2 kangaroos per hectare.

- There was a negative relationship between kangaroo density and native grass cover in some years (especially dry seasons).
- There was a positive relationship between kangaroo densities of 0-2 and short grass cover and a negative relationship between kangaroo densities of 0-2 and long grass cover.
- The study could not identify any upper limit of kangaroo densities beyond which vegetative richness and condition declines.
- The study could not identify an optimal kangaroo density that maximises vegetation richness, diversity and condition. But richness and diversity were highest where some kangaroos were present.
- There was considerable changes in vegetative structure and composition between years, perhaps associated more with prevailing climate conditions than kangaroo densities.
- Most statistically significant relationships between kangaroos and vegetation condition had wide confidence intervals, and varied across years and plant communities. There was a high level of uncertainty in site-level predictions at high kangaroo densities.
- It was difficult to isolate the effect of kangaroo grazing from the influence of other factors such as land use history, and presence of other animals.
- A manipulative field experiment that included multiple replicants of paired enclosure plots, with input from biostatisticians was suggested for future monitoring.

This last point suggesting future research warranted more detailed examination, with a view to determining whether any of these suggestions have been adopted by the ACT government in its next generation of design for data collection and condition monitoring projects.

For future ACT government research into the relationship between kangaroos and vegetation, the CSIRO report suggest:

- Paired plots (one open to kangaroos the other excluded) of similar vegetation, replicated several times within each site.
- Additional plots allowing some but not continuous kangaroo grazing to compare the impacts of no grazing, medium density grazing and high density grazing.
- If the medium kangaroo density grazing option is impractical, paired plots across multiple sites where kangaroo densities vary might be used to obtain data on the impacts of grazing by different kangaroo densities. But the benefits of this could be confounded by site to site differences.
- Due to the year-to-year differences, multiple years of monitoring would be necessary for the study to be meaningful.
- Discussion with biostatisticians might help address other limitations of the experiment eg the difference due to experimental treatment rather than the influences they wish to measure; ensuring sufficient replication at appropriate scales; ensuring randomised unbiased plot selection; and ensuring independence of observations.
- A more even spread of experiment sites across different types of landscapes.
- The importance of recoding as much baseline data as possible on all sites prior to beginning the experiment.
- Removing from the study any data which are too difficult to analyse, or correlated with other variables.

- Not bothering with the indicators of rare species because rare species are not likely to be well enough distributed across the sites.
- The need to focus on understorey vegetation structure, rather than ground cover alone.
- Using actual values (percentage cover, height in centimetres, counts of individual plants) rather than category values (height classes, broad cover classes).
- Using continuous as well as categorical values in each measurement (eg not just whether a species is present but how much/many of it is present).

The report found many flaws in the Line-Intersect Transact Method used by the ACT in 2012 and 2013.

- There was variability in how different surveyors estimate the distance a particular life form, by height class category, extends along the line transect.
- There was a difference in the way grass cover was measured.
- The various combinations of categories resulted in some 216 variables, too many to be analysed separately.
- Tussock size and shape were recorded but it is impossible to measure changes in shape.
- There is no easy way to graph measurements from the two dimensional conceptual model for measuring grassland structure, nor to statistically compare changes between years.
- Replicates were supposed to be placed within floristically and structurally representative vegetation subtypes, but no weighting is recorded for the different subtypes.

On this last point the CSIRO report suggests that:

- vegetation subtypes might be weighted by their percentage coverage of the site; and
- transect locations (at least three of them to ensure plot-level variation) might be randomly moved each year.

2015: (released as Document 2) Project Design for Research on kangaroo impacts in Canberra Nature Park

Although this paper is named ‘Project Design: Research Report”, it appears to be a retrospective report of a project that has already been implemented between 2012 and 2014, and therefore, presumably, was initially conducted without reference to any of the criticisms or suggestions in the CSIRO report of 2013 (see above).

In addition to measuring kangaroo densities and kangaroo off-take of herbage mass, the project design report also proposes surveys of floristic, reptile and (if funding allows), mammal, bird and invertebrate abundance and diversity.

However, since the Overview makes it clear that kangaroo killing will be based only on ‘green herbage mass’ and kangaroo population growth rates, without regard to floristic, reptile, mammal, bird and invertebrate abundance and diversity, data from these investigation would appear to be for general information purposes, and otherwise unconnected with the kangaroo issue.

Overview

The overview of this document is an unabashed spin document. It asserts as established knowledge the matters yet to be established by the proposed project. It claims that KMP 2010 identified, simply by asserting it, a need to moderate kangaroo density in the Canberra Nature Park, in order to protect threatened ecosystems. It asserts that 'the ecology behind the policy to control kangaroo grazing pressure is well understood' and that 'subsequent research publications have validated this policy', referencing the same narrow and not demonstrably independent group of collaborative researchers cited in KMP 2017 (see above).

The overview states that this project aims to develop a 'kangaroo numerical response empirically' (presumably meaning how many to kill), based on kangaroo population growth rates and annual records of 'green herbage mass', rather than by any measure of actual ecological damage or benefit resulting from kangaroo off-take of herbage mass, or any other kangaroo contribution to the ecosystem.

It appears the number of kangaroos to be killed will be determined entirely on the basis of this biomass indicator. Plant, reptile and (maybe) invertebrate diversity will also be monitored (subject to funding) but findings will, apparently, play no part in the determination of how many kangaroos to kill.

Stage 1

The research sites initially encompassed a range of kangaroo densities. Except for plots intended for measuring floristic diversity, one hectare plots within reserves were selected at random, and stratified by canopy cover. Plots for monitoring floristic diversity were positioned in areas considered to have relatively high grassland or woodland values.

Stage 2

The main change from stage 1 to stage 2 was that kangaroo 'impacts' were to be considered only at the 'plot level' rather than the 'reserve level'. The plot selection aims to cover five levels of kangaroo density, two levels of vegetation structure and three classes of grass community. Kangaroo density at the plot level would be measured by quantity of grass apparently consumed by kangaroos (off-take).

Stage 2 would also involve a trial of different kangaroo counting methods. Direct counts, sweep counts, walked line transect counts and faecal pellet counts would be used for counting kangaroos, depending on the size of the reserve.

Identification of research plots

Replicate plots (ie plots as similar as possible in terms of plant components and condition) would be used, one with kangaroo access the other with kangaroos excluded, across various densities of kangaroos. However, the project design report notes that, because the routine 'culling' has reduced densities across the CNP to more or less the same, placing plots for differing densities of kangaroos is now somewhat problematic. Presumably this means the project will be unable to assess the differences in herbage off-take (or any floristic or reptilian differences) resulting from different densities of kangaroos.

Replicate pairs of plots are to be sited in different reserves. The CSIRO concerns with the confounding impacts of site to site differences are not acknowledged.

Assessing vegetation structure and herbage mass

The aspects of vegetation structure and biomass on which data will be collected will include:

- grass height
- contribution to dry weight of the top four plants
- percentage cover of bare ground, grass, litter, non-grass vegetation
- percentage of grass which is green
- depth of thatch
- perennial grass reproductive status
- presence of log, shrub tree or rock.

Further detail on collecting and recording these data are found in Document 3, 'Herbage mass and structure methods'.

It is not clear which findings and combinations of these variables are considered to be ecologically desirable and which ecologically undesirable, in which locations and in what climatic conditions, or why.

Assessing floristic richness and diversity

The need to assess ground-layer community as well as overall vegetation type, is recognised. The assessment will be undertaken in a 'high value' 20 by 20 m quadrants. A second assessment will be based on each whole one ha area. It is not clear how this broader assessment will be conducted.

A second assessment will be conducted using a step point transect. It is not clear if this second assessment will be of the 20 by 20 m quadrant of the whole hectare.

A complete species list for each plot will be compiled, but it is not explained how floristic richness and diversity will be assessed from this list.

As the 'step point transect' does not seem to be explained in the document, it is also not clear whether, and if so how, this method will overcome the CSIRO criticism of the line intersect transect method (see above).

Assessing reptile abundance, richness and diversity

Tiles will be placed for small reptiles to hide under within the one ha research plots. These will be regularly checked for hiding reptiles. Active searches will also be conducted. Presumably the actual number of individuals by species sighted will be counted, rather than a population estimated from single sightings, but this is not absolutely clear.

Assessing small mammal abundance

Due to the disappearance of small mammals from the CNP, any investigation of the relationship between ground layer vegetation and small mammals will require extra funding and will be restricted to a number of small sites with large pre-established grazing exclosures. Presumably the actual number of individuals by species sighted will be counted rather than a population estimated from single sightings, but this is not absolutely clear.

Assessing bird abundance and diversity

As survey of bird abundance may be undertaken by volunteers.

Assessing invertebrate abundance and diversity

Students will be encouraged to undertake pitfall trapping of invertebrates for an invertebrate survey.

Project Milestones and deliverables

The Report gives a timetable for products including a progress report which was scheduled for 2015 and a final report for completion by June 2016. Neither of these reports have been included with the FOI hardcopies. (The 'interim report' included in the FOI material is dated 2013 so is presumably not the one referred to.) Presumably both these reports have yet to be completed.

2014: (released as Document 3) Herbage mass and structure methods

The actual title of this document is 'Method for measuring herbage mass and structure', and it is included in the FOI release as an attachment to Document 2 (see below).

It explains how herbage mass and structure data will be collected and recorded, but not how it will be assessed.

2013: (released as Document 4) Kangaroo off-take methods

The actual title of this document is 'Method measuring kangaroo off-take', and it is included in the FOI release as an attachment to Document 2 (see below).

It explains how kangaroo off-take (quantity of herbage consumed by kangaroos) will be collected and recorded, but not how it will be assessed.

Undated: (released as Document 5) Reptile ID

The actual title of this document is 'Canberra Nature Park Reptile Surveys', and it is included in the FOI release as an attachment to Document 2.

It consists of coloured illustrations and descriptions of 26 reptiles, eight frogs and 3 marsupials (and a few unidentified and apparently irrelevant illustrations of other mammals).

Undated: (released as Document 6) Grass ID

The document is included in the FOI release as an attachment to Document 2 but has no title. It is a detailed table describing 30 grass types. Because the document has no title and the title given in the FOI release list provides no further identifying information, it is not clear whether it is a list of grasses found in the ACT or some wider region.

Part 3: Analysis of project design in the context of CSIRO comments and suggestions for future research

1. Analysis of the project design report in relation to CSIRO's comments on data collection 2009-2013

In terms of the CSIRO comments on the data collection up until 2013, neither of the following failings of the earlier data collection appear to have been addressed in the design of this data collection project.

- The study could not identify any upper limit of kangaroo densities beyond which vegetative richness and condition declines.
- The study could not identify an optimal kangaroo density that maximises vegetation richness, diversity and condition.

The project design report does not propose any new way of collecting data that will enable these assessments to be made.

2. Analysis in relation to CSIRO's suggestions for future research

In relation to the CSIRO suggestions for future research, the project design report addresses, or fails to address them as follows:

- Paired plots (one open to kangaroos the other excluded) of similar vegetation, replicated several times within each site.

Paired plots are proposed in the 2015 project design report. 'Eight plots' of 1 ha were to be randomly positioned in reserves spanning a range of kangaroo densities. Presumably this means eight plot per reserve, rather than eight plots in total.

- Additional plots allowing some but not continuous kangaroo grazing to compare the impacts of medium density grazing.

Not used, presumably not practical.

- If the intermediate kangaroo density grazing option is impractical, paired plots across multiple sites where kangaroo densities vary might be used to measure the impacts of intermediate kangaroo densities. But the benefits of this could be confounded by site to site differences.

This is the method of assessing the impacts of different densities of kangaroos that is proposed in the project design report. The confounding problem of other site differences raised by CSIRO is not addressed. The fact that, due to 'culling', there is no longer much difference in kangaroo densities across CNP is noted in the project design report.

- Due to the year-to-year differences, multiple years of monitoring would be necessary for the study to be meaningful.

CSIRO does not suggest a minimum number of years but, as mentioned above, evaluation of whether the impacts of kangaroo grazing on vegetation are ecologically positive or negative would require a longitudinal study including both an extended *El Nino* and *La Nina* period (and preferably several of both). Since the proposed project was only intended to run for two years before the final report, the project appears to have failed in regard to this suggestion.

- Discussion with biostatisticians might help address other limitations of the experiment eg the difference due to experimental treatment rather than the influences they wish to measure; ensuring sufficient replication at appropriate scales; ensuring randomised unbiased plot selection; and ensuring independence of observations.

The project design report states that statistical analysis using a consultant will be conducted, presumably in regard to analysis of the data collected, but not, apparently, in relation to the design of the project. No report on the statistical analysis of the data has yet been released. Presumably it will be included in the (already one year plus) overdue final report.

- A more even spread of experiment sites across different types of landscapes.

The project design report does not appear to give any consideration to collecting data across different landscape sites beyond the grassland and open woodland, probably because these are the landscapes that dominate ACT reserves.

- The importance of recording as much baseline data as possible on all sites prior to beginning the experiment.

Unfortunately the table of milestones does not identify the point at which the exclosures will be erected, so it is not clear how much of the data collected by the proposed surveys of kangaroo numbers, reptiles, herbage mass and structure, and floristic diversity will be conducted before erecting the exclosure cages. The first reference to the cages in the order given for the milestones is that they should be 're-set' - not set. So it is not clear whether this suggestion has been addressed.

Additionally, the underlying problem remains that no baseline data will ever now be available (other than anecdotal) from either the time of European settlement or the time before the ACT government began killing kangaroos every year.

- Removing from the study any data which are too difficult to analyse, or correlated with other variables.

The project design report does not mention any intention to do this in the data analysis phase of the project, but it may be addressed in the progress and final reports, should they ever be completed.

- Not bothering with the indicators of rare species because rare species are not likely to be well enough distributed across the sites.

The project does not explain how it will assess diversity and richness from its species lists of flora and reptiles, so it is not clear if this criticism of the earlier monitoring work has been addressed.

- The need to focus on understorey vegetation structure, rather than ground cover alone.

It is not clear that this failing of the earlier data collection has been addressed.

- Using actual values (percentage cover, height in centimetres, counts of individual plants) rather than category values (height classes, broad cover classes).

Since there is little detail in the project design report on how floristic richness and diversity will be assessed (beyond counting individuals), it is not clear whether this failing in the earlier data collection will be addressed.

- Using continuous as well as categorical values in each measurement (eg not just whether a species is present but how much/many of it is present).

Since there is little detail in the design project report on how floristic richness and diversity will be assessed (beyond counting individuals), it is not clear whether this failing in the earlier data collection will be addressed.