

## **LIMESTONE PLAINS GROUP**

*An alliance of ACT scientists and nature conservation groups advocating responsible and ecologically informed management of grassy ecosystems in the ACT and region*

PO Box 6031, O'Connor, ACT 2602

8 October 2007

Dr Maxine Cooper  
Commissioner for Sustainability  
and the Environment  
GPO Box 158  
CANBERRA ACT 2601

Dear Dr Cooper

The Limestone Plains Group is an alliance of ACT scientists and nature conservation groups advocating responsible and ecologically informed management of grassy ecosystems in the ACT and region. It was formed in July 2007 in response to concern about management of native grassland on Defence land at Belconnen and Majura. A statement of the Group's position with respect to this issue is attached together with our two media releases.

The key issue at this time is a continuing reluctance by the Department of Defence to take timely and decisive action to reduce kangaroo populations at both Belconnen and Majura in order to relieve grazing pressure on the natural temperate grassland and several threatened grassland species found at these locations.

We understand that Defence has received expert advice that the physical state of the grassland at Belconnen indicates non-selective grazing and that any grazing-sensitive species (plants or animals) will have already been lost or at risk of being lost. A list of the threatened grassland species is attached.

The Limestone Plains Group seeks your intervention in this issue, which appears to have become a case of the responsible management agency failing to take prompt action to secure the viability of the whole grassland ecosystem and to conserve threatened species, choosing instead to continue investigating translocation of kangaroos into NSW, against the advice of the ACT Government and others with relevant technical expertise.

The issue is now urgent because spring is the time when grassland species grow and set seed. Continued overgrazing is also affecting the grassland structure, which is well documented as being an essential habitat component for the grassland fauna, particularly the lizards.

The Limestone Plains Group is also concerned to support structures that will help prevent an issue such as this occurring again, regardless of who is responsible for the land. We ask that your Office use its influence in the ACT in support of this objective, and seek your agreement to sponsor or otherwise participate in two proposed initiatives.

Firstly, we are seeking to see established amongst the relevant agencies an on-going forum for ACT grassland managers, researchers, and community groups to coordinate monitoring, management and research into grasslands. This forum could be along the lines of a *science reference group* or *grassland management group*, similar to the *Weeds Working Group* that already exists to coordinate weed control effort in the ACT. Such a forum could share information and experience on management of grassland and threatened species, coordinate management actions and research, and support consistent monitoring of grasslands and the sharing of survey results. Involvement of NSW agencies facing similar issues in the local region might also be considered.

Secondly, and linked to this initiative, the Limestone Plains Group is planning to run a workshop in November on monitoring techniques for grasslands and grassland species, with a view to promoting consistent methods, sharing of results and coordinated learning of how ACT grasslands are functioning in both drought and other conditions. We propose to invite you in your role as Commissioner for Sustainability and the Environment to sponsor this workshop and participate in achieving its aim of consistent methods and reporting in the ACT and region. Such a process could help support preparation of the State of the Environment reports by providing reliable and consistent data on one of the ACT's most endangered ecosystems.

We will keep your office informed of progress in planning the monitoring workshop. We will also be pleased to provide any other assistance or information that we can.

Yours sincerely



Isobel Crawford and David Shorthouse  
For Limestone Plains Group.

8 October 2007

#### Attachments

Limestone Plains Group statement on Case 1

Two media statements

List of threatened species found at Belconnen and Majura grasslands.

# LIMESTONE PLAINS GROUP

*An alliance of ACT scientists and nature conservation groups advocating responsible and ecologically informed management of grassy ecosystems in the ACT and region*

Submission to Inquiry into ACT Lowland Grasslands by the Commissioner for Sustainability and the Environment.

## **Reference 1: Review existing management arrangements.....**

- *Action Plan 28* outlines the broad principles for conservation management of ACT grasslands. Williams *et al.* 1995 reported to the ACT Planning Authority on *Principles and Strategic Options for the Conservation of Native Grasslands and their Threatened Fauna in Gungahlin*. More specific guidelines are set out in the *Grassy Ecosystem Management Kit* prepared by Sharp S., *et al* (2005).
- All agencies and landholders responsible for managing lowland grasslands should be required to prepare a management plan that is consistent with these documents. This requirement should be enforced by virtue of (and as appropriate) government policy commitment or legislative requirement (nature reserves), lease conditions (e.g. Barton grasslands), or by undertakings to the Commissioner for Sustainability and the Environment (e.g. Canberra International Airport). The existing management plan for Canberra Nature Park contains insufficient detail to be adequate for grassland management although it is not necessary for another statutory management plan to be prepared. A more detailed statement for each grassland can be prepared based on the *Grassy Ecosystem Management Kit* (above).
- Priority actions outlined in *Action Plan 28* should be implemented in full and with greater commitment by all parties. The ACT Government's 2004 announcement that two nature reserves would be established in the Jerrabomberra valley does not appear to have been fully actioned, although it is understood that the Conservator of Flora and Fauna has requested the necessary amendments to the Territory Plan.

## **Reference 2: Identify the causes of deterioration....**

- *Action Plan 28* and the *National Recovery Plan for Natural Temperate Grasslands* outline the principle threatening processes that grasslands and their component species are being subjected to in the ACT. Urban development, roads and other infrastructure, inadequate resources for management, weed invasion, and overgrazing are leading to degradation of ecological qualities, loss of species diversity, fragmentation of habitat and direct loss or reduction in grassland area. Overgrazing by kangaroos should be added in the light of recent experience.

- The drought of the past few years is likely to have exacerbated these pressures, but perhaps also has caused a dramatic decline in populations of some grassland species.
- The issue of over-grazing by kangaroos of some grasslands has exposed a chronic lack of understanding amongst agencies and stakeholders about kangaroo biology, local kangaroo/pasture interactions, the practical realities of the available methods of kangaroo control, and the role of kangaroos in a dynamic grassland ecosystem.
- The reports of the Kangaroo Advisory Committee (1995-1997) need to be reviewed and the recommendations that are still relevant (e.g on translocation, need for scientific basis for management, fertility control as a long term measure) reiterated in the Commissioner's report. The Limestone Plains Group is considering preparing a case to the ACT and the Commonwealth to have grazing by kangaroos listed as a threatening process.

**Reference 3: Identify any impediments to implementing short and long-term management practice for conservation....**

LPG believes the key impediments are:

- Uneven understanding by the wide range of landholders responsible for lowland grasslands of their obligations to implement sustainable conservation management of an endangered ecological community and the threatened species that are reliant on grassland habitats.
- Uneven scientific understanding of the biology, ecology and the complex dynamics of the ecological communities under threat by most stakeholders.
- Lack of coordination of management effort covering many aspects including grazing management, threatened species monitoring, weed control and fire management.
- Grasslands with significant conservation values in the Majura and Jerrabomberra valleys are not protected as nature reserves under the Territory Plan.
- Divided responsibility for planning and management of land containing lowland grasslands and threatened species between Commonwealth and ACT agencies.
- Inadequate avenues for cooperation amongst landholders and consequently poor coordination of conservation effort, management actions and monitoring standards.
- Lack of scientific peer review of data collection methods, ecological monitoring programs, reporting standards and analysis of results.

**Reference 4: Identify ways of ensuring effective communication with stakeholders.....**

- There is currently no formal arrangement that encourage accessing of research knowledge, sharing of information, coordination of management, learning from peers, and jointly achieving conservation goals. The existing arrangements between ACT and Commonwealth agencies through Memorandums of Understanding appear to be ineffective in achieving their intended purpose.
- The Commissioner could help to establish a framework for cooperative and coordinated management of all ACT lowland grasslands and grassland species through a stakeholder forum. The focus of this could be information sharing, peer review of monitoring methods and data interpretation, coordination of management through a 'nil tenure' approach, and regular reporting of progress and status with consolidated reports via the periodic *State of the Environment* reports.

**Reference 5: Determine whether any policy/legislative changes are needed for protection of lowland grasslands**

- Recognition by all parties and levels of Government of the poor conservation status of native grasslands and grassland plants and animals and a need for structures that encourage cooperation and integrated decision-making in regard to planning and management of land containing grassland habitats.
- Establishing a framework and timetable for resolving planning issues in the Majura and Jerrabomberra valley that will support identification of conservation areas, coordinated management of threatened species and release of land for planning and development purposes.
- Implementation of Government policy to effect previously announced changes to the Territory Plan to establish nature reserves in the Jerrabomberra valley.
- Improved coordination amongst Commonwealth agencies responsible for planning, management and environment protection of land in the ACT that will protect areas of lowland grasslands that are identified as being of national significance.
- Examination of ways in which Commonwealth responsibilities can be discharged through application of support from the National Reserves System.
- Convening under the auspices of the Commissioner for Sustainability and the Environment (see 4 above) a standing forum of stakeholders to monitor progress in planning, managing and conserving lowland grassland habitats and their threatened species.

## LIMESTONE PLAINS GROUP

*An alliance of ACT scientists and nature conservation groups advocating responsible and ecologically informed management of grassy ecosystems in the ACT and region*

### **ACT Lowland Native Grasslands: Inquiry by the ACT Commissioner for Sustainability and the Environment.**

#### **Belconnen Defence site (14 December 2007).**

1. The LPG's general submission presented at the round table discussion on 21 November is regarded as part of this submission (attached).
2. Action to reduce the population of kangaroos at Belconnen must be treated with greater urgency than is currently the case. We understand that Defence and ACT Government officers commenced discussion and preparation of a plan to reduce the kangaroo population late in 2006. It is most unfortunate, possibly dereliction of duty that a year has passed without the required action having taken place.
3. Defence's own expert group concluded that
  1. The structure of the grass sward and the condition of the soil are indicative of very heavy grazing.
  2. The long-term sustainability of the grassland is threatened by this ongoing grazing pressure.
  3. Eastern grey kangaroos are the only significant grazing species on the site.
  4. Reduction of kangaroo density, and hence grazing pressure, is essential to allow the grassland to regain appropriate structure and soil condition (extract from document provided by Defence and assumed to be based on Expert's report).
5. Activities necessary to trap, dart, and euthanase kangaroos should be located on areas that do not contain native grassland or threatened species (Golden Sun Moth, Ginninderra Peppercress). Additional damage to the grasslands must be avoided.
6. A management plan for the remaining kangaroo population must be prepared so that necessary future actions are not a surprise to stakeholders.
7. Consideration should be given to removing the fence recently erected by Defence around the population of the Ginninderra Peppercress. The objective is to allow the habitat supporting the population to be subject to 'normal' ecosystem processes. This issue should include consultation with appropriate experts in endangered plant populations ( e.g. Australian Native Plants Society, CSIRO, ANU (Botany and Zoology) and DECC NSW.
8. Consideration should be given to remedial management of the grassland (e.g. additional weed control, addressing sources of soil erosion) that is apparent as a result of the overgrazing. This should be paid for by Defence but be at requirements specified by grassland experts.
9. Ensure monitoring programs are in place for the grassland and threatened species consistent with the Limestone Plains Group's general submission.

## LIMESTONE PLAINS GROUP

*An alliance of ACT scientists and nature conservation groups advocating responsible and ecologically informed management of grassy ecosystems in the ACT and region*

### CASE 1 – Threatened Species and Kangaroo populations on Defence land at Belconnen and Majura Training Area.

#### Principles & Priorities

1. ***Natural Temperate Grassland*** is one of Australia's most endangered ecological communities. It is now reduced to about 1% of its former area, with remnants fragmented by urban development, rural land use and land clearing, and degraded often by weeds, nutrient enrichment, and inappropriate grazing management.
2. Native grasslands are the primary habitat for a wide range of grassland plant and animal species, some of which are now uncommon and restricted in their distribution, and some that are listed as threatened with extinction under Commonwealth, ACT, NSW and/or Victorian legislation.
3. Grassland communities at Belconnen and Majura are of such high quality that they qualify for protection as nature reserves. The ACT Government has protected the major grasslands it is responsible for by adding them to its nature conservation estate. The two outstanding grasslands at Belconnen and Majura are managed by the Department of Defence but are not formally protected or managed with sufficient recognition of their biodiversity values.
4. The Belconnen grassland contains ***Natural Temperate Grassland*** and populations of the following threatened species: Golden Sun Moth, Perunga Grasshopper, and the only known population of the Ginninderra Peppercreep.
5. The Majura Training Area contains ***Natural Temperate Grassland*** and ***Yellow Box - Red Gum Grassy Woodland*** (endangered ecological communities) and populations of the following threatened species: the Grassland Earless Dragon, Striped Legless Lizard, Golden Sun Moth, Perunga Grasshopper, Button Wrinklewort, Brown Treecreeper, Hooded Robin, and Canberra Spider Orchid.
6. The Majura population of the Grassland Earless Dragon is a major part of one of the two populations left in the ACT (Majura and Jerrabomberra valleys).
7. Kangaroos are natural grazers in grassy ecosystems. However excessive and/or selective grazing of grasses and herbs is likely to affect threatened species habitat by:
  - reducing the diversity and structure of the habitat, particularly the tussock structure of native grasses that provides shelter for the Grassland Earless Dragon and Striped Legless Lizard and for the insects they feed on.
  - reducing root and underground stem biomass of native grasses which provide food for the larvae of the Golden Sun Moth.

- increasing inter-tussock spaces thus allowing weeds to invade and cause a deterioration of the qualities of the grasslands,
- allowing 'Weeds of National Importance' to increase their presence at both Belconnen and Majura, specifically: Serrated Tussock, Chilean Needle Grass and African Love Grass.

## PRIORITY ISSUES

1. **An urgent priority is to support recovery of native grasslands** at Majura following the recent severe drought and significant grazing pressure, and so maximise the opportunity for native grasses and herbs to commence recovery during the spring and summer of 2007-08.
2. **An option for Majura is to fence out kangaroos temporarily and as an emergency measure**, pending decisions on the longer-term management of this species. However there is a need to consider unintended impacts of such a move, to consider an experimental framework for it, so we learn from it, and to ensure a temporary fence does not become a permanent mechanism to exclude kangaroos and transfer the problem to other areas.
3. **Conservation management of the Grassland Earless Dragon in the Majura population should include all managers** of land containing habitat for the species (Canberra International Airport, Defence, Air Services, private lessees).
4. **The Belconnen grassland must be actively managed using the best available expert scientific advice** if it is to support a population of kangaroos into the future. Fertility control following culling may be a realistic option to achieve a stable population.
5. **Recovery Plans\* and Recovery Teams\* are a key source of expert opinion and information on threatened flora and fauna and recovery actions.** Membership includes academic, community and government interests and sometimes landholders. (\* established under the Commonwealth's *Environment Protection and Biodiversity Conservation Act (1999)*).
6. **The Belconnen and Majura grasslands warrant protection as part of the National Reserve System**, under either Commonwealth or ACT legislation.
7. **It is essential to establish and maintain monitoring programs designed to track recovery of grassland habitat and associated threatened species**, grazing pressure and other environmental parameters, and provide feed-back to land managers on the success or otherwise of their management.
8. **All monitoring results should be available to all parties** as scientific information should be neutral in any consideration of management options.

# MANAGEMENT OF KANGAROO-RELATED ENVIRONMENTAL AND ANIMAL WELFARE ISSUES

## EXPERT PANEL ASSESSMENT – AUGUST 2007

### Panel members

Dr Hal Cogger, John Evans Memorial Fellow, Australian Museum  
Dr Graeme Coulson, Senior Lecturer in Zoology, The University of Melbourne  
Dr Sue McIntyre, Senior Principal Research Scientist, CSIRO Sustainable Ecosystems  
Dr George Wilson, Consultant and Director, Australian Wildlife Services

### Introduction: Management Objectives

One of the major components of the Defence Environmental Strategic Plan 2006-2009 is biodiversity conservation and landscape management. Included in its stated goals are, on the lands for which the Department is responsible:

- to protect biodiversity and landscape values
- to protect ecological processes

It was within these broad policy objectives, and operating under its Terms of Reference (**appended**), that the Expert Panel visited the Belconnen Naval Transmitting Station (BNTS) site on 11 August 2007. The principal purposes of the visit were to assess the environmental impact of the current on-site population of Eastern Grey Kangaroos (*Macropus giganteus*) on the ecological integrity of the entire site and to recommend actions that would ensure that kangaroo numbers and key ecological processes are sustainable.

The BNTS contains a variety of habitats, but the greater part consists of a virtually treeless remnant of the original temperate native grasslands that were once a conspicuous part of the ACT landscape. It is this remnant that is most impacted by the resident kangaroo population.

Further, as the BNTS site is securely fenced, the kangaroo population is effectively a captive population, mandating that the Department of Defence manage it in such a manner that it does not result in a diminution of biodiversity and landscape values or degrade on-site ecosystems.

Consequently the Committee set, as the principal objectives of its visit, to:

- Assess whether the current density of the resident population of eastern grey kangaroos was sustainable in terms of their health and reproduction;
- Assess the impact of current kangaroo numbers on the health and ecological integrity of the remnant native grassland;
- To assess options for reducing kangaroo numbers in a humane and ethical manner if it should be determined that these numbers and their environmental impacts are currently excessive, and to determine a target density for sustainability; and
- To make a broad assessment of the biodiversity conservation significance of the BNTS site and to identify immediate (i.e. short-term) actions needed to reduce or eliminate practices and processes that currently threaten the integrity of its biota and ecosystems.

### **Ecosystem qualities associated with sustainable management**

The sustainable management of a grassland requires that sufficient plant material (biomass) be present to provide habitat for the range of species associated with it. Plant biomass accumulates as a result of energy capture from the sun and thus provides the primary energy source to support ecosystem functions. Biomass provides the primary food source for all the species in the grassland food web. In addition, the physical presence of the grass sward provides the means of protection of soil and the physical structure necessary for the shelter, foraging and breeding requirements of all grassland species.

A healthy soil-plant system is necessary for sustainability. Loss of soil, dead plant material and excessive loss of water reduces primary productivity of the grassland. A sustainable grassland is therefore conservative of soil and plant material. The structure of the grassland should prevent this material being washed off the site, even during heavy rainfall events. Loss of plant litter and dung inhibits essential recycling of nutrients and limits the effectiveness of rainfall absorption.

Because species vary in their requirements, variation in grassland structure provide a means by which the maximum number of species can persist. For example, the need for large tussocks with accompanying thick litter might be associated with the provision of shelter (e.g. for lizards, insects), structure for foraging (e.g. the use of tall flowering stems to attach spider webs) or for food supply (e.g. thick litter providing a damp organic layer for invertebrates). A short grass sward may be essential to provide open foraging areas for some species.

Grassland structure is intimately associated with the grazing effects of large herbivores (e.g. kangaroos, domestic livestock, hares). Little or no grazing allows for the accumulation of biomass and selects for tall-growing grazing-intolerant plant species. Moderate grazing allows the herbivores to graze selectively and in native grasslands, this creates patchiness - areas of both tall and short grass swards. Heavy grazing pressure results in non-selective grazing - the herbivores eat virtually all plants on offer and the resulting grass sward is very short and lawn-like. Plant selected for under heavy grazing

pressure are grazing tolerant and short-growing (even when ungrazed). The relative amounts of different patch structures is an important consideration in the sustainable management of grasslands. The high priority for soil protection means that tall and medium height patches are essential over the majority of a grassland area. In commercially grazed native pastures, the maximum recommended area of short patches (lawn areas grazed non-selectively) is one third of the grassland area.

## **Observations of the current situation**

### **(a) State of the grasslands**

#### Sward condition

The grassland sward is very heavily grazed, as evidenced from its uniform low height across the site (Figs 1-6) and fenceline comparisons indicating higher biomass in adjacent paddocks. An earlier survey (HLA-Envirosciences, May 2006) reports sward heights of 15 cm in the most widespread community (*Austrodanthonia* dominated grassland) the current height is estimated to be less than 3 cm. The grassland is in a particularly vulnerable situation having experienced heavy grazing over a time of severe drought (Spring 2006). The coming growing season (Spring - Summer 2007) is a critical time for plant recovery and seeding and even in a commercial situation, immediate destocking would be a recommended practice during drought recovery. If there was insufficient rainfall for Spring-Summer growth, destocking would still be recommended to prevent further damage to plants. The physical state of the grassland indicates non-selective grazing and suggests that any grazing-sensitive species (plants or animals) will have already been lost, or are at risk of being lost.

#### Soil condition

There is evidence of extensive, and in some cases severe soil erosion (Figs 4- 6) at the Belconnen grassland site. This is apparent from the presence of pedestals and erosion scalds. Indications of further erosion hazard are the presence of extensive bare ground and the degree of crust brokenness associated with trampling. Both these expose the grassland to soil loss. In addition, the short sward does not provide any obstruction to overland flow of water during heavy rainfall. The large amounts of dung and the more limited amounts of trampled litter are therefore highly vulnerable to being washed off the site, losing this organic matter from the ecosystem will disrupt nutrient recycling and water infiltration processes.

Fig. 1. View indicating the extent of short patches that result from non-selective grazing and heavy grazing pressure.

Fig. 2. Close up of short patch indicating very close cropping of the grass sward. The plant cover here is reasonably good, but the shortness of the sward enables overland flow to transport dung and loose plant litter over the surface at times of heavy rainfall.

Fig. 3. Heavy grazing at this site has exposed high levels of bare ground. Heavy kangaroo traffic has damaged the surface crust that is generally protected by growth of lichens, algae, liverworts and mosses (cryptograms). The broken crust makes soil erosion more likely with rainfall run-off.

Fig. 4. General view showing short swards, red areas of bare soil and eroding areas in the background indicative of gully initiation.

Fig. 5. General view showing short sward, and extensive areas of bare eroded soil.

Fig. 6. Close up of area depicted in Fig. 5, showing pedestalling. The perennial grasses provide relative more soil protection and soil erodes from around them, leaving the tussocks sitting at the original soil height.

**(a) Other species (Biodiversity)**

The BNTS site, while consisting mostly of open grassland, also contains a number of other habitats. These include native eucalypt woodland, unoccupied residences and other buildings (some with gardens and ancillary areas planted with numerous exotic trees and shrubs), stony outcrops and small areas of ungrazed grassland.

Monitoring of threatened plant species by HLA-Envirosciences in the period 2005-2007 has resulted in extensive lists of plant species present, while also providing valuable baseline data with which to compare changes in both plant diversity and the condition of the native grasslands over time.

However systematic faunal surveys have not been conducted on the site, with most studies confined to particular threatened species (e.g. the sun moth, *Synemon plana*) or problem species (e.g. eastern grey kangaroo). The Vulnerable Perunga Grasshopper (*Perunga ochracea*) is also recorded from the site, but no systematic study of this species appears to have been undertaken on the site. We have yet to determine the extent to which insects and other invertebrate groups found on the site have been documented.

Of eight threatened species of birds recorded from the ACT, none have been recorded from the BNTS site.

Of three threatened reptiles, only one (the Striped Delma, *Delma impar*) has been recorded from the site (date uncertain). Of the remaining two species the Grassland Earless Dragon (*Tympanocryptis pinguicolla*) has a high probability of having been present on the site in the past, and is likely still be present. The very small area of suitable habitat for the Pink-tailed Worm-lizard (*Aprasia parapulchella*) makes its presence unlikely but possible.

While the extensive native grassland on the site is the preferred habitat of the first two lizards cited above, the grassland is at this time so heavily overgrazed that ground cover that would normally provide small, terrestrial organisms with sufficient shelter from predators and excessive solar radiation is virtually absent. The low growth, with some early levels of erosion, makes it highly unlikely that either lizard species is currently present on the BNTS grazed grassland. This contrasts with the structurally more diverse grassland on private grazed land adjacent to the BNTS, and to those parts of the BNTS between the outer and inner fences of the property.

It follows that the success of any effort to rehabilitate the grassland in order to conserve its biodiversity will depend (for all non-flying species) on the residual biota present on those parts of the site outside the grazed areas, or on adjoining properties. Knowledge of the state of these other areas (through appropriate surveys) is an important precursor to planning the rehabilitation of all or part of the grassland for biodiversity conservation. Without an on-site source of recolonisation, especially of any threatened species that are known to be present or believed to have been present in the past, the only effective approach would involve recruitment of key taxa by their reintroduction from areas outside the BNTS site.

### **(c) State of kangaroo feed**

#### Standing crop

The standing crop of forage available to kangaroos is currently low, and is composed entirely of green pick. However, while the sward is obviously kept short by kangaroo grazing, there was no evidence that the population is currently limited by food availability: the kangaroos were resting during the day rather than feeding intently as they would if food was seriously limiting. There was also some evidence of bark stripping in a stand of low trees, consistent with kangaroos seeking fibre to compensate for the absence of dry grass in sward, but this was not extensive or severe.

#### Grass production

The production of new grass biomass in the months ahead will be primarily a function of rainfall. If rainfall is average, or better, there is likely to be sufficient production to sustain the current population of kangaroos and the young that will soon leave the pouch permanently. There is unlikely to be a surplus of biomass, even in good conditions, because the low stature of the sward will restrict its growth for some time. On the other hand, if the next few months are drier than average, there may be inadequate forage for the current population, leading to more severe grazing impacts on the vegetation and soils, and having negative effects on the welfare of the kangaroos.

### **(c) Health of the kangaroos**

#### Very high density

- 450 per square km is an extremely high density for a free-ranging population

#### No current evidence of starvation

- Muscle masses are normal
- Mobs are lying down in the afternoon, apparently with full stomachs
- Age structure appears normal
- Sex ratio appears normal
- Almost all adult females were carrying large pouch young
- Numerous young at foot, the first to suffer when nutrition fails, were present
- Older animals appeared to be moving freely and not stressed

### **Conclusions**

1. The structure of the grass sward and the condition of the soil are indicative of very heavy grazing.
2. The long-term sustainability of the grassland is threatened by this ongoing grazing pressure.
3. Eastern grey kangaroos are the only significant grazing species on the site.
4. Reduction of kangaroo density, and hence grazing pressure, is essential to allow the grassland to regain appropriate structure and soil condition.

## Key recommendations

1. Control the kangaroo population
  - Reduce population by 400
  - Suppress rate of increase of remaining 100
2. Provide supplementary feed
  - To save grass and soils; not needed for animal welfare
  - As a prelude to darting in enclosures
3. Reduce population through combination of
  - Translocation
  - Euthanasia
4. Slow subsequent growth with fertility control
5. Implement the following management procedures to obtain an even-aged population of approximately 100 kangaroos

### Translocate as many as possible

- If reception sites for adults can be found
- If hand rearers are available
- If cross border movement and release can be done legally
- If animal welfare issues central to translocation and release can be addressed
- Offer pouch young and juveniles for hand rearing
  - Less onerous animal welfare standards due to smaller size
- Anticipate great difficulty finding acceptable receival sites for adults
  - ACT
    - No translocation reception sites in ACT
  - NSW
    - Wildcare says it can take 100 to a site 'owned by NSW Government' which is leased by Bill Waterhouse and is adjacent to a nature reserve in the Braidwood district
- NSW permits will be required
  - Department of Environment and Climate Change will need to authorise import of kangaroos into NSW and then authorise their release.
- Translocation must meet animal welfare standards
  - Catching
  - Transporting
  - Releasing

## Initiate capture for translocation, euthanasia and fertility control

### Enclosure

- Erect an enclosure
  - With a gate that can be closed remotely
- Supplementary feed in the enclosure
  - Pellets, Lucerne, molasses flavoured pellets with high protein
  - To reduce the impact of population on grass recovery

### Darting techniques

- Free ranging capture darting has been recently undertaken
  - Low return per effort
- Dart within the enclosure
  - Operate in late afternoon
  - softly softly with minimal personnel

### Driving into wire yards or nets

- Not recommended - can lead to large numbers in nets and injuries

### Oral tranquiliser

- Chloral hydrate in feed or water
  - Unlikely to get enough ingested

## Euthanasia

### Lethal injection by dart

### Shooting has not been approved by AFP

- High powered rifles unacceptable in built up area
- Shotguns or low powered rifles not permitted under code of practice
- Explosive projectiles a possibility

## Fertility control

To avoid population increasing rapidly again and requiring further culling, fertility control is needed on remaining 100 kangaroos

- Include those that are part of the existing fertility control project
- Vasectomise other males
  - Only requires one treatment
- Maintain even age structure in population