

Canberra, August 2006



Edited by Michelle J. Dawson, Chris Lane & Glen Saunders



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This project was managed by Michelle J. Dawson – Invasive Animals Cooperative Research Centre.

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Foreword

Feral horses present a complex challenge for land managers. They are large introduced animals capable of damaging the Australian environment, a pastoral pest, a motor vehicle hazard, a meat resource and their control can significantly stir animal welfare concerns. They are also a cultural icon appearing on our ten dollar note. Horses first escaped domestication to become 'feral' 200 years ago, and they are now found in all mainland states and territories.

The Invasive Animals Cooperative Research Centre sponsored a national workshop, which brought together land managers, scientists and peak interest groups on the 3rd and 4th August in Canberra to discuss current approaches and issues around feral horse management in Australia.

Horses are well adapted to the highly variable Australian environment. There are thought to be in excess of 400 000 feral horses in Australia, mostly in arid and semi-arid regions. If left unmanaged they have the potential to increase at 20% per year. Management approaches vary across the country and include no intervention, humane lethal control, trapping and mustering.

There have been relatively few research programs on feral horses in Australia. However feral horses may be costing the economy over \$30 million dollars in lost cattle production alone, with an unquantified impact on native plants and animals. Feral horses don't spread as fast as other introduced animals such as rabbits and foxes, and are theoretically easier to control. However it can be difficult to control feral horses in a way that the entire community finds acceptable. Successful feral horse management typically engages stakeholders, and is based on sound knowledge and information sharing. Control methods vary across the landscape depending on the scale of the problem and other local issues.

Feral horse management differs across Australia. The workshops' function was to bring together people from across the country to determine whether there is a benefit in a National Feral Horse Management Strategy and to look at areas to focus future research efforts.

Professor Tony Peacock Chief Executive, Invasive Animals Cooperative Research Centre, Canberra 27 November 2006

Acknowledgements

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National Feral Horse Management Workshop Steering Committee for the direction they provided for the workshop. The Steering Committee included representatives from Queensland, Northern Territory, New South Wales and Australian Capital Territory Governments and the Invasive Animals CRC.

Simon McGuinness and Nigel McGuckian from RMCG Consultants for providing excellent facilitation during the workshop.

Workshop participants, in particular presenters, who contributed to the success of the workshop.

List of Abbreviations

| ABMA | Alpine Brumby Management Association |
|--------|---|
| ACT | Australian Capital Territory |
| ADF | Australian Defence Force |
| APAS | Australian Pest Animal Strategy |
| COPs | Codes of Practice |
| DEC | Department of Environment and Conservation (NSW) |
| EPBC | Environment Protection and Biodiversity Conservation Act 1999 |
| FPQ | Forestry Plantations Queensland |
| GFRNP | Guy Fawkes River National Park |
| GnRH | Gonadotrophin Releasing Hormone |
| IA CRC | Invasive Animals Cooperative Research Centre |
| KNP | Kosciuszko National Park |
| NP | National Park |
| NPWS | National Parks and Wildlife Service |
| NRM | Natural Resource Management |
| NRMW | Department of Natural Resources Mines and Water (Queensland) |
| NSW | New South Wales |
| NT | Northern Territory |
| QPWS | Queensland Parks and Wildlife Service |
| RSPCA | Royal Society for Prevention of Cruelty to Animals (Australia and/or NSW) |
| SA | South Australia |
| SOPs | Standard Operating Procedures |
| TBL | Triple Bottom Line |
| TFTA | Townsville Field Training Area (North Queensland) |
| USA | United States of America |
| VCD | 4-vinylcyclohexene diepoxide |
| VPC | Vertebrate Pests Committee (National) |
| VRD | Victoria River District (Northern Territory) |
| WA | Western Australia |
| ZP | zona pellucida |

Workshop Outcomes

Workshop sessions identified key areas for a national focus for feral horse management.

- 1. The participants recommend a national accreditation process for the development and maintenance of skills and adoption of national standards for feral horse control.
- 2. Animal welfare needs to be a key consideration in all steps leading towards a national approach to feral horse management.
- 3. Strong and varied community perceptions of feral horses have been a stumbling block for management. National leadership in community education on why feral horses are a pest that needs to be managed would be beneficial. Inclusiveness of stakeholders in feral horse management programs is extremely important for successful outcomes.
- 4. Management at a national scale could be viewed as successful if the distribution, abundance and impact of feral horses are reduced in priority areas.
- 5. National demonstration sites could exemplify the humane and efficacious reduction of feral horse impacts in a manner acceptable to the community.
- 6. Research on feral horses is surprisingly lacking in Australia and would benefit from national leadership and direction. It should: accurately map the distribution and abundance of feral horses; quantify feral horse impact in relation to density and control; evaluate the humaneness and suitability of control techniques; document community and stakeholder perceptions on feral horse impact and management; and assess whether feral horse impacts threaten native species or communities.
- 7. An agreed National Strategy would improve feral horse management in Australia and address many of the barriers identified during the workshop.

Background

At the April 2005 NRM Ministerial Council meeting, the ACT Environment Minister, Mr Jon Stanhope MLA, requested that the issue of feral horse management be raised on the NRM Standing Committee agenda for its September 2005 meeting. The NRM Standing Committee is made up of Chief Executive Officers of Australian and State Government departments responsible for NRM matters. At its September 2005 meeting, the Standing Committee agreed to the issue of feral horse management being referred to the Vertebrate Pests Committee (VPC) to consider development of a national approach to this issue.

The VPC is responsible for coordinating the implementation of best practice pest animal guidelines including those for feral horse management. The VPC supported a Feral Horse Workshop, which was proposed and principally sponsored by the Invasive Animals Cooperate Research Centre. A Feral Horse Workshop Steering Committee was set up to achieve this outcome.

The workshop was held at the Quality Hotel Dickson, Canberra, over the 3rd and 4th of August 2006.

Approximately forty invited participants attended the workshop including representatives from: state/territory and Commonwealth Governments (except Tasmania), Universities of Canberra, Sydney and Queensland, CSIRO, Animal Health Australia, Australian Veterinary Association, RSPCA (National and NSW), Central Land Council, Australian Horse Alliance, and New Zealand Department of Conservation. While invitations were extended to other groups, not all were able to attend the workshop.

The workshop included presentations from speakers from each state and territory, the Department of Defence, animal welfare and cultural perspectives, and research scientists. A guest speaker from New Zealand Department of Conservation gave a longer presentation at the end of the first day. Presenters were asked to address the scope of the feral horse issue, management strategies, what are the barriers and what works well, and where a national approach could be beneficial. This structure was most suitable for land managers and was adapted by speakers to suit their topic. These presentations were summarised by the authors and are included as papers below.

Presentations were interspersed with workshop sessions which are summarised at the end of the document and in the facilitator's notes in the Appendices.

Workshop Objectives

The objectives of the workshop were developed prior to the workshop and were based on the original resolution from the Natural Resource Management Standing Committee (No. 10.12), discussions at workshop steering committee meetings, and discussions with the facilitator. The objectives emphasise information sharing, opportunities for collaboration, and a national approach to feral horse management.

The objectives were to:

- 1. Build common understanding among participants about current approaches and issues around the management of feral horse impact in Australia.
- 2. Identify what works well and what are the barriers.
- 3. Identify areas where a national approach or collaboration will be beneficial.
- 4. Identify and discuss actions required to achieve matters identified in Objective 3.
- 5. Understand current and identify future areas for feral horse research.
- 6. Determine whether a national strategy for feral horse management is required.

The objectives of the workshop were met through a series of presentations and workshop sessions.

Summary

Scope of the Feral Horse Issue

Feral horses are widely distributed in parts of the Northern Territory, western and northern Queensland, the arid zone of South Australia, and the northern rangelands of Western Australia. There are isolated populations of feral horses in NSW and Victoria and occasional incursions into the ACT. In eastern Australia (including Queensland), where the majority of people live, feral horses are found primarily on crown land. These populations are typically smaller than in the rest of Australia, but are the focus of most of the public and media attention.

Feral horses cause negative economic, environmental and social impacts and are a safety concern for motorists. They also have positive social and economic impacts. The negative economic impacts include competition with domestic livestock for vegetation, interference with station management, and the potential to act as vectors for disease. Commercial use and tourism are positive economic impacts of feral horses in some regions. Feral horses impact on the environment by changing the structure and composition of vegetation, trampling and fouling water sources, causing soil compaction and erosion and competing with native species for resources.

Community perceptions are a very important aspect of feral horse management in Australia and across the world. For example in New Zealand, the Minister for Conservation received more submissions relating to the management of (wild) Kaimanawa horses between 1990 and 2003 than any other issue. In Australia, they are a special part of history and bush lore and organisations such as the Australian Horse Alliance are concerned with protecting the cultural value of feral horses. Indigenous communities also have strong beliefs around horses and many communities want minimal management and resist culling opportunities and/or view feral horses as a resource. On the other hand many conservationists believe that they have no place in the Australian landscape. These community perceptions need to be recognised and integrated into feral horse management.

The humaneness of control methods is a key issue in feral horse management. Maintenance of high standards during control programs has been addressed in some states and territories through accreditation programs (especially aerial shooting). A focus of efforts by the RSPCA and a range of national bodies including the VPC have been to improve the humaneness of vertebrate pest control techniques, including for feral horses. These efforts include the development of a national approach towards humane vertebrate pest control. Advantages and disadvantages of control techniques are discussed in the 'Model Code of Practice' for the humane control of feral horses along with its' associated standard operating procedures.

The conduct of scientific research on feral horses is not to a national program and is often opportunistic. There is a scarcity of published peer reviewed research on feral horses in Australia. The relationship between feral horse density and damage remains to be quantified in any area, which impedes effective management. Much of the evidence on environmental impacts and population ecology is anecdotal with the exception of a few key studies in central Australia and the southern highlands in 1990/91. In 1993, Dobbie *et al.* recommended that feral horse density be reduced to 0.1 horses per square kilometre for the rangelands to control feral horse damage based on experience and observations. Similar benchmarks have not been set for other environments. There has been recent localised research into community perceptions of feral horse management. There are many opportunities to assess the relative humaneness of current control techniques with a recent study using fear indicators to address welfare concerns. Fertility control, although appealing is not currently feasible. Continued research and development on VCD may deliver a viable alternative in the future. The economic impact of feral horses was also identified during the workshop as an area needing research attention.

Management Strategies

Feral horses are controlled in all mainland states and territories, sometimes in conjunction with other large herbivores (donkeys and camels). Management effort varies due to the varying abundance of feral horses, their pest status and available resources. Management strategies are different for each state and territory; some nested within regional management plans with defined objectives, others operating off established protocols or opportunistically.

In WA, the horse is declared under the *Agriculture and Related Resources Protection Act 1976* when running wild in agricultural and pastoral areas. In SA, horses are a declared species under the *Natural Resources Management Act 2004*. Feral horses, along with donkeys, are considered a top management priority in the NT where the environmental impact and technical capacity to manage them are considered to be high. In Queensland, feral horses have no pest status but moves are underway to develop a state feral horse management strategy. In Victorian and NSW national parks horses are managed to conserve environmental values and feral horse management plans are being developed for NSW conservation reserves. The ACT has a feral horse management plan which is under biennial review. States and Territories liaise in areas where populations cross borders, though the workshop identified a need to improve these arrangements.

There is a suite of control techniques used in feral horse management, and multiple techniques are used in each State/Territory. Mustering is used where it is economical in Western Australia, Northern Territory and South Australia with aerial and ground shooting as alternatives. Various techniques are used in Queensland depending on land tenure. In NSW conservation reserves, aerial shooting is currently banned so other control methods are used such as trapping and mustering. In Victoria, Parks Victoria works with the Alpine Brumby Management Association which captures and removes feral horses. The ACT management plan includes aerial and ground shooting, trapping and fencing to restrict the impacts from feral horses to the vicinity of its border with NSW.

A case study presented at the workshop from the Kaimanawa Mountains, New Zealand illustrated an evolving management program strongly influenced by community perceptions. It has resulted in a management plan that was developed in conjunction with interest groups with agreed desired outcomes including a sustainable wild horse population and conservation values that are no longer threatened. The issue of choice of control techniques was not a core issue for the management plan but rather the choice reflected the core objectives of the plan.

What are the Barriers and What Works Well?

Barriers to managing the impact of feral horses include limited resources; conflicting perceptions of feral horse impact and suitability of control methods in the broader community; and lack of coordinated management programs. Feral horse management is costly particularly when the populations are large and remote, and control programs are labour and time intensive. Preparing management plans, monitoring, stakeholder liaison, and information sharing also add to the costs of feral horse management. Commercial harvesting can reduce costs in some circumstances.

Feral horse management and control is often impeded by conflicting perceptions in the community. For example, some do not see the impact and distribution of feral horses as a problem, and therefore do not consider them to be a pest. Others see them as an icon or as a resource that may have some use in the future. Conflicting perceptions stem partly from a lack of information on the impact of feral horses and a lack of dissemination of available information. A negative perception of control methods, in particular aerial shooting, is also a barrier to control.

Lack of coordination and knowledge can be a barrier to successful feral horse management programs. A clear direction on management objectives at a State/Territory or regional level supported by basic knowledge regarding impact and distribution is a pre-requisite for the implementation of effective management programs. In addition liaising with and involving stakeholders in a program is essential but can be a barrier as it is time consuming and varying opinions need to be resolved. However, failing to consult stakeholders can lead to serious negative community perceptions of feral horse management, detrimental effects for the individual program and flow on effects on all feral horse management programs through negative media attention.

Feral horse management programs work well when they are adequately resourced; they have clear direction; are based on sound science; the human dimension is well managed; and the welfare of feral horses is taken in to account. Clear direction comes from well defined policy (including management plans) and best practice guidelines. Programs which incorporate sound scientific and local knowledge work well and can be used to guide management objectives, set control targets, determine appropriate methodology and provide justification for the management program. Scientific research carried out in conjunction with management programs has flow on benefits to all feral horse management if it is shared, as it increases our overall knowledge base and helps inform decisions. Science and local knowledge can also inform the public and media.

Successful programs involve good relationships with land owners, lobby groups (e.g. conservation, animal welfare, horse interest) and professionals (e.g. horse handlers, scientists). This is often achieved by including representatives in a working group or at least inviting them to public meetings. Working groups can set objectives and participate in the management program and usually meet regularly throughout the planning and implementation of the program. Such a working group disseminates information to interest groups and concerns can be taken back to the working group in a controlled setting, which helps to resolve conflicts.

Effective reductions in feral horse impacts have been achieved by pooling skills and resources when feral horse populations run over several land tenures. Integrating control techniques such as combining mustering/commercial sale with aerial shooting (using qualified people) has also been successful in reducing populations to acceptable levels where one technique alone would have failed. Surveys of feral horse populations pre- and post-control ensure that populations have been effectively reduced. Once a population is reduced, rigorous maintenance control ensures ongoing success. Programs that have eradicated feral horses have seen responses in vegetation and wildlife and have removed the need for ongoing feral horse control.

Where a National Approach could be Beneficial

A national approach to feral horse management would be beneficial in providing uniform guidance to land managers and interest groups and in breaking down many of the barriers listed above. National endorsement of standards for control techniques and an accreditation scheme would be an essential component of this approach. National standards (best practice) would include codes of practice, standard operating procedures, and guidelines for handling and transport. A national accreditation scheme for people involved in different elements of feral horse control (including shooting, handling, and transport) would provide a larger pool of highly qualified operators who could be involved in control programs regardless of lead agency or land tenure.

A collation of existing knowledge on feral horses and their management would be of value. Dobbie *et al.*'s (1993) work is a good foundation to build upon and there is a lot of international literature and experiences that can now be included. Important areas to focus on are impact; managing community perceptions; control techniques and their relative humaneness; and survey and monitoring techniques. An identification of knowledge gaps would be an element of this process which could feed into national research priorities.

Dissemination of existing knowledge to both managers and the public at a national level would benefit feral horse management. The National Feral Horse Management Workshop was a successful first step in this process and needs to be followed up by raising the public profile of feral horses, in particular that they do have detrimental impacts and need to be managed.

Underpinning the successful management of feral horses is a sound scientific understanding of the impact of feral horses in different environments, and how to manage them effectively in a manner that is acceptable to the community. National leadership is required to strategically address gaps in our knowledge which will then need to feed back into public education.

Papers

1. A Western Australian Perspective

Richard Watkins, Department of Agriculture and Food

Scope of the Feral Horse Issue in Western Australia

Unmanaged feral animals can have significant impacts on natural resources, industry, individuals and the economy. One of the Department of Agriculture and Food's key objectives is the effective management of the risks of animal and plant pests on productivity, sustainability and market access.

The horse (*Equus caballus*) is a declared animal under the *Agriculture and Related Resources Protection Act 1976* when **running wild** in agricultural and pastoral areas of Western Australia. It is declared in an A5 category which requires landholders to reduce/control numbers within an infestation on their land under their control.

Feral horses in Western Australia are predominantly located in the rangelands.

The rangelands make up 87 % of Western Australia's landmass and include all but the south west of the State. Livestock grazing on pastoral leasehold is the dominant commercial land use across 42% (910,000 km²) of the WA rangelands and unallocated Crown lands comprise another 37%.

The feral horses are mainly located in the Kimberley, Pilbara, and Goldfields. A pest animal survey was undertaken by Vertebrate Pest Research Section of the Department of Agriculture and Food and Conservation and Land Management staff in 2002/03. Data collected in this survey indicated that there was 1 percent of pastoral leases that were considered to have a heavy infestation, 5% a medium infestation and 66 % to have no infestation. (8% were unknown).

Problem: In Western Australia the main impacts of feral horses are economic, environmental and social. The economic impact is mainly attributed to:

- Competition with domestic livestock for vegetation
- Impacts on station management; Damage to fencing, disrupting station horses during musters; take mares from station stocks and upset breeding programs; fighting between stallions and injured animals.
- Exotic Diseases: The feral horse is susceptible to a number of exotic diseases including Brucellosis, Equine encephalomyelitis, Glanders, Hendra virus, Japanese encephalitis, Rabies, and Vestibular stomatitis (Category 1 and 2 diseases extracted from AUSTVETPLAN 2000)

The environmental impact is on native vegetation due to the grazing technique of horses and soil erosion when numbers are high.

Social issues associated with feral horses include the desire of some indigenous communities to retain feral horse populations with minimal management and resisting culling opportunities. The basis for this belief is that horses may provide business opportunities and training opportunities for indigenous youth.

The management of feral horses must also recognise their cultural significance. Wild horses are regarded as a national symbol by many Australians and the subject of bush folk lore. In highland areas of Australia they may be source of eco tourism and regional employment.

In an increasingly urbanized society the general public are becoming more remote and less informed on the realities of animal production and conservation in rangeland and agricultural areas. The perception these people may have of horses may be vastly different to feral herds in the rangelands. Pressure from animal rights group is an increasing issue.

Management Strategies

Feral horses are a complex management problem because they are widespread, often occur in relatively inaccessible country, are a major pest to both agriculture and the environment and are a commercial resource and an animal welfare concern.

Horses are generally viewed differently by pastoralists and public to other feral animals. While most pastoralists have no emotional problems controlling most feral animal species; some have difficulty culling horses. This can probably be attributed to the close liaison between horses and man over many years.

The responsibility for feral horse control lies with the landholder. In Western Australia pastoralists are rated to raise money for control of declared plants and animals. These funds are matched by state government and form a Declared Plant and Animal Control Fund. These funds are used to contract trained government officers to undertake control of feral animals on behalf of landholders.

The main management methods utilised in Western Australia is commercial harvesting and control by shooting. Commercial harvesting is undertaken to reduce large numbers when the price per head exceeds the cost of transport and mustering. Given the cost of transport it is generally uneconomical in many areas of WA. Significant numbers have been transported from the Kimberley to the abattoir at Peterborough in South Australia. Where it is uneconomic to sell the horses and they are still a problem, aerial shooting is the most effective control technique. Aerial control is generally undertaken in conjunction with the feral donkey radio telemetry program. Good planning is required between station management and the control team as it is difficult to distinguish between station horses and feral horses.

What are the Barriers and What Works Well?

The barriers to good feral horse control include:

- The concept that feral horses may have a value at some time in the future; training of indigenous youth, pet meat, station horses, rodeo horses.
- Cost of control techniques.
- The thought that feral horses are an icon: Brumbies should be protected/ Save the brumby.
- People in general like horses and don't want to kill them. Many stations are happy to have a small population of horses running on their property as long as they don't interfere with management.
- Stations with little or poor management.

Given the extensive area of the WA rangelands the best method for control is dependent on the situation. Generally an integrated approach involving mustering, commercial sale if possible, followed by aerial control is usually the best method of control.

Where a National Approach could be Beneficial

A national approach may be beneficial to:

- Provide a public perception/awareness campaign on feral animals including feral horses.
- Assist the collation of existing impact data and identification of knowledge gaps that require further work.
- Identify key decision points for managing conflicts between heritage and environmental values and better quantify the economic, social and environmental impacts of these animals at a national level.

References:

Woolnough, A., Gray, G., Lowe, T., Kirkpatrick, W., Rose, K. and Martin, G. (2005). Distribution and Abundance of Pest Animals in Western Australia: A survey of institutional knowledge. Vertebrate Pest Research Section, Department of Agriculture, Western Australia.

Dobbie, W., Berman, D., and Braysher, M. (1993). Managing Vertebrate Pests: Feral Horses. Department of Primary Industries and Energy. Bureau of Resource Sciences, Australian Government Publishing Service, Canberra.

2. Feral Horse Management in South Australia

Scott Jennings, Department for Environment and Heritage

Scope of Feral Horse Issue

Feral horses are distributed widely throughout the arid zone of South Australia across the Strzelecki, Sturt Stony and Simpson deserts, to the far north west of the Anangu Pitjantjatjara Lands (Figure 1). Historically many stations bred horses for military use within Australia and for export to British colonies such as India. When demand declined, these horses were left to form feral mobs. During the 1980's, as part of the Brucellosis-Tuberculosis program, thousands of horses were removed from stations throughout the far north and infrastructure improvements were made to numerous stations to allow better stock management and capacity to manage feral herds (G. Axford, *pers. comm.*).

Figure1: Map of horse distribution in South Australia (based on the Biological Databases of South Australia, 1980-2005. Map created by R. Urban)



While the feral horse is a declared species under the *Natural Resources Management Act 2004*, there is no statutory requirement for land managers to control them. However, they are considered to have a negative impact on the natural environment and programs that target their removal from properties and regions are supported. These programs aim to reduce impacts on mound springs, cultural sites, surface and stock waters, along with reducing the total grazing pressure and competition for resources with native species and stock. It is difficult

to quantify the direct impact feral horses have throughout the arid zone due to the remoteness of the country they inhabit and impacts of other species such as feral donkeys, camels, and domestic cattle.

Aerial surveys undertaken in fixed-wing aircraft, utilising strip-counts have been conducted throughout South Australia to monitor large herbivore populations. In 2000 a survey of the Anangu Pitjantjatjara Lands estimated the density of horses at 0.05 km⁻², with an estimated population of around 5,000 animals (Last 2001), and in 2001 an aerial survey of the Simpson Desert region estimated the density to be 0.14 km⁻², with a population estimate of less than 2,000 animals (Axford, *et al.* 2002). Expansive areas and low scattered numbers require control programs to be integrated, well coordinated and supported.

Management Strategies

For South Australia, the estimated population density and distribution of horses throughout the arid lands has low precision. Aerial surveys have focused on feral camels, pigs or weeds. Horses and donkeys are recorded during surveys, however the number sighted is usually low in proportion to camels and often preclude meaningful analysis. A focus on feral horses would require a different survey methodology such as increasing the sampling intensity and varying survey height, speed and possibly aircraft type. Other information is gathered through landholder surveys and reports as well as some on ground photo-point and biomass sampling.

Control techniques vary across the State, but are usually a combined approach of mustering and shooting either from the ground or the air, depending on the number of horses encountered. Mustering is always the first option given the ability to readily muster and trap mobs if numbers warrant it and if a team of musterers are available. However, people must be organised and well-equipped to tackle the difficult and remote terrain. Due to a reduction in the labour force throughout pastoral properties, staff are no longer readily available or equipped to muster small mobs of horses, so small mobs are generally shot opportunistically (B. Greenfield, *pers. comm.*).

When a coordinated control program is running in the district with numerous properties involved, animals are culled with the use of aerial marksmen shooting from a Robinson R22 helicopter. Marksmen are fully trained and accredited for the task, using .308 calibre semi-automatic rifles. The use of aerial marksmen allows all animals in a mob to be humanely culled, as the helicopter is able to remain with the mob, ensuring every animal is culled.

What are the Barriers and What Works Well?

Funding is the primary barrier that inhibits the establishment and continuation of programs, whether it is for establishing monitoring sites, aerial survey or coordinated and integrated control programs. As horses are often in the same area as feral camels and donkeys and all species are contributing to impacts, control programs target all large feral herbivore species. While this outcome is ideal, the remoteness adds to the cost and logistic difficulties if animals are to be mustered and trucked to other destinations.

Due to the remote nature of dealing with feral horses in South Australia, along with the different land managers that are involved, programs need to be well planned to maximise the benefit and opportunity for success. This takes resources in terms of staff through planning and coordination, along with operational expenditure. Programs need to clearly identify the various issues and desired outcomes so all involved are aware of what is trying to be achieved.

Awareness of the problem, being able to identify the direct impacts attributed to feral horses, being prepared to implement programs and discuss options are all barriers, as views vary with the various land managers and the manner in which the horses can be managed. Determining whether they are a pest or a resource is often the hardest issue to resolve. Once agreement can be made on their status we can then put steps in place to initiate a program. Coordinated programs undertaken in South Australia have often worked well where numerous land managers have been able to pool resources and undertake control programs, usually with the assistance of regional soil boards and government agencies such as the Department for Environment and Heritage. All stakeholders contribute to the program, supplying fuel or accommodation, spotting planes, or culling teams, etc. Through this coordinated approach large areas are able to be surveyed and effective control of the feral herbivore populations within a region achieved.

The Department for Environment and Heritage successfully negotiated the removal of a population of feral horses, initially estimated at around 200, known as 'Coffin Bay Ponies' from the Coffin Bay National Park. This process took over 10 years of negotiation. Initially the population was reduced through mustering and trapping, leaving an agreed population of 20 mares and one stallion, with progeny being mustered and removed on a yearly basis. Throughout this time monitoring was put in place to assess the grazing impact of all herbivore species on the park. While control of other herbivore species was taking place it was apparent that regeneration was still being hindered. Eventually through numerous negotiations, and lobbying from the general public and friends of parks groups, it was agreed to remove all of the horses from the park. This process was assisted with the allocation of land for the ponies to be managed elsewhere on the peninsula (T. Gerschwitz, *pers. comm.*).

Where a National Approach could be Beneficial

A coordinated National approach to feral horse management would be beneficial and supported by South Australia if applied effectively. As the feral horse, donkey and camel problem is shared across regions, programs should pursue integrated control of all three species as the impacts are similar, and the time and money spent in the region would be maximised. An important consideration is education and training. Aboriginal communities in particular are generally not in favour of a shoot and let-lie policy for feral animal control, perceiving feral herbivores as an important resource, creating opportunities for employment and cash return, as well as having historical links. If sale of live animals is to be supported as part of an integrated control program, it must be recognised that abattoirs that process these animals and other infrastructure required for yarding and transportation are limited and that codes of practice apply to all aspects of the process. Financial incentives to improve infrastructure and market access for feral livestock would be required, which a National approach may assist in resolving.

A standardised national population survey and monitoring approach could be applied to adequately survey regions to assess densities and impacts, and coordinate awareness programs, but this must flow through to action on the ground across all regions. Funding to support programs, allowing them to be implemented at appropriate scales and followed through over extensive areas is essential. To be successful programs would need to be coordinated across community groups and land managers, and incorporate a cross border and inter-agency approach to control programs involving neighbouring states and territories.

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3. Feral Horses in the Northern Territory

Glenn Edwards, Keith Saalfeld and Tony Bowland, Department of Natural Resources, Environment and the Arts

Scope of the Feral Horse Issue in the Northern Territory

Feral horses have been present in the Northern Territory since early European settlement. In fact, the first major influx of horses into Australia was the importation of the Timor Pony at the Port Essington on the Coburg Peninsula in 1838-1849 (Groves 1989). Feral horses were recorded on the Coburg Peninsula as early as the 1820's (Letts 1962) and were well established in Central Australia by the 1870's (Dobbie *et al.* 1993). Presently, major concentrations occur to the west of Alice Springs, in the Gulf region, in the Victoria River District and to the south of Darwin extending as far as Katherine (Dobbie *et al.* 1993) (Figure 1). Feral horses also occur on Vanderlin Island in the Sir Edward Pellew Island Group (Johnson and Kerle 1991) and on Bathurst and Melville Islands.

Recent aerial surveys put the population of feral horses in the Northern Territory at about 265,000 (Saalfeld, unpublished data, 1986-2001).

Figure 1: Map of the Northern Territory showing the Victoria River District, the Gulf region and West MacDonnell ranges.



Management Strategies

In the Northern Territory, the environmental impact of horses and the technical capacity to manage them are considered to be high, whereas the economic impact is deemed to be moderate. The high population densities with the propensity to increase rapidly along with an extensive distribution contribute to high levels of impact. Feral horses, along with donkeys, are considered a top priority for management attention in the Northern Territory. The first major attempt to manage feral horses in the Northern Territory commenced in 1986 near Alice Springs. An aerial survey conducted in 1984 put the number of feral horses in central Australia at about 54,000 with most of these in the ranges to the east and west of Alice Springs (Graham et al. 1986). Following discussions between park managers, wildlife rangers, scientists, Aboriginal traditional owners and pastoral land managers, a control program was developed to reduce the number of feral horses on the West MacDonnell national park, nearby Finke Gorge national park and adjacent landholdings to the west of Alice Springs (Bryan 2001). The proposed control area was approximately 3,000 km² in size. Initially the program employed a combination of coacher mustering, helicopter wing mustering and aerial shooting from helicopters. As horse populations declined, it became uneconomical to muster and aerial shooting became the primary method of control. The program proved highly successful- a follow-up aerial survey in 1988 indicated a 77% decline in feral horse numbers in the control area (Low and Hewett 1990). A total of 32,881 horses were removed from the control area between 1986 and 2001, the bulk of these in the first 8 years of the program (Bryan 2001). Nowadays, routine maintenance control on an annual basis is all that is required to keep horse numbers in check.

The second major attempt to implement regional control of feral horses in the Northern Territory commenced in 1999 in the Victoria River District (VRD) west of Katherine. An aerial survey in 1996 put the population of horses and donkeys in the VRD at about 30,000 and 70,000 respectively. Following extensive consultation with landholders, the VRD was declared a pest control area in 1999 and destruction notices were served on individual land holdings. The declared area is 95,000 km² in size. To date, about 130,000 donkeys and 30,000 horses have been removed from this area under this program using a combination of mustering and aerial culling.

In recent times, smaller scale horse management programs have been implemented to the north and west of Alice Springs.

What are the Barriers and What Works Well

The technical capacity to manage feral horses is well developed. Coacher mustering and helicopter wing mustering have worked well in the Alice Springs region when densities of feral horses have been high and in country that is not too rugged. Coacher mustering has the advantage that horses remain relatively calm throughout the operation but experienced personnel must be used. Wing mustering can be done in rough terrain and does not require the level of experience needed for coacher mustering. However, horses often escape during wing mustering operations after which they can become unmusterable (Bryan 2001). Aerial culling has proved extremely effective at all densities and in all terrains but the costs increases inversely with density and highly trained personnel must be used.

Key elements underpinning the success of the West MacDonnell region horse control program are:

- pre- and post-population surveys in the planning and early implementation phases
- adequate resources
- rigorous maintenance control
- use of qualified personnel
- incorporation of expert scientific and local knowledge
- 100% stakeholder support prior to commencement of programme
- flexible methodology

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The VRD program has not proved as successful as that in the West MacDonnell region in reducing large feral herbivore populations. The main problems have been (a) deliberate non-compliance with destruction notices on the part of a small but significant number of landholders, (b) the inability of some landholders to meet the required off take rate rates, (c) an over-reliance on government personnel to implement aerial culling, (d) donkeys breeding at a rate almost equivalent to that at which they have been removed and (e) the sheer size of the area involved.

The management of horses is a sensitive issue in Australia as it is elsewhere. In many parts of Australia, there is public concern over the methods which are used to manage feral horses, particularly aerial culling. The public reaction to a media campaign concerning horse management on Guy Fawkes River National Park in New South Wales in 2000 illustrates this point (English 2001). This sensitivity on the part of the public is the main barrier to more widespread, more effective and more humane control of feral horses across Australia. In the Northern Territory, as opposed to other parts of Australia, the public generally appear more accepting of large-scale programs to manage feral horses. Nevertheless, there are sensitivities within Aboriginal communities regarding the shooting of animals like horses to waste (Rose 1995).

A second major barrier to the control of feral horses (and other pests) in the Northern Territory is that many landholders lack the resources with which to tackle the problem. This is particularly true of Aboriginal landholders who own and manage about 50% of the Northern Territory landmass. Many Aboriginal people live in impoverished conditions and there is chronic underemployment in most Aboriginal communities. Under these circumstances, the management of pest animals is often considered a low priority if it is considered an issue at all.

In Central Australia, feral horses are often rejected by the pet meat industry because of the possibility that horses may have ingested species of the genus *Indgofera* which can lead to the poisoning of domestic cats and dogs. This condition is known as Birdsville disease (Dobbie *et al.* 1993).

Where a National Approach could be Beneficial

A national approach to the management of feral horses could be beneficial in the following areas:

- National recognition that horses can be pests that need managing
- National endorsement of humane control measures
- National accreditation of aerial shooters or at least the setting of national standards
- Coordination of control measures across borders
- Raising the profile of the issue which might lead to increased funding for control measures.

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4. Feral Horse Management in Queensland

Andrew Wilke and Gina Paroz, Department of Natural Resources, Mines and Water.

Introduction

The management of feral horses in Queensland is currently at a crossroads with relatively little strategic management taking place over the past 5 years by the major state players. Feral horse numbers and impacts have been increasing in several areas and moves are underway to develop a state feral horse management strategy.

Scope

Feral horses have traditionally had a wide distribution throughout western and northern Queensland (Figure 1) with approximately 100, 000 feral horses across the entire state (Mitchell *et al* 1985).

Figure 1: Feral horse distribution in 1982

Figure 2: Feral horse distribution in 2000



In 2000, a presence and absence survey was conducted and is shown in Figure 2. This information only represents the presence of feral horses in the local government areas, and not the distribution within the area.

The major difference between 1982 and 2000 is the presence of populations in south-east Queensland, however it should be noted that feral horse populations are present in almost all land types that are not intensively managed.

The favoured habitat areas appear to be open forests or scrub with access to water. In the western regions, large numbers occur in the dune areas and plains with low mulga scrub. Feral horses also inhabit commercial forestry plantations, areas of forest close to densely populated urban areas and until recently, offshore islands.

Feral horses have a range of adverse impacts. Economic impacts include competition with domestic stock for grazing, damage to farm infrastructure and the potential for feral horses to act as vectors of diseases and parasites. The major social impacts relate to the potential for feral horses to cause motor vehicle accidents. The potential environmental impacts of feral horses include damage to water holes and wetlands, accelerated soil erosion and overgrazing of native species amongst others (Dobbie *et al* 1993).

Management Strategies

Feral horses currently have no pest status in Queensland although the Department of Natural Resources Mines and Water are clearly the lead agency for their management. A number of other state and federal agencies are concerned with feral horse management including the Queensland Parks and Wildlife Service, the Department of Defence and Forestry Plantations Queensland. In addition local governments in Queensland have carried out localised control operations for feral horses, particularly where they posed a danger to traffic and rural infrastructure and landowners have long carried out control to reduce damage to production. Feral horses also have commercial value with many being used to ride and others supplying the pet meat trade as well as being exported for human consumption.

Department of Natural Resources Mines and Water

The Department of Natural Resources Mines and Water (NRMW) has a number of responsibilities for pest management. The *Land Protection (Pest and Stock Route Management) Act 2002* is the primary act relating to management of vertebrate animal species but feral horses are not a declared pest under the act.

Under previous legislation (*Rural Lands Protection Act 1985*) feral horses were a declared animal for the whole of the state, which required landowners to destroy feral horses and restricted their introduction, keeping and selling. When the *Land Protection (Pest and Stock Route Management) Act 2002* was being written, previous pest declarations made under the *Rural Land Protection Act 1985* were assessed to determine whether declaration was a tool needed for control of the species. Feral horses were not seen as a significant concern and the declaration of feral horses ceased with the repeal of the *Rural Lands Protection Act 1985*.

Recently the department has initiated a pest assessment for feral horses which is currently in a draft stage. The assessment examines the economic, social and environmental impacts and benefits of feral horses and the feasibility of regulation. In addition to this, the State Land Pest Management Committee has requested NRMW to lead the development of statewide policy for feral horse management on state lands, including the possible development of a state feral horse management strategy.

Queensland Parks and Wildlife Service

The Queensland Parks and Wildlife Service (QPWS) have custodial management responsibilities for about 12 million hectares of land. There are no specific policies or operational procedures relating to how feral horses are to be managed, but a generic approval system that could include feral horses is in place. Strategies for feral horse control are considered on a case by case basis taking full account of the nature and extent of environmental impacts, the range of potential control options and the scope for integrated action with neighbours across estate boundaries. Non-lethal methods of feral horse control are preferred; however, in cases where lethal methods are assessed as the only viable option, close liaison with the RSPCA is established.

During the 1980s and 1990s, and in conjunction with neighbours, QPWS was actively involved in the removal of feral horses from several national parks. During this period, in excess of 5,000 animals were destroyed. More recently, the successful removal of 28 feral horses from Fraser Island was achieved by trapping.

Populations of feral horses have become established at numerous locations on the protected areas and forest estates across the State. While not quantified, they are known to be causing negative ecological and social impacts. The productivity of neighbouring properties is also affected.

QPWS has recently initiated the development of an integrated pest management strategy for Carnarvon National Park, with a strong focus on dealing with the issues and impacts of feral horses. Neighbouring landowners have been lobbying for control due to damage to farm infrastructure, competition for grazing and the potential for feral horses to act as vectors of diseases and parasites (e.g. cattle ticks). QPWS also see need for control as current horse densities (1.51 horses/km²) are having adverse impacts on biodiversity values, particularly those around the sensitive spring areas. The population is large enough to be both regionally and nationally significant. Key stakeholders including traditional owners, neighbouring landowners, the RSPCA and the Wildlife Preservation Society are being actively engaged in a consultation process. It is expected that when this programme is successfully concluded, the operation will be used a template for other operations throughout the state.

Department of Defence

The Departments activities are guided by the 'Management of Feral Animals, Weeds and Overabundant Native Species on Defence Estate: National Guidelines'. They have actively managed feral horses on different properties throughout the state including Greenbank Training Area and Townsville Field Training Area.

The Townsville and Greenbank operations are examples of extremely well planned operations with extensive community and stakeholder consultation. In the case of Townsville a stakeholder forum was held with landowners and interested parties which resulted in an agreed programme which has included two aerial shooting operations to date. In the case of Greenbank, local councils and the RSPCA were engaged early in the process and a pro-active media campaign was initiated to ensure that people were aware of the problems posed by the feral horses to traffic and the bases operations. The media became bored with the issue and the operational aspects of the project proceeded without any issues.

Forestry Plantations Queensland

Forestry Plantations Queensland (FPQ), a state government commercial business, manages the Queensland Government's 200,000 hectare forest plantation estate. Feral horses are present in commercial forests along the Fraser Coast and at Beerburrum. They are not seen as a threat to forest production values but do pose a threat to human health and safety as a number of major roads, including the Bruce Highway, traverse the forests. FPQ do not have specific policy relating to feral horses but are concerned about the potential for feral horses on their land to cause accidents and injury to staff, contractors and members of the public.

Feral Horse Management – Best Practice and Barriers

In common with many pest management operations, managing the human aspect of feral horses often provides the greatest challenges. This has certainly been the case for feral horses in recent examples in Queensland. Where the human aspect has been well managed, the management of the horses has taken place smoothly. This aspect of management needs to clearly highlighted in any polices relating to feral horse management and adequate time and resources allocated to it in individual operations.

Best practice regarding control methods is occurring and state agencies are sharing information regarding successful operations. There is a need to ensure there is no duplication of effort between agencies and information sharing continues to take place. Aerial shooting of feral horses as a management tool needs to remain available to all managers.

Barriers to feral horse management in Queensland include lack of clear direction on management at the state level and lack of knowledge regarding impacts and distribution. The first issue is being addressed and has not stopped a number of recent successful operations. The second issue requires some strategic directions to be set and research undertaken to determine impacts at a number of different levels.

The significance of feral horses to indigenous communities in Queensland is not well documented. A number of aboriginal councils have horses listed as animal of concern in local pest management strategies although this refers to uncontrolled domestic horses. Some control operations have proceeded in areas where indigenous communities have been key stakeholders but this issue is yet to be tested fully.

Benefits of a National Approach

The major benefit provided by a national approach to feral horse management is one of consistency in terms of developing management programmes and implementing control options. Research into several areas, including environmental impacts and control methods, would also benefit from a coordinated national approach.

With respect to national standards, The Model Code of Practice for the Humane Control of Feral Horses has not been adopted by all states and territories.

There are a number of national groups with an interest in feral horse management including the RSPCA and The Waler Horse Society of Australia Inc. Engaging organisations such as these at a national level would assist in their engagement at the state and operational level.

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5. Feral Horse Control on the Defence Estate

Bruce Lambie and Tony Law, Department of Defence

Background

Defence is entrusted with the stewardship of approximately three million hectares of public land with properties in all States and Territories of Australia with many containing significant tracts of remnant native vegetation. Although the prime purpose of these properties is for training by the Australian Defence Force (ADF), many properties contain significant natural and cultural environmental values.

Defence is committed to fulfilling its environmental legal and stewardship responsibilities and employs a team of environmental professionals to facilitate the sustainable environmental management of the Defence estate. The ongoing challenge for this team is to ensure that these properties are able to satisfy their prime purpose, while balancing the need to protect environmental values. Defence also retains the services of some of the largest environment management consulting firms in Australia to provide expert scientific advice.

Following the Defence efficiency review in the early 1990's, Defence adopted a purchaser provider arrangement between the ADF and the civilian component of the department. The Defence estate was divided into twelve administrative regions and management responsibility for the provision of goods and services was devolved to the level closest to the customer. The delivery of those goods and services is provided mainly through contractual arrangements with industry, and the control of feral animals is just one of these services.

Why do Defence Properties have Horses?

Because of the dangerous nature of many Defence activities, land used by Defence has not been subject to development pressures experienced elsewhere across Australia. In many parts of Australia Defence lands contain large tracts of remnant native vegetation and so are like islands in a sea of agriculture, pastoralism or development. In such cases feral animals such as horses are often found on these properties because of the shelter they provide.

Most of the Defence properties that contain feral horses are located in the Northern half of Australia and as is the case else where in Australia, feral horses on Defence properties mainly originate from animals migrating onto Defence properties or, they were already present when Defence acquired the land. It should also be noted that some of these properties such as Bradshaw Field Training Area (approx 8,700 km²), Shoalwater Bay Training Area (approx 4,500 km²) and Townsville Field Training Area (approx 2,300 km²) are quite large.

Why are Horses a Problem for Defence?

Personnel Safety – Military training areas are normally very busy places anyway but, with the heightened state of Defence operational tempo, most training areas are being used extremely heavily in preparation for deployment. The large number of vehicles traversing the road network of training areas translates to a significant risk of Defence personnel being injured in vehicle accidents involving horses. Likewise, if horses leave a Defence property and move onto surrounding public roads there is a potential risk to civilian traffic and injuries to members of the public.

Ground Cover – A key threat to being able to maintain training areas in a condition that is able to sustain the physical pressures associated with training activities, is a loss of ground cover. Feral animals such as horses contribute to total grazing pressure as well creating trails that can facilitate soil erosion with resulting impacts on water quality, biodiversity as well as make the training area unnavigable.

Welfare of Horses – Apart from the direct injuries that horses might receive from live firing of weapons, horses can suffer from lack of food or water in drought years. Defence properties do not have internal fencing that is suitable for the management of horses nor does Defence have the resources for managing domestic animals, and so it is not possible to undertake any animal husbandry that might be required or, confine feral horses to certain areas.

Training Schedules – Military training activities involve detailed planning and preparation that can begin 18 – 24 months out from their activity date. Every effort is made to facilitate training activities proceeding as scheduled, thus allowing horses to build up in numbers that might either impact on the training activity directly or, having to interrupt schedules to cull horses, is highly undesirable.

How does Defence Remove Horses?

Although Defence appreciates that it is not always possible or cost effective to eradicate feral animals from an area; total removal and preventing reinfestation by feral horses is still strived for where possible.

In keeping with the Defence 2005 Environment Policy <u>http://www.defence.gov.au/ environment/</u>, guidelines were developed to promote a consistent approach to the management of feral animals across the Defence estate. These guidelines place a great deal of emphasis on identifying stakeholders and consulting with them early in the planning process. To ensure these guidelines were in keeping with industry best practice, they were also reviewed and endorsed by Dr Glen Saunders of the NSW Department of Primary Industries.

To ensure that animal welfare considerations are appropriately addressed, all feral horse control activities undertaken on the Defence estate are also required to be done in accordance with the model codes of practice for the humane control of various feral animals that were prepared by NSW Department of Primary Industries with support from the Natural Heritage Trust.

Given that Defence is a Commonwealth agency, it is also obliged to abide the provisions of the *Environment Protection and Biodiversity Conservation Act 1999* and consider any potential environmental impacts the might result from implementing the plan.

Although the principles of the feral animal guidelines and the model codes of practice are to be complied with; each region has a senior manager and it is up to them to determine which control method suits the circumstances of the particular property and provides a cost effective and pragmatic solution.

Due to constraints such as the existence of unexploded ordnance, remoteness and rough terrain as well as having to undertake control activities within tight timeframes so as not to interrupt training area bookings, most horse control has been undertaken by aerial culling with some trapping and relocation undertaken where it was feasible. Moreover, Defence always endeavours to undertake these control activities in co-operation with the neighbouring land managers.

Benefits of a National Strategy?

Although Defence believes that the process it already has in place to undertake horse control reflects industry best practice, the development of a national Feral Horse Control Strategy is supported in principle so long as it is pragmatic, efficient and effective. Defence believes that its current approach satisfies the requirements of stakeholder consultation and animal welfare while still leaving enough flexibility for those responsible for managing land, to decide what is appropriate for their local circumstances.

Even though Defence believes its current feral horse control procedures reflect best practice, there are two aspects where a national strategy would assist Defence with its feral horse control activities.

Firstly, because Defence has its feral animal control work performed by contractors, a lot of attention is paid to the credentials, reputation and experience of the tenderers. Given that the codes of practice for humane control of horses includes aerial and ground shooting as a control method and also identifies the areas that should be targeted, it would be of assistance to the procurement process if a future national strategy referred to a nationally accredited level of marksmanship that matched the requirements of the code that people undertaking this type of work had to comply with.

The second issue where a national strategy could help is in promoting agreement that feral horses should be controlled wherever they occur across Australia and that the relevant model code of practice and corresponding standard operating procedures should also be accepted nationally. This would assist Defence in its liaison with the different State and Territory authorities, help lessen the risk of reinfestation and provide a consistent message to the general public.

In addition to this paper, the Department of Defence presented a case study of feral horse control work it had recently undertaken at the Townsville Field Training Area (TFTA) in North Queensland. The case study presented the key issue of the exercise including:

- Defining the impacts of feral horses on TFTA;
- Assessment of risks posed by feral horses;
- Determining extent of infestation;
- Preparing a draft plan;
- Identifying stakeholders and consulting with them;
- Finalising plan;
- Implementation; and
- Monitoring and reviewing.

6. The Impact of Feral Horses: Are They a Really Bad Pest?

David Berman, Department of Natural Resources and Mines

Successful vertebrate pest management programmes that I have been involved in have incorporated the following components.

- 1. Study of the ecology of the pest in particular their distribution and density.
- 2. Quantify the impact.
- 3. Assess various control techniques and strategies.
- 4. Conduct control programmes using the best techniques and strategies.
- 5. Determine the success of control programmes by determining the distribution, abundance and impact again.

Components 1 and 2 are the foundation upon which a successful control programme is based. It is essential to have a good understanding of the ecology of feral horses, in order to quantify their impact. In this paper I show that the negative impact of feral horses in Australia has been substantially underestimated and could well be more than other important Australian pests such as cats, foxes or wild dogs.

Impact can be social, environmental or economic and can be positive or negative.

Why is there a Need to Look at Impact?

The cost of negative impact must be determined in order to justify feral horse control and to determine how much can be spent on control. We need to know how bad feral horses are compared to other pests so that the limited funds for management of pests can be used appropriately.

The assumption that an introduced animal is causing damage may not be correct. Feral horses in some places may in fact be beneficial. They may be reducing bushfire fuel loads by removing grass. They may be exerting no negative impact at all and simply providing pleasure for those that love seeing wild horses living free in the bush. Control in this case would be a waist of time and money.

Alternatively feral horses may be increasing the risk of extinction of yet another Australian mammal or they may be making a cattle-producing enterprise unviable. They may be posing a life-threatening risk to people travelling in vehicles on roads. Or they may be simply disturbing people who obtain pleasure from walking through pristine Australian bush where there are no other signs of introduced plants or animals.

Unfortunately many vertebrate pest control operations including feral horse operations still focus on killing the animal and bypass measurement of the impact. By failing to assess impact land managers will most likely ensure failure of a control programme.

Social Impact

Feral horses are protected from lethal control techniques in the United States of America because they "are living symbols of the historic and pioneer spirit of the West; ... they contribute to the diversity of life forms within the Nation and enrich the lives of the American people ..." (Public Law 92-195, December 15, 1971) (<u>https://www.blm.gov/adoptahorse/</u>). Wild horses are also a very special part of Australian history. It is perhaps important to preserve some populations of feral horses in some places, in a way that they are not causing environmental or economic damage.

Environmental Impact

Studies of environmental impact have been conducted in central Australia (Berman 1991; Berman 1988), the Australian Alps (Dyring 1990), in north east New South Wales (Schott 2002), New Zealand (Rogers 1991), north America (Beever and Brussard 2000) and Argentina (Zalba and Cozzani 2004).

The direct environmental impact of feral horses is easy to detect (e.g. dung or snorting) and quantify but difficult in some cases (e.g. pads and grass removal) to distinguish from changes caused by other introduced herbivores, especially cattle.

In central Australia, to look at environmental impact of horses alone, I selected an area used by horses but not cattle and compared it with areas used by both horses and cattle. I found variation in vegetation, wildlife and soil erosion corresponded with changes in grazing intensity. High density of horse dung and tracks was associated with denudation, low density of macropod dung, water-holes fouled with horse carcasses and the greatest occurrence of gully erosion. Feral horses have the potential to exert impact on almost all areas of pasture in central Australia because they are able to walk up to 50 km from water and traverse hills, which are barriers to cattle (Berman 1991; Berman and Jarman 1988).

The relationship between trampling and soil properties and the vegetational differences between trampled and untrampled areas has been examined (Dyring 1991) for feral horses in the Australian Alps. Where there were 20 to 50 passes of a horse the compaction of the soil increased significantly. Exotic plants featured more in trampled sites compared to untrampled sites.

In New Zealand horses compromised floristic, rare plant habitat, and landscape nature conservation values (Rogers 1991) and in North America feral horses had a substantial impact on vegetation (Turner 1987). Where they have been excluded there was greater plant species richness, percent cover, and abundance of grasses and shrubs, as well as more small mammal burrow entrances than where horses were present (Beever and Brussard 2000). Further work showed that sites occupied by horses possessed less community completeness (biotic integrity) and poorer reptile species richness than sites where horses grazed (Beever and Brussard 2004). Also where horses were removed there were more ant mounds and the soil was less compacted (Beever and Herrick 2006).

The work so far demonstrates clearly that feral horses have impact on native plants and animals. An economic value of these plants and animals should be determined as has been done for the impact of other pest species (McLeod 2004) and I expect it to be substantial.

Economic Impact

The economic costs of feral horses can include competition with livestock for pasture (Berman 1991), and research and control costs (McLeod 2004). A research cost of 0.5 million dollars per year has been published as the entire economic cost of feral horses in Australia (McLeod 2004). While I very much doubt the research cost has been anywhere near 0.5 million dollars this amount is insignificant compared to the potential cost of lost cattle production.

There are somewhere between 300,000 and 600,000 feral horses in Australia (Dobbie *et al.* 1993). These horses mainly inhabit extensive cattle producing areas and they eat the same pasture species as cattle (Berman 1991). It is likely that one horse is equivalent to one cow (Berman 1991). That is if there are 1000 feral horses on a cattle station then the station can run 1000 fewer cattle. Assuming this to be true and that cattle can bring in \$100 per beast per year profit (Berman *et al.* 2002), horses may be costing the economy somewhere between 30 and 60 million dollars per year in lost cattle production alone. In addition to this there is damage caused to pasture composition and soil due to overgrazing. This makes the land less productive as the palatable pasture species disappear and pasture plants find it more difficult to grow.

Add to this the value of the native plants and animals that are damaged in areas over populated by feral horses and the economic cost of feral horses in Australia could be more than that reported for some of our other important pests such as cats, foxes or wild dogs (McLeod 2004).

Future Feral Horse Impact Research

There is a tendency for studies of impact to be avoided because of the perceived difficulty. This must change. Monitoring plots, exclosures or other technique for quantifying impact and the benefits of control must be established before or at the time control commences. This area of research is a vital part of the management process.

A better estimate of the Australian feral horse population size is required and a better map of distribution will enable determination of a more accurate cost of damage to industries such as the cattle industry. The dollar cost of environmental damage should be estimated.

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7. Feral Horses in Victorian Parks and Reserves

John Wright, Charlie Pascoe and Dave Foster, Parks Victoria

Feral Horses in Victoria

Feral horses have been present in Victoria for over 100 years with current populations established from escaped domestic stock (Menkhorst 1995). Most feral horses in Victoria occur in the alpine region of the state, particularly in the Eastern Alps Unit of the Alpine National Park and adjacent areas of Crown Land (east of the Benambra-Corryong Road), with a small population in the Bogong High Plains area. There are also records of feral horses scattered throughout the broader alpine area, as well as in East Gippsland. An isolated population occurs in Barmah State Park and the adjoining State Forest (DSE 2005) (Fig. 1).

Figure 1. Distribution of feral horses in Victoria. Data sources: Atlas of Victorian Wildlife (DSE 2005) and Parks Victoria's Environmental Information System.



The abundance of feral horses in the state is not well-known. Abundance has been assessed formally in the eastern alps and Bogong High Plains areas. This was done as part of a larger survey across the Australian Alps National Parks in April 2003. This aerial survey, which covered areas in New South Wales, as well as northern Victoria and the Bogong High Plains, estimated the population across that broad area to be 2,369 \pm 800 SE (Walter 2003). More recent aerial surveys estimated the population in the Bogong High Plains area in April 2005 to be 92 (95% CI = 81 - 116) and in the eastern alps in April 2006 be 655 (95% CI 395 - 1085) (Parks Victoria unpubl. data).
There has not been any formal assessment of the abundance of feral horses in the Barmah area, however Menkhorst (1995) indicates the population was thought to be in the order of 200 – 300 individuals. More recent estimates by local rangers indicate that the current population is more likely to be 100- 150 (S. Armstrong, *pers. comm.*). No estimates of abundance are available for other areas of the state.

Legislation

Feral horses are not formally recognised as pests under Victoria's *Catchment and Land protection Act 1994*, which obliges land managers to control listed pest species. However, various other pieces of legislation also dictate obligations for land managers and hence set the context in which feral horses are managed by Parks Victoria. For example, the *National Parks Act 1975* requires that "...each national park and State park is controlled and managed, in accordance with the objects of this Act, in a manner that will...exterminate or control exotic fauna ..." Similar requirements exist for other parks managed under the Act.

The *Crown Land Reserves Act 1978* requires that areas be managed for the purpose for which they were reserved, which in many instances is conservation of native flora and fauna or other environmental values. In addition other legislation such as the *Flora and Fauna Guarantee Act 1988*, which provides a legal framework for the conservation of Victoria's native flora and fauna, obliges land managers to ensure the protection of listed flora, fauna and communities.

Issues

Social/cultural Issues

The presence of feral horses in Victorian parks and reserves creates a number of social and cultural issues. Some of these issues stem from varying viewpoints that different members of the community have about feral horses. Some community members view feral horses and as an iconic part of the landscape and part of Victoria's cultural heritage. As such, they are opposed to any removal of feral horses from parks and reserves. A bumper sticker produced by the Alpine Brumby Management Association (ABMA), includes the words "Preserving the spirit of freedom and heritage in the high country". Some tour operators promote the opportunity to see feral horses as part of their tours (Pascoe and Foster 2004).

At the other end of the spectrum, some community members have concerns about the environmental impacts caused by feral horses and/or don't believe they belong in parks and reserves. For example, one community group, the Friends of the Cobberas, has established a series of exclosure plots at Native Cat and Cowombat Flats in the Alpine National Park to build a stronger understanding of the impacts of feral horses on vegetation and stream banks. In Barmah State Park, there are also concerns about the potential impacts of feral horses on aboriginal cultural sites, although the nature of these impacts is not well understood (DCE 1992a).

Feral horses also have an impact on the experience of park visitors. These include such things as wandering through campsites, the presence of dung piles, visitors feeling confronted or threatened and various safety concerns surrounding this, as well as contamination of drinking water for example through stream-bank damage or faecal contamination (Pascoe and Foster 2004, S. Armstrong, *pers. comm.*).

Other social issues relate to illegal activity. In Barmah State Park, some illegal shooting of feral horses occurs, creating potential concerns for public safety and placing demands on park staff to enforce legislation (S. Armstrong *pers. comm.*). Similarly, in the Alpine National Park, illegal brumby running, as well as illegal trapping or shooting of feral horses occurs, again creating potential concerns for public safety and placing demands on park staff to deal with compliance issues (Pascoe and Foster 2004).

Environmental Issues

Although there has been little formal research to assess environmental impacts of feral horses in Victoria, observations by park staff and visitors, as well as the limited amount of research that has been undertaken (e.g. Prober and Thiele, in prep., see also Nimmo 2005 for brief review) identify a range of potential impacts as matters for concern. These include changes to vegetation composition and structure resulting from grazing, trampling and spread of weeds, impacts on soils such as the creation of bare ground, track formation, soil compaction, and increased erosion; and impacts on water quality due to destabilisation of stream banks, increased sediment loads and increased nutrient levels through faecal contamination.

Management of Feral Horses

Objectives

Parks Victoria's broad management objectives for feral horses are to minimise the impacts that feral horses have on parks and reserves, and to reduce or remove feral horses where appropriate using suitable and humane techniques. Efforts focus on minimising impacts in areas of greatest value where evidence suggests impacts are occurring and where management is feasible. What this means is that management has two components:

- · Improving our knowledge of abundance and impacts
- Minimising impacts in targeted locations where this is feasible.

The Management Plan for Barmah State Park and State Forest includes as a management objective the removal of feral horses by the most practicable and humane means (DCE 1992a). The Alpine National Park Management Plan (DCE 1992 b, c) makes no explicit mention of the management of feral horses but includes a general objective of controlling or eradicating introduced animals. The current working objective for the Alpine National Park is to eradicate feral horses west of Benambra-Corryong Road and to manage populations to minimise environmental impacts elsewhere.

Approaches

Although historically a range of techniques including trapping, shooting and brumby running have been used in various locations around the state, brumby running, trapping and fencing are the only management approaches currently permitted for the management of feral horses in Victoria's parks and reserves. There is no active management of feral horses in Barmah State Park but in the Alpine National Park, brumby running and fencing are used.

Brumby running is done in partnership with the ABMA. This is managed under an annual contractual arrangement whereby Parks Victoria identifies target areas and the number of animals to be removed, as well as meeting public liability insurance costs, while the ABMA undertake mustering and roping. Some areas have been fenced protect a sensitive sites and/ or to enable the impacts of feral horses to be examined. In addition Parks Victoria monitors trends in abundance of feral horses.

What Works Well, What are the Barriers?

The majority of Parks Victoria's investment in feral horse management is in the brumby running program in collaboration with the ABMA in the Alpine National Park. The strength of this relationship is due largely to recognition by Parks Victoria of the skills of ABMA members and the need to maintain effective communication. Both organisations have agreed that whilst there are differences in their long-term objectives for feral horses, in the short term they will work together to achieve mutually satisfactory outcomes in specific areas of the park and agreed to reassess the mutual benefits of the relationship on a regular basis (Pascoe and Foster 2004). Parks Victoria's longer term objective to eradicate feral horses from part of their

current range and minimise their impacts in other areas is in contrast to that of the ABMA, which aims to manage feral horse populations in perpetuity through sustainable harvesting. These differences may ultimately present a barrier to achievement of longer-term goals.

Other barriers include illegal brumby running activity undertaken outside the Parks Victoria – ABMA relationship, which makes it difficult to assess the effectiveness of the control efforts undertaken. In addition, observations in many locations indicate that feral horses have negative impacts on park values, understanding of the nature and extent of these impacts in different situations and how they relate to abundance is limited. This coupled with the need for better knowledge of the appropriateness of a range of techniques other than brumby running or fencing to minimise these impacts also present a barrier to effective long-term management of feral horses across all Victorian parks and reserves.

Benefits of a National Approach

A national approach to the management of feral horses offers a range of benefits to land managers. It would facilitate sharing of knowledge both on the nature of issues associated with feral horses as well as different approaches to managing these impacts. It would also enable identification of where similar issues are being faced across the country and where differences occur. Opportunities for collaboration either in research and monitoring to betterunderstand how to manage issues, or for integration of management across agencies may then arise. For example, there may be opportunities for Victoria and New South Wales to integrate their monitoring and management of feral horses across the Australian Alps National Parks. An additional benefit that may result through greater understanding of the issues at a national level is a wider acceptance across various stakeholder groups that feral horses do have negative social and environmental impacts that need to be managed.

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8. Feral Horse Management on Conservation Reserves in New South Wales

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In New South Wales, feral horses are a significant problem within a number of conservation reserves on the Great Dividing Range and eastern seaboard. English (2001a) estimated the population of feral horses in NSW as between 5000 and 8000 horses. The largest population, in excess of 3000 horses, occurs within the Kosciuszko National Park (DEC 2004). The highest horse densities on conservation reserves have been recorded in the Guy Fawkes River NP at 5.47 horses per km² within isolated catchments (Freeman 2005). Other conservation reserves where horses are a significant problem are Oxley Wild Rivers, Yuraygir, Barrington Tops, Blue Mountains, and Kanangra-Boyd National Parks and Yerranderie State Conservation Area. Feral horses are also present on lands adjoining most of these reserves.

Horse populations, in these reserves, have increased to levels where their impacts on the environment are significant. They accelerate erosion through trampling, compaction and grazing, impact on native vegetation and ground-nesting birds, foul water holes and contribute to the spread of weeds. In high altitude areas of the Kosciuszko NP, alpine herbfields experience the most severe impacts through heavy grazing, and bog and fen communities are trampled and drained through the establishment of incised gully lines along horse trails. In the Blue Mountains NP feral horse impacts accelerate soil erosion that increases sedimentation and potential transference of dangerous pathogens into the Warragamba dam an important water source for the city of Sydney.

The Department of Environment and Conservation (DEC) has a legal obligation to manage these feral horse populations to protect native plants and animals. Management strategies are being developed to reduce horse numbers in these parks and to prevent feral horses moving into or increasing in numbers in other reserves.

Feral horse management in New South Wales has had a high public profile since the aerial cull of horses in Guy Fawkes River National Park (GFRNP) in October 2000 received national media attention. In response to community concerns, the NSW Minister for the Environment banned the aerial culling of horses in national parks in NSW and set up an independent inquiry into the cull and the future management of horse populations in GFRNP and parks elsewhere in NSW (English 2000, 2001a, 2001b). Since this time horse management practices by the DEC continue to receive close scrutiny from a range of community and horse interest groups.

Management Strategies

DEC recognises there are a wide range of views in the community about the management of horses in conservation reserves in this state. In the Guy Fawkes River, Kosciuszko, Oxley Wild Rivers and Blue Mountains National Parks community based steering committees, and or specialist reference groups have been convened to assist DEC in the development of the horse management plans for each area. Plans for the management of horses in other parks are in progress.

In recognition of wide community interest on horse management in the Kosciuszko, Guy Fawkes, and Oxley Wild Rivers national parks, the plans for these reserves have been made available for public comment before being finalised. In some instances, public submissions have exceeded submissions received for reserve plans of management; Guy Fawkes River NP received a total of 76 public submissions on the draft horse management plan.

Plans to reduce feral horse numbers in national parks are guided by the recommendations of Associate Professor Tony English from the University of Sydney in his report to the New South Wales Minister for the Environment (2001b) and by the Model Code of Practice for the Humane Control of Feral Horses (Sharp and Saunders 2005). Horse management plans are structured to address site-specific issues within each reserve. All plans include objectives to conserve and protect the natural values of the conservation reserve and the implementation of humane horse control techniques. Each plan examines the range of horse management methods available, including immobilisation using tranquillisers, fertility control, trapping, mustering, fencing, shooting and roping, and discusses issues associated with each before recommending preferred control method(s) for the reserve.

The management of feral horses in NSW is not as straight forward as the management of other vertebrate pests such as feral pigs and goats. Feral horses can have historic, cultural and economic value in NSW. This was well illustrated in public submissions made to the Guy Fawkes River National Park Heritage Working Group (HWP 2002).

Given the high incidence of horse ownership in Australia and this country's historical association with horses it is not surprising that feral horses have an iconic status for some people in NSW. Despite this however, very few people in this state have an understanding of the complex issues associated with managing feral horse populations in conservation reserves. There is a need to raise the public awareness on the significant environmental impact of feral horses; the limited options available for horse control; and the high costs associated with some techniques including trapping and mustering. The establishment by DEC of local community steering committees to assist in the development of horse management plans has provided a forum in which to raise the awareness of community leaders on these issues and to get community feedback.

Case Study

The Guy Fawkes River National Park is regarded as a "biodiversity hotspot" as it protects many threatened species/communities. It contains spectacular rugged gorges along the Guy Fawkes, Aberfoyle, Sara and Henry Rivers and conserves one of the most significant areas of declared wilderness in northern NSW.

Management of horses in the park began in the early 1990s with various capture and removal programs. After the aerial cull in October 2000 and subsequent community concerns about managing these horses and their heritage values, the NSW Minister for the Environment commissioned a study into the heritage value of horses in the park. In February 2002 the Heritage Working Party reported that the horses have significant local heritage value. In response the Minister announced that the horses would be humanely removed from the park and made available to people who had an interest in breeding and conserving the horses for their heritage value.

The GFRNP Horse Steering Committee was set up to assist DEC in the development of a horse management plan for the park. This committee included representatives from the GFRNP Heritage Working Party, RSPCA, veterinarians, experienced local horse handlers, local landholders, local horse interest groups, the NPWS Regional Advisory Committee, the Grafton Rural Lands Protection Board, the Local Aboriginal Land Council and the NPWS. The steering committee's terms of reference were to assist the process of consultation and the humane removal and appropriate management of horses from the GFRNP outside the park. The establishment of the steering committee also provided the opportunity for local people with experience in handling horses in rugged country to be involved in developing the most appropriate method to humanely remove the horses from the park.

The plan examined the range of horse management methods available, including immobilisation using tranquillisers, fertility control, fencing, trapping, mustering, shooting and roping, and discussed issues associated with each. However, the implementation of humane and effective strategies for controlling feral horses in rugged gorge country is very difficult. Over the previous decade techniques including mustering and trapping operations, using local horsemen and helicopter mustering, had been trialled with limited success. In the 10 years up to 2000, 156 horses were removed from the national park using these techniques.

Recommendations of the plan were to further trial and assess passive horse capture and removal techniques in the park. The techniques assessed in the trial were trapping horses into steelyards (Figure 1) and specially designed trap paddocks aided by feed-based lures, coacher horses and low stress stock mustering.

Results of this trial showed that horses could be trapped effectively in both steel trap yards and trap paddocks. During the 8 month trial 158 horses were captured and removed from the park. Of these horses over 95% were re-homed through the efforts of the local Guy Fawkes Heritage Horse Association. DEC does not retain responsibility for horses once they are removed from the park, it does however where possible make horses available to local horse groups who have an interest in breeding and conserving the horses for their local heritage value.

Since control programs commenced in the park in early 1990's a total of 1003 horses have been controlled in the park including 606 during the 2000 aerial cull. There are approximately 300 horses remaining in the park and controlled removal is continuing. The aim of GFRNP horse plan is the removal of all horses within 5 years.

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Table 1: Summary of feral horse populations in conservation reserves in New South Wales - Status and planning

| DEC Region (PWD Division) | Reserve | Estimated horse population | Population monitoring | Terrain | Reserve area (ha) | Environmental impact monitoring/ research | Status of planning |
|------------------------------|---|-------------------------------|---|--|----------------------|---|--|
| North Coast | Guy Fawkes River NP | 00 E | Mark-recapture population modelling | Rugged gorge country | 105,000 | Exclosure plots, ARC PhD (in progress), Masters project – impact of tree chewing (2005). Mark- recapture density study (2005). Documentation of site-based impacts | Management plan prepared and being implemented. |
| North Coast | Yuraygir NP | 30 | Ground counts | Coastal plains, saltmarsh, heath and ranges | 40,000 | Documentation of site-based impacts | Management strategy prepared |
| Northern Tablelands | Oxley Wild Rivers NP | 400 | Aerial counts | Rugged gorge country | 140,000 | Exclosure plots, documentation of site-based impacts | Public exhibition period ended final management plan being prepared for approval |
| Hunter | Barrington Tops NP | > 40 | Ground based counts | Sub-alpine plateaus and open woodland | 88,000 | Documentation of site-based impacts | Draft management plan in preparation |
| Hunter | Myall Lakes NP | 40 | Ground based counts | Rugged ranges | 45,000 | Documentation of site-based impacts | Management plan approved and being implemented |
| Blue Mountains | Blue Mountains NP & Kanangra -Boyd NP | 60 | Ground based counts | Sandstone plateau with deeply incised gorge system | 316,184 | Documentation of site-based impacts | Draft management plan awaiting approval for public exhibition |
| Snowy Mountains | Kosciuszko NP | 3000 | Aerial transect counts | Alpine mountains, rugged ranges and frost hollow plains. | 690,000 | Sub-alpine impacts study (1990). Impact monitoring project (1999). PhD study (2002). Documentation of site-based impacts | Management plan for alpine area approved and being implemented. KNP wide draft plan in preparation |

9. Feral Horses in the Australian Capital Territory

Nicky Webb and Don Fletcher, ACT Government

Scope of the Feral Horse Issue in the ACT

A population of about 200 feral horses was established in the Australian Capital Territory (ACT) in the early 1960's. This horse population is said to have been almost eliminated by a large snow event in 1964. The remaining population of horses (totalling 33) were culled in 1987 in accordance with the Namadgi National Park Plan of Management. Whilst the program objectives were achieved the action generated substantial public outcry.

The ACT remained free of feral horses until 2001 when small groups of horses began appearing briefly in grassy flats along the crest of the Bimberi Range. The horses most probably originate from the expanding horse population in northern Kosciuszko National Park. They are not behaving strictly as altitudinal migrants but move back down into NSW in some winters and during dry conditions. Over the last five years the maximum group size has increased to 13, with recent monitoring (June 2006) locating 11 horses at Jack's Flat south of Mt Murray. The decrease in snow falls on the ranges make it likely that in some years horses will change from altitudinal migrants to permanent residents of the sensitive sub-alpine communities in Namadgi National Park.

Management Strategies

Environment ACT released a Feral Horse Management Plan in 2004 in response to the threat of feral horses re-establishing in Namadgi National Park. The Strategy outlined the following three control methods that were dependent on area, accessibility, and the potential for horses to adversely impact sub-alpine wetland sites:

- "Barrier" fencing to prevent horses entering Namadgi National Park
- Trapping and removal
- Lethal control (ground or aerial based shooting)

The Feral Horse Management Plan is currently being reviewed in the light of experiences gained in both the ACT and NSW since the 2004 Plan was developed.

What are the Barriers and What Works Well?

Logistics and budgetary constraints have so far limited management of the horses in the Mount Murray area of Namadgi National Park. A planned trapping and removal exercise at Jack's Flat in 2004 did not occur as the horses had moved back into NSW. The "Barrier" fences have not prevented horses entering Namadgi National Park from NSW due to fence damage from fallen trees and horses walking around the fences. Four horses that moved further into the Park after the 2003 bushfire were humanely destroyed by ground based shooting. By then they had already done minor damage to a nationally significant wetland within the Canberra water-supply catchment. Consultation with the ACT Animal Welfare Advisory Committee and use of the media worked well in minimising an adverse public reaction to the cull of these four horses.

Where a National Approach Could be Beneficial

The ACT's feral horse issues are trivial relative to the other States and Territories represented at the Workshop. Even so, the small size of the ACT pest budget limits the Territory's ability to manage the few horses that could lead to the eventual re-establishment of feral horses in Namadgi National Park. An obvious long term prospect for the ACT is to work with NSW in a cooperative effort to control horses closer to the source population and in more favourable terrain in Kosciuszko National Park. A national approach would benefit the ACT if it were to provide leverage for Federal funds to support such a collaborative management solution.

10. Animal Welfare – RSPCA perspective

Bidda Jones and Steve Coleman, RSPCA.

The RSPCA has an interest in feral horse management both nationally and at a State/Territory level. Nationally, RSPCA Australia has been closely involved with improving the humaneness of vertebrate pest control in recent years, starting with the 2003 RSPCA Australia Scientific Seminar which examined the issue from a range of stakeholder perspectives. This was followed by a workshop jointly organised by RSPCA Australia, the Victorian Animal Welfare Science Centre, and the Vertebrate Pests Committee, which developed key components for a national approach towards humane vertebrate pest control. A discussion paper based on the proceedings of the workshop was subsequently published and has been widely circulated (HVPC Working Group 2004).

Regionally, the RSPCA regularly liaises with State/Territory government agencies on specific feral horse management programs and techniques. For example, RSPCA NSW is represented on the Wild Horse Management Committees for Kosciuszko, Warragamba, Guy Fawkes River and Oxley River National Parks, organised by the NSW National Parks and Wildlife Service. To date, the Guy Fawkes River National Park program has been the most successful and is now advanced in its protocols.

RSPCA input includes advising on lethal and non-lethal control techniques, reasons for and against the capture and training of feral horses, and overseeing trapping and handling carried out under control programs. The RSPCA may also be required to investigate specific complaints of cruelty arising from control programs. Control measures experienced in NSW programs have so far included ground shooting, trapping, roping, helicopter mustering and the use of coacher horses. Each of these techniques has the potential for animal suffering. The advantages and disadvantages of different control techniques are discussed in the Model code of practice for the humane control of feral horses and associated standard operating procedures published by the Australian Government Department of Environment and Heritage (HVPC Working Group 2004).

The issue of feral horse management is a controversial one that tends to incite strong responses from stakeholders. The RSPCA's position on feral horse control is based on the best interests of the animals' welfare, and is guided by a number of key principles for humane control. These are based on the implementation principles put forward in the discussion paper on humane vertebrate pest control (HVPC Working Group 2004):

1. Justification

Before a control program is developed, it must first be established that it is necessary. The potential benefits of control need to be identified so that they can be maximised, and any anticipated harms minimised. This requires a sound understanding of the impacts of feral horses on the environment. The need for control must be assessed on a case-by-case basis – it should not be assumed that the impacts in one region necessarily occur in another, or that the solution to the problem is the same.

2. Achievability

Is the control program likely to be a success, i.e. will it result in a sustainable reduction in adverse impacts (not how many animals will be removed or killed)? If the proposed benefits are not achievable, even if the harms are low, the control program cannot be justified.

3. Humaneness

The most humane approach that will achieve the aims of the control program must be used. The humaneness of a specific technique is influenced by a range of factors, including the skill of the operators, terrain, season, and the numbers of horses involved, so the methods used must be appropriate for the given situation. In the case of horses, non-lethal control methods such as mustering and trapping can cause significant distress and injury. Even fencing can be inhumane if it is difficult for horses to see or prevents them from accessing known watering points. In such cases lethal control methods may be preferable. Where horses are to be killed, it is likely to be less stressful to humanely shoot them in the field than to muster and transport them to an abattoir.

4. Efficacy

Control programs should be designed to maximise impacts – this requires a collaborative approach across landholders and jurisdictions. Sharing of information on the success of previous control programs can also help to improve the efficacy of future programs. A coordinated and strategic approach to control can also help in determining which methods can best achieve the aims within their particular locations.

5. Best practice

The control methods used must be applied in the best possible way. The use of codes of practice (COPs) and standard operating procedures (SOPs) can assist in this: there are currently moves towards having the COPs and SOPs (Sharp and Saunders 2004) adopted nationally, include *Model Code of Practice for the Humane Control of Feral Horses* and SOPs on ground shooting, aerial shooting, mustering and trapping of feral horses. These provide detailed guidance on the choice of control techniques and how to carry them out in the best way. Assessment of the impact of control methods is also important in the development of best practice. For example, the collection of data from horses prior to, during and after any intervention can be used to reduce the impact of control methods on horse welfare and thus ensure that the future initiatives are informed by current or previous activities.

6. Measuring success

Control programs do not always achieve their aims. Whether or not this is the case must be determined so that techniques can be refined accordingly. The real measure of success is a reduction of the negative impact of feral horses (which is why the impacts must first be known). Success cannot simply be measured by a reduction in the feral horse population.

7. Maintaining outcomes

Once the desired outcomes have been achieved, steps must be taken to sustain this situation – if this is not done, then the control program has had no purpose.

8. Balance

Where there is a choice of methods, there needs to be a balance between humaneness, perception, feasibility, emergency needs and efficacy.

A key issue for the RSPCA in the control of feral horses is being able to determine the relative humaneness of current control techniques. Future management programs should make provision for rigorous data collection from horses prior to, during and after any intervention to help ensure that future feral horse initiatives are informed by current activities. A firm basis is needed for decision-making on when to adopt lethal or non-lethal control, and to help reduce the impacts of mustering, trapping and transport where these are used.

Research into the impacts of control on the welfare of feral horses should go hand-in-hand with research into reducing their impacts. A national coordinated approach to feral horse control has the potential to significantly improve our understanding of both these issues.

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11. Horse Culture in Australia and the Management of Wild Horses

Graham Crossley, Australian Horse Alliance

Introduction

This paper contains both the contents of the presentation I delivered to the conference and a few points that I wish to stress having participated in the workshop. I'd like to thank the sponsors, organisers, facilitators, other presenters and all the workshop participants.

The Horse in Australia

First Fleet – First horses

Seven horses arrived with the First Fleet having been picked up at the Cape of Good Hope.

Early Imports

Early imports were of whatever type was needed to assist in the development of the colony and included Draught Horses, Coach breeds, Ponies, Riding and race horses. The principle riding horse breeds were Thoroughbreds and Arabians with some Timor Ponies. The Clydesdale was the main draft horse used due to its good nature and ability to "walk out" and therefore cover the longer distances encountered in Australia in a reasonable time.

Emergence of a unique Australian horse

Horses were typically put to many and varied uses and had to survive on native grasses without stabling. A hardy and versatile breed of riding horse emerged from the foundation stock to suit the needs of Australia. Today this breed is known as "The Australian Stock Horse" and the "Waler Horse"

The Horse in Australia – Exploration and Development

Horses were used in the exploration of this vast land and the settling and development of it by the settlers that followed for Agriculture, the Gold Rush and for Communication between centres.

The Horse in Australia – Transport

Horses played a vital role in Australia's agriculture and transport right up till the end of the Second World War when they were gradually replaced by mechanisation.

The distances covered were vast – even by today's standards.

It was only in 1948 that the number of motor vehicles exceeded horses for the first time.

Our family's bread was delivered by horse drawn Baker's Cart up till the early 1970s. The horse and driver were faster then the car and driver doing the rounds.

The "Waler" Horse and Australians at War

Horses also played a vital role in the military, starting with our exports of horses to the British Army in India in 1840.

As their popularity grew due to their hardy characteristics, more and more were exported and became known as "Walers" after the colony of "New South Wales". These horses also served the Australian army.

At the conclusion of the First World War – 160,000 horses had been sent overseas with only one being brought home.

Uniquely Australian Horse Equipment

Australians have developed many unique pieces of horse equipment out of the practical experiences they gained forging our nation. Examples include the Australian Stock Saddle, Four Bar Stirrups, Extended Head Bridle, Saddle Bag, Quart Pot, Camp Oven, Barcoo Bridle, Bedourie Oven and many more.

Return of Horse to Station Work

Horses are now replacing vehicles, motorbikes and helicopters in station and stock work as they cause less stress to animals, have lower impact and are more versatile. They also make good economic sense.

Horse as a Cultural Icon

Horses are an Australian Icon and part of our identity. It opened the Sydney Olympics. The horse is loved by most Australians and appears as a central part of our poetry and stories. Australians have a strong attraction to and identity with horses. No other animal evokes the same level of feeling in people as does the horse. (We should remember this when thinking about public opinion).

Recreation

As our prosperity has increased and later generations have enjoyed more time for recreation, Australians have increasingly turned to the horse for recreation.

Economic significance

Recreational horse riding is a major economic and social force today. In the 1999/2000 financial year 257,000 people participated in recreational horse riding. During that year there was a \$3 billion cost of just owing horses - \$2 billion of which was recreational (remainder racing and breeding husbandry) (J. Gordon).

Shooting Brumbies Is Not Acceptable

Recreational Horse Riders strongly oppose aerial and ground shooting of wild horses on humane grounds.

Guy Fawkes National Park NSW

Dr A.W. English in his Oct 2000 report on the cull of Feral Horses in the Guy Fawkes River National Park (NSW) concludes :

- "That the shooting was carried out in a humane way..."
- "That the culling operation was planned and carried out in a most professional way..."
- All three shooters were trained and currently FAAST protocol accredited (paraphrased for brevity)

Horse riders do not agree with the conclusions of that report. We believe photos taken by horse riders who hiked into the Guy Fawkes area immediately after news of the helicopter shoot clearly show poor marksmanship and cruelty to animals. Photos were of:

- A foal shot through the jaw. This is poor marksmanship and the horse must have suffered before finally dying.
- A horse shot through the leg. A leg shot will not immediately kill a horse. Blood flowed down the leg indicating suffering during the elapsed time before the horse died.
- A horse shot in the hip near the tail. This photo indicates very poor marksmanship of the FAAST accredited shooters who were required to shoot into the heart lung area at a maximum range of 40 to 50 metres.
- A mare shot triggered a spontaneous abortion but death came before life could begin.

The FAAST protocol requires shooters to ensure horses are killed cleanly and for any horse that is wounded to be immediately followed up and dispatched before shooting of other animals continues. The triggering and progress of the spontaneous abortion indicates that some time has elapsed between the initial shooting of the mare and her eventual death. This is clearly not in keeping with the FAAST protocol and is entirely outside community expectations for the humane treatment of animals.

Humane Treatment of Horses

Horses are sentient beings who feel pain. We ask that the humane treatment of horses must always be the first priority. It is not negotiable. Cruelty is un-acceptable. There is zero tolerance for cruelty in the public's perception.

Management Considerations

Feral horse programs should be part of an overall land management strategy and ranked appropriately. Programs must be socially acceptable or you will suffer a very strong public backlash. Horse riders, Brumby/Waler groups and local horse people are stakeholders and should be consulted. Community resources can be helpful.

Please consider the following examples of land management issues and consider where feral horse management program would rank by comparison:

1. Threatened Species Protection, Wollemi Pine

The Wollemi Pine is Australia's most threatened plant with 50 individuals in the wild. *Phytothera* root rot fungus has been introduced by rogue bushwalkers; there is no legal protection for the Wollemi Pine. Bushwalkers can walk anywhere in declared wilderness areas in NSW (however they must use tracks in Commonwealth reserves).

2. Bushfires

Bushfires are an extreme threat to biodiversity, and massive erosion occurs resulting in sedimentation and fouling of waterways. In the Canberra/NSW Bushfires (2002/2003), four humans and 500 houses were lost in Canberra. Now, the ACT Emergency Services are in turmoil, and the ACT Government is considering outsourcing the management of Namadgi National Park and Tidbinbilla Nature Reserve to NSW (where the bushfire started). There is no Bushfire management plan three years on. Erosion by brumbies is miniscule by comparison.

3. Walker Damage

Repair of damage caused by walkers is expensive. It cost \$2.4 million to repair walker erosion on Kosciuszko summit, \$7.6 million to repair the Main Range walking trail in Kosciuszko National Park, and \$500,000 to repair the Royal National Park walking trail.

Please rank your management problems as a first step.

Summary

- 1. Australia was built on the horses back.
- 2. Australia has a unique culture strongly linked to the horse.
- 3. Horses evoke very strong feelings in Australians.
- 4. Helicopter and ground shooting of horses is not acceptable.
- 5. The humane treatment of horses must always be your first priority.
- 6. Any feral horse management program must be socially acceptable.
- 7. Horse welfare quality control and audit processes should be built into any feral horse management programs.
- 8. Land managers should rank ALL issues (such as bushfires, threatened plants, walker damage etc.) BEFORE embarking on a feral horse management program.
- 9. Government feral horse control programs on private land should be conditional on a property native vegetation management plan so that reduction in horse impacts are not replaced with increased cattle impacts.
- 10. Horse riders want to work with land managers including the various park services around Australia to achieve sustainable and just outcomes that preserve out cultural and natural heritage.
- 11. Turn your problem into a positive by involving people who care about horses.
- 12. There is a largely untapped resource of skilled horse people in the community.

12. Density, Damage and Control of Feral Horses

Jim Hone, Institute for Applied Ecology, University of Canberra

The effect of control on biodiversity conservation values, or on production yield, could be estimated as a simple comparison of biodiversity, or yield, with and without control. However a more useful approach is to estimate the relationship between the level of control and the level of biodiversity conservation value or production yield. The relationship can be broken down into its component parts involving biodiversity (or yield); damage, abundance and control level, and each described and estimated. That is, the approach used here. Some of the approach has been described previously (Braysher 1993, Hone 1994, 2004) including for feral horses (Dobbie *et al.* 1993).

The aim of this paper is to give an overview of a framework, by using graphical models, linking biodiversity (or yield), damage, abundance and level of control of vertebrate pests, with emphasis on feral horses (*Equus caballus*).

Biodiversity vs. Damage

As pests cause more damage then some biodiversity values may decline (Fig. 1), and others may increase. Horses may have impacts by their eating and trampling. Biodiversity may be measured as species richness of native plants, or some related measure.

Figure 1: Examples of possible relationships between biodiversity and damage by a pest



Damage vs. Abundance

Damage by vertebrate pests is assumed to be positively related to pest abundance, or population density (Braysher 1993). There is a range of empirical studies that support the assumption (Hone 1994, 2007). There are many possible shapes of the relationship (Figure 2) and these can be shown to correspond to different mechanisms concerning what causes an area or site to change from not damaged to damaged (Hone 2006).

Figure 2: Examples of possible relationships between damage and pest abundance (after Hone 2006). Relationships 5 and 6 are not shown.



Abundance vs. Control Effort

The level of pest control effort can be measured as the number of traps, the number of hunters and so on. As the level of control effort increases the abundance of pest can decrease (Figure 3). Horse control may be by trapping, mustering, shooting or fertility control. Eberhardt (1987) reported considerable variation in abundance of a feral horse population that was occasionally mustered. Likely effects of horse control were examined by simulation and annual harvest rates for sustained control and eradication estimated (Walter 2002).

Figure 3. Examples of possible relationships between pest abundance and control effort



Biodiversity vs. Control Effort

The expected relationship between measures of biodiversity and the level of control effort can be derived from the above three relationships and should be also be estimated from field data though logistics often prevent it. In general it is expected that as the level of control effort increases then biodiversity values change, either in a positive (Figure 4) or negative manner. Other relationships are possible including declines in biodiversity with increasing control effort.

Figure 4: Examples of possible relationship between biodiversity, as measured by species richness, and control effort



A challenge for the future is to evaluate the evidence for these relationships and explore their practical implications for feral horses. Clearly, the relationships in Figure 4 suggest that with increasing control effort there will be benefits for biodiversity conservation however at high levels of effort there is little or no gain. Such efforts would be a waste of money.

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13. Kaimanawa Wild Horses: Management versus passion

Bill Fleury, Department of Conservation

Introduction

In the late 1800's and early 1900's feral horses were a feature of the landscape in many areas of the North Island of New Zealand. The herds had resulted from farm escapes and abandonment, accidents or warfare and in some cases, deliberate releases. The herds were harvested for stock and riding horses, meat, hides and hair. Many of the herds roamed unmanaged or lightly grazed Crown or Maori owned land. Intensification of farming and large scale forestry establishment coupled with more efficient harvesting techniques and a reduced demand for farm stock horse replacements saw most herds eradicated.

By about 1980 only a small remnant population remained in the central North Island east of Waiouru in the southern Kaimanawa Mountains. A herd also remained at Aupouri in Northland. This paper focuses principally on the Department of Conservation's experience with managing the Kaimanawa herd; the Aupouri herd is currently largely unmanaged.

Brief History of the Kaimanawa herd and its management

Feral horses were first recorded in the southern Kaimanawa Mountains in 1876. Although the herd has evolved from a mixture of ancestral breeds, genetic distance studies indicate that the current Kaimanawa horses show highest genetic similarity to Thoroughbred and Thoroughbred cross types of breed. Genetic differences from other domestic horse populations in New Zealand are small.

Horses within a specific area of the southern Kaimanawa Mountains (including most of an Army Training Area at Waiouru, a small section of Kaimanawa Forest Park and some adjoining privately owned areas) were protected in 1981 after concerns were raised by local people that shooting and capturing were leading to the extermination of the herd and wild horses in general. Legislative protection effectively gave the Kaimanawa horses the same status as kiwi and other protected native species.

The herd was estimated to number only 174 in 1979 but following protection the herd size increased rapidly. By 1994 there were at least 1576 horses in the area. Because of increasing concerns, about the impact of horses, generated by both the results of routine horse counts and an increasing knowledge of the ecology of the area the Department began to develop a management plan in 1989/90.

A draft management plan was made available for public comment in 1991. While the public debate clearly supported management of the herd to control its impacts there was little support (and much hostile opposition) to proposals to reduce the herd by shooting from helicopters. Many of the objectors to helicopter shooting drew on media and interest group reports/stories of unacceptable practices in Australia. A common theme for many of the objectors was a desire to see the horses that were removed remain alive. As a consequence of the objections the option of removing horses by mustering was investigated with trial musters conducted in 1993, 1994 and 1995 despite firm advice from core animal welfare groups that shooting was the most humane option. The trial musters were successful although their relatively high cost and the limited demand for captured horses was quickly established.

Process of Developing the Kaimanawa Wild Horses Plan

The 1991 draft management plan was developed largely "in house" by Departmental staff and researchers. Public and media interest plus the creation of a number of interest groups and the adoption of a "save the Kaimanawa Horses" cause by established groups following the release of that plan led to the recognition that successful planning would need to involve some or all of these interest groups.

Representatives of key groups were invited to participate in a working party which had its first meeting in October 1994. Representatives included President and Vice President of the Kaimanawa Wild Horse Preservation Society, Deputy President and Conservation Director of Royal Forest and Bird Protection Society, National President of Royal NZ Society for Prevention of Cruelty to Animals and Chairperson of Rangitikei/Hawkes Bay Conservation Board plus 2 other members. The International League for the Protection of Horses was represented initially but withdrew at an early stage. Representation by the leadership of the key groups ensured that high level agreement could be reached.

Following the first meeting a public seminar at which results of the trial musters, some new population and ecological research plus a summary of developments in the area of immunocontraception were presented and discussed. This seminar "kick started" the new management planning process and the working party steadily progressed through a review of information, identification of issues and values, review of management strategies and development of a draft plan.

After considerable debate the working party concluded that there were four aspects to resolving the conflicts surrounding the management of the Kaimanawa wild horses. They were;

- 1. Eliminating the impacts of the horses on important conservation values,
- 2. Ensuring all treatment of the horses is humane,
- 3. Establishing ways to preserve and control the horse herd long term to eliminate the negative and retain the positive values they have,
- 4. Deciding who is best to carry out long term management.

By partitioning the debate in this way the working party was able to develop a set of goals and objectives agreed to by all parties. These goals and objectives have provided a solid foundation for all subsequent management decisions.

Goals:

- 1. To ensure that the welfare of the horses is dealt with appropriately.
- 2. To promote the sustainability of the natural features and ecosystems of the Moawhango Ecological District, with respect to Kaimanawa wild horse impacts on these.
- 3. To manage the Kaimanawa wild horse herd at a sustainable level.
- 4. Objectives were separated into Ecological and Horse objectives;

Ecological objectives:

- Ensure that nationally endangered and rare plants and a number of biogeographically significant plants are not adversely affected by Kaimanawa wild horses.
- Prevent further degradation of the ecosystems of tussock grasslands, subalpine herbfields, wetlands and forest margins, by the Kaimanawa herd.
- Prevent the Kaimanawa wild horses from spreading into the neighbouring Tongariro National Park and the Kaimanawa Forest Park.

Kaimanawa wild horse objectives:

- Retain a herd of (at least) a minimum effective population of Kaimanawa wild horses, in a generally free ranging existence.
- Ensure that the Kaimanawa wild horse population is managed at a level which allows a safety margin in the biological tolerance of the area.
- Ensure that treatment of Kaimanawa wild horses is humane.
- Reduce conflict between Kaimanawa wild horses and other land uses and ecological values.
- Improve public access to view the Kaimanawa wild horses.
- Ensure public safety from roaming horses.

The issue of choice of management methodology was considered to be not a core issue for the management plan rather that that choice reflected the core objectives. It was however recognised and agreed that a "guiding principle in all control options should be that the vital interest of individual horses is respected, including the avoidance of unnecessary pain and/or stress. Effective control programmes which utilise the most humane methods available should be pursued".

With agreement on the goals and objectives of management a set of desired outcomes was developed and management recommendations to achieve those outcomes developed.

Desired outcomes:

- A sustainable Kaimanawa wild horse population/environment relationship exists.
- A minimum effective population (i.e. 300 plus) of Kaimanawa wild horses is retained as a wild herd.
- A humane, effective and flexible population growth control programme is able to maintain both a healthy wild herd and a healthy habitat, wherever the herd is located.
- Opportunities for the public to appreciate the herd have been enhanced.
- Kaimanawa Wild Horse Trust management is dedicated to horse welfare issues and the horses are no longer in conflict with other values.
- The at risk conservation values in the Moawhango Ecological District are no longer threatened by the impacts of the Kaimanawa wild horses.
- The Department of Conservation continues to monitor the conservation values in the district and advocates for the preservation of outstanding conservation values.
- The army and other land managers continue to control other plant and animal threats to the natural ecosystem.

Following public comment the working party made recommendations on the amendments to the draft plan and the plan was subsequently submitted to the Minister of Conservation in December 1995 and approved in May 1996.

The working party process provided a means by which groups with often strongly opposed views e.g. environmentalists and horse preservationists could share the same background material and debate competing issues and values in a neutral setting. A high degree of trust and respect developed between most individuals involved and debates around different value sets led to significant compromises and the acceptance of those compromises. Only one group withdrew from the process. This group essentially opposed many of the compromises necessary to achieve effective management of the herd.

The working party continued to advise and support the Department during the implementation of the management plan and with the addition of landowner representatives is currently constituted as the Kaimanawa Wild Horse Advisory Group. It meets twice a year with key tasks to review results of population estimates and subsequent management recommendations in April/May and again in October to review the outcome of the annual muster. The advisory group developed its own set of terms of reference which included acknowledgement that members of the group agreed to accept the Kaimanawa Wild Horses Plan.

In 2004 the advisory group reviewed the management plan and assisted the Department to document an operational plan for the implementation of the management plan. This clarified and described the management options and processes that had been developed and implemented in response to the recommendations of the management plan.

Managing the public interest

Public and media interest in Kaimanawa wild horse management has been a significant feature of management activity since the 1991 draft management plan. This is illustrated by the relative volume of submissions made to the Minister of Conservation on the issue of Kaimanawa Horses compared with all other issues people chose to write to the Minister about. Between 1990 and 2003 more than 1400 letters or requests for information were received by the Minister. In the same period only the contentious issue of Marine Reserve creation approached Kaimanawa horses in volume of traffic with approximately 1300 submissions. By way of contrast protection of kiwi (the national icon and an endangered species) attracted only about 200 submissions during the period. Public interest peaked in 1996 and 1997. Implementation of the management plan was to begin in 1996 with the removal by shooting of horses from the more remote areas of their then range. The timing coincided with a national election and public opposition resulted in the shooting decision being reviewed and replaced with a large scale muster and adoption programme in 1997. 1069 horses were mustered and sold in an operation that resulted in reduction of the herd on Crown land to about 500 and the reduction of the feral range from about 70,000 ha to about 25,000 ha. Annual musters of surplus animals have maintained this outcome.



Figure 1: Ministerial correspondence on Kaimanawa Horse Issue 1990 - 2003

The public and media interest in the herd placed background research and the planning rationale under strong scrutiny once management was begun. The management planning process ensured that key interest groups were well informed and in many instances were able to publicly support the Department's actions. Their support was crucial in gaining political support for the management programme. In addition the working party had often sought further analysis and explanation which was then available to answer similar queries from the public. In some cases the interest group representatives were also able to bring their own strong views on the requirement for management to the debate, e.g. the national president of RNZSPCA strongly endorsed population reduction after observing mares in very poor condition.

Many journalists typically sought to sensationalise horse management issues and focus on conflict. This attitude was partially generated by our decision to limit media access to management activities (particularly early musters) because of our own uncertainty over outcomes. In hindsight a more open approach may have reduced suspicions and mistrust. However there were also issues associated with working in an army training area and issues of animal welfare that meant media and public access had to be controlled. Overall however, the working party approach had significantly reduced the potential for conflict between core interest groups and the department was able to concentrate on issues rather than negotiating conflicts.

A key element in managing the public interest was to ensure that the Minister of Conservation (occasionally the whole cabinet) was well briefed and understood the ecological imperatives behind the need to manage the horses. The support and involvement of working party members added significant weight to such briefings and helped to prevent horse management becoming a political issue.

The public and media interest highlighted the need for consistency of message delivered by all spokespersons. "Fudging" was rapidly detected and many opponents maintained meticulous records and files and cross-referenced comments and explanations. We rapidly learnt that spokespersons must have excellent background knowledge, understand the issues well and have some personal credibility.

Opponents were often able to make good use of the internet to share their views and/or gather information and support from elsewhere. Hence issues such as the Guy Fawkes National Park incident provided "grist to the mill". The Department has not made as much use of the Internet to disseminate information in a timely manner as perhaps required. Adequate resources allocated to information transfer should be considered essential for all similar programmes.

A key issue of contention for many years was the estimation of population size. We have utilised a census/total count approach which has been viable because of the open nature of most of the terrain. Improvements in satellite navigation techniques have allowed the method to be refined over the years. Although criticised by biologists because the technique does not provide for error estimates, we have found the results to be robust when comparing estimates of numbers removed derived from the counts, to the actual number removed. A significant amount of public mistrust of the data was removed by incorporation of an independent observer, nominated by horse interest groups, in the 2002 count. Inclusion of such an observer at an earlier date may have reduced mistrust of the Department's objectives prior to management commencing.

Significant opposition to the management of the herd arose in urban populations. Provision of field trips organised by the Department and the provision of Departmental staff to guide field trips organised by interest groups were, and are, a significant means of providing an opportunity for such people to view the landscape and see the management difficulties first hand.

The Department was fortunate to be able to utilise the results of some robust and thorough ecological research to support its management planning. The clear identification of impacts attributable to the horse population and the threats they posed to a suite of endangered species allowed some clear goals for management to be established. These goals see the programme well supported by environmental groups.

One of the most significant contributors to the successes of the management programme has been the continued professionalism of the mustering team contracted to provide this service. Approximately 2800 horses have been mustered since 1993 with only 1 known injury requiring the destruction of a horse. The combination of skilled and experienced stockmen and helicopter pilots and well designed capture pens and yards has been crucial in ensuring that the operation has maintained the support of organisations such as the NZ Veterinary Association, RNZSPCA and the Kaimanawa Wild Horse preservation Society.

Summary

Key "learnings" arising from the Kaimanawa Wild Horse management experience are:

- Involve lobby groups and professionals in debating the issues (controlled setting)
- Establish clear objectives with wide support if possible
- Consistency of message
- Provide media opportunities supported by knowledgeable and credible spokespersons
- Let others front especially those involved in debating the issues
- · Deception and half-truths are rapidly identified
- Independent verification is very useful
- Strong science to support planning is essential
- Provide Information in a pro-active flood and provide opportunities to observe
- Ensure management is competent, professional and humane

Further Information and references

See www.doc.govt.nz

14. Equine Physiological and Behavioural Responses to Fear-Provoking Stimuli: Implications for Feral Horse Management

Sarah Joseph, University of Queensland

(This is an abstract of Sarah's Doctor of Philosophy thesis submitted in November 2006. Full copies of the thesis will be available from the University of Queensland.)

A series of experiments were conducted in order to compare relative fear response of domesticated horses (*Equus caballus*) to a variety of potential feral horse repellents. Fear indicators were also used to aid in identifying aspects of feral horse management that might be of particular welfare concern.

The first experiment measured changes in heart rate and behaviour in 12 restrained, domesticated horses in response to 23 auditory, olfactory, and visual stimuli, in order to assess the relative potential effectiveness of fear-provoking stimuli as repellents for feral horses. Significant differences (P<0.05) in response were found at both the category and individual stimulus level. The auditory stimuli caused a greater increase in heart rate and defecation rate than both visual and olfactory stimuli, and visual stimuli caused a higher heart rate response than olfactory stimuli. These findings may have significance for feral horse management, as most commercially available herbivore repellents are olfactory or taste-based.

Further testing of best candidate repellents was carried out on 12 young, unbroken domesticated horses in open-field tests in order to examine the relationship between fear and repellence. Changes in heart rate and behaviour were measured in response to conflicting motivation caused by the presence of a food reward and the introduction of a potentially fear-provoking stimulus. Horses demonstrated a stronger avoidance of auditory stimuli than either visual or olfactory stimuli, and were more hesitant to approach visual stimuli than olfactory stimuli. Category specific behavioural patterns were observed (labelled "vigilance" versus "panic"), suggesting that different types of stimuli might have different applications as repellents.

The accuracy of using a domesticated horse model to predict feral horse response to novel visual stimuli was also explored. A total of six foals in two groups were tested in a familiar environment. One group consisted of foals that had been removed from a feral population, while the second group contained foals that had been bred and raised in captivity. A silhouette of a lioness and an observer waving a flag were positioned in front of a food reward, and data on time to approach and consume the feed were recorded. While feral foals initially took longer to approach and consume feed, their response was not significantly different (P<0.05) from the domesticated foals by the third day of testing. This indicates that while the degree of responsiveness may vary between domesticated and feral horses, their pattern of habituation to fear-provoking stimuli will likely be similar, suggesting the potential suitability of using domesticated horses as models for feral horses in future research.

A final experiment was conducted on 12 young, unbroken domesticated horses in order to investigate the effects of group dynamics and familiar environment on the relative efficacy of olfactory, visual, and auditory stimuli. Horses were tested in 3 groups of 4, and were presented with one repellent from each category. Groups were significantly more likely to approach a food reward within 30 seconds of its presentation when no stimulus was present (P<0.05), and tended to take longer to consume feed in the presence of a stimulus. However, differences between the three stimulus categories, in terms of approach and feed consumption data, were not significant. Overall approach and consumption time was short, perhaps due to experimental design; indicating a need for further testing of feral horse repellents in a field situation to be carried out.

Additionally, several phases of a current feral horse management operation were observed and assessed for relative humaneness. Insights into the equine fear response, which had been acquired from previous experiments, were used to help identify areas of particular welfare concern and to make recommendations for possible improvements. In particular, the presence and proximity of humans to captured horses, and the order in which horses are destroyed, should be given special attention by managers. Because opportunities for scientists to observe feral horse management operations, particularly those involving lethal control, are rare, it is especially important that such observations are reported. It is hoped that these recommendations may provide a foundation for future assessment of relative humaneness involved in feral horse management.

In summary, the studies reported on suggest that fear does indicate a degree of repellence, and that it may be possible to rapidly screen a number of potential repellents on domesticated horses before carrying out costly field trials. However, high motivation to enter an area or consume a food source may greatly reduce the effectiveness of repellents in a field situation, and further testing is required to assess this. Finally, by examining the psychological stressors involved in a range of management techniques, it is possible to improve the welfare of managed feral horses.

15. Estimating Abundance of Wild Horses using Aerial Survey

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Introduction

The estimation of the size of a wild horse population is essential for management. It aids managers in determining the size of the management issue, targets for control, resources required, where to target effort, and to measure the success of management programs.

Aerial survey is often used to estimate the size of wild horse populations because horses are generally distributed across large areas and are large and easily sighted from the air. Aerial survey is used the world over to estimate wild horse abundance including in New Zealand (e.g. Linklater and Cameron 2002), the USA (e.g. Ransom *et al.* 2005), and Australia (e.g. Bayliss and Yeoman 1989).

There are many ways to estimate abundance using aerial survey. In this paper I present three methods that are often used for broad scale aerial survey and illustrate the advantages and disadvantages of each method and how they influence population estimates. This work is presented in detail in Walter and Hone (2005). I also present a novel approach to estimating abundance of small populations of wild horses using aerial survey.

Broad Scale Surveys

Three methods often used to estimate abundance of wild horses and other large herbivores include strip count, double count and line transect (Walter and Hone 2005). Each method takes a sample of the population and estimates are made based on the sample. Strip counts involve an observer counting all horses found within a strip (delineated by markers on the aircraft) along transects flown by aircraft. Double count surveys (also referred to as mark-recapture) involve two observers surveying the same strip (one in the front and one in the rear of the aircraft) independently and without collusion and using mark-recapture analysis to determine the proportion of animals each observer sees and adjusting for the error. Line transect methods involves observers allocating horses observed into distance categories (from the aircraft). Analysis allows adjustment for horses being less likely to be detected with increasing distance from the aircraft.

The area surveyed was the Australian Alps national parks which extend from the ACT through NSW and into Victoria. They encompass national parks, which are typically mountainous and follow the Great Dividing Range. The total area of the Australian Alps national parks is 16 400km². The area surveyed only included the areas where horses were known to occur (2 789km²). The survey was conducted in 2001 but was repeated in 2003 after severe wildfires passed through the area.

East-west transects were flown 2km apart in a Bell Jet Ranger helicopter at approximately 100kmh⁻¹ at a height of 100m above the ground. Two observers were located on the left-handside of the aircraft and recorded sighting details without collusion. The data was recorded in a manner to allow analysis using strip count, double count and line transect methods. A bar attached on the underside of the helicopter was used to delineate the width of strips on the ground and was divided into 0-50m, 50-100m, 100-150m and 150-200m distance categories. All horses sighted were placed into one of these categories.

The three methods gave different density estimates and precision. Line transect techniques are the preferred survey method, and the other two methods are likely to lead to large underestimates in population size. The lowest estimates were from the strip counts. Estimates from each observer over the 200m strip were approximately 55 horses per km² (Table 1). The double count technique gave an estimate approximately 30% higher. The higher estimate was achieved because the two observers did not see all of the same groups. Line transect

methods gave the highest population estimates and were more than three times higher than strip estimates. Unfortunately actual population size is not known but the line transect method is likely to be the most accurate estimate because it does not assume that all horses are seen in the strip. As Figure 1 illustrates, the number of horses sighted declines with distance from the aircraft. This is most likely because horses are missed further from the aircraft because horses are obscured by vegetation. The trend is stronger in 2001 than 2003 because much of the vegetation was burnt prior to the 2003 survey, improving visibility.

Table 1: Estimates of wild horse density and coefficient of variation in the Australian Alps national parks (2001) using strip count, double count and line transect techniques for a 200m strip.

| Method | Wild horse density (horses/km²) | Coefficient of Variation (%) |
|--------------------------|------------------------------------|---------------------------------|
| Strip Count (observer 1) | 0.57 | 29 |
| Strip Count (observer 2) | 0.54 | 26 |
| Double Count | 0.74 | 18 |
| Line Transect | 1.86 – 2.09 | 31 |

Figure 2: The probability of detection of wild horses with increasing distance from the centre line of the aircraft.



Small Scale Survey

Commonly used aerial surveys techniques (including those described above) are unsuitable for small areas because it is difficult to obtain an adequate sample size and level of precision, and there issues associated with counting animals more than once if transects are too close together (Linklater and Cameron 2002). In 2005, Parks Victoria and I trialled a mark-recapture technique in the Bogong High Plains (over an area of approximately 200km²) to estimate wild horse abundance (Dawson 2005). Freeman (2005) and Ransom *et al.* (2005) report that they have used similar techniques.

The area was surveyed using transects under a stratified sampling regime. The method differed from the broad scale survey in several fundamental ways. Firstly, the area was surveyed on two consecutive days (mark and recapture events) with transects offset by 500 metres on the second day to reduce bias. Secondly, there were four people in the helicopter (including

the pilot) and everyone searched for horses. Once a group of horses was sighted, detail observations were made with data collected on group size, composition and distinguishing features. Photographs of the groups were also taken to aid in identification. After the survey the records were reviewed and each group and individual was assigned an identification code and the number of times each individual was sighted was calculated.

Population size was estimated using the Chao estimator (1988) which allows for heterogeneity in capture probabilities. There were an estimated 92 (95% confidence interval: 81-116) wild horses in the survey area (Table 2). The average probability of capture of an individual horse was 0.58. This suggests that in a direct count survey only 58% of horses would have been observed. This novel method of population estimation proved to be superior to direct counts and is likely to give more accurate estimates. The accuracy of the technique needs further testing, either by increasing the number of sample periods or sampling a population of known size. The method is dependent on correctly identifying individual horses from their natural markings which can be difficult when horses do not have many markings and the area is timbered.

Table 2: Numbers of wild horses sighted and population estimate of wild horses during the Bogong High Plains survey, 2005.

| | Number of Horses |
|----------------------------|-----------------------|
| Day 1 | 50 |
| Day 2 | 57 |
| Total | 72 |
| Population estimate (Chao) | 92 (95% CI: 81 - 116) |

In conclusion, there are numerous methods that can be used to estimate wild horse population size. A summary of four methods are presented here. For broad scale aerial surveys, line transect methods were preferred. Identifying horses from their natural markings from the air and using mark recapture analysis also proved to be a useful method for population estimation in smaller areas.

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16. Fertility Control of Large Herbivores: a Brief Overview of the Options

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Management of wildlife pest populations, whether introduced or indigenous, is of concern both nationally and internationally. However, management of large herbivores across vast areas and in difficult terrain is complex and time-consuming. Conventional controls, from trapping to shooting to culling or poisoning, require regular application and may or may not be species specific. More than 20 years ago it was recognised that developing alternative methods, such as fertility control, may reduce or stabilise populations before they achieve levels that lead to damage in crops, pastures or natural environments. The development and application of fertility control as an additional and non-lethal tool for wildlife management has gained public acceptance for a number of reasons. In particular it is perceived as more species specific, more humane and potentially more cost effective. However, so far there have been no broad scale and cost-effective applications of fertility control to wildlife populations.

Fertility control has been considered as a potential tool in species with high fecundity (Caughley et al. 1992), for species with high natural adult mortality rates and rapid turnover (Bomford 1990, Barlow et al. 1997) and in circumstances where the effects of sterilisation may exceed an increase in juvenile or adult survival due to a lowering of birth rates (Sinclair, 1997). It could also be used to prevent or reduce population growth after other techniques have been applied to reduce numbers, particularly in long-lived species (Bomford 1990; Barlow, 1994). Increasing mortality in a population through the use of lethal controls has an immediate impact on population numbers and by inference the damage cause. If fertility control is applied in a long-lived species there would be a delayed response until natural mortality begins to reduce population size. Thus if these sterilised animals cause as much damage as fertile animals it would be of little value to the land manager in the short term. In this circumstance, fertility control would need to be part of an integrated program and in conjunction with another control method to achieve similar reductions in damage to the use of lethal control alone. In some circumstances, since sterile individuals fail to contribute to the next generation and also compete for space, food and social order, their presence reduces the reproductive success of fertile individuals or other subordinates. This particularly applies to territorial animals.

Ideally, a fertility control agent needs to induce permanent sterility leading to reduced recruitment in the pest population, be easily delivered to reach an adequate proportion of the target population, produce minimal side-effects to the target species (behavioural or social structure changes), be host specific, be environmentally benign and be cost effective. For any particular species, it may be difficult to meet all of these requirements for impacts to be significantly reduced.

Reproductive targets for fertility control include disrupting either the hormonal feedback associated with the hypothalamic-pituitary-gonadal axis, the function of the gonads, fertilisation, and/or implantation. Later stages of pregnancy and lactation could also be targeted (Marks *et al.* 2001) but these approaches raise animal welfare issues. Table 1 summarises targets and agents and their advantages/disadvantages.

In the last three decades, there has been considerable research into the use of steroidal and non-steroidal hormones to disrupt regulatory feedback between the gonads and the pituitary and/or the hypothalamus and thereby disrupt reproductive function (Table 1). Studies using oestrogens, progestagens and androgens have demonstrated major effects on the uterus, ovulation and implantation, and on spermatogenesis. Continuous exposure is required to maintain the effects but this has been difficult to achieve in bait delivered forms as many were unpalatable at the concentrations required for efficacy (e.g. for rodents – see Gao and Short 1993). Furthermore, side-effects were also apparent in most individuals, the effects

were not species specific, and some of the steroids posed an environmental hazard. Similar disruptions of the hypothalamic-gonadal axis could be achieved using agonists or antagonists of Gonadotrophin Releasing Hormone (GnRH). However, the outcome was similar in terms of lack of species specificity and the need for continuous application (Herbert *et al.* 2005) (Table 1).

An alternative approach has been to use implants of steroids or non-steroidal hormones. Recently a number of workers in Australia have used implants of steroids, such as Levonorgestrol, a synthetic progestagen, and have achieved infertility for more than 2 years in macropods (Nave *et al.* 2002). However, delivery of this agent is problematic and expensive at the population level because each individual must be captured to insert the implant.

Another approach has been that of immunocontraception in which the body's immune response is induced to tackle a self hormone or other reproductive antigen (such as egg coat proteins, sperm proteins, implantation or other uterine or oviduct proteins). Proteins in the zona pellucida (ZP) that surround the oocyte have been shown to cause high levels of infertility in immunized animals (Gupta *et al.* 2004; Kirkpatrick and Frank, 2005). Immunisations against GnRH can also achieve effective fertility control in white-tailed deer (Miller *et al.* 2000). However, delivery of these agents also requires individual capture and, in most cases, booster immunisations. Another approach in which a virus would serve as the delivery vector for zona pellucida proteins (virally vectored immunocontraception) (Tyndale-Biscoe 1994) has been extensively researched for rabbits, foxes and mice in Australia. However, for a range of technical reasons associated with the chosen viral vectors, the approach is no longer being pursued (Hardy *et al.* 2006).

Recent studies in mice and rats have assessed the effects of the industrial chemical, 4vinylcyclohexene diepoxide (VCD); treatment for 15 days induced a rapid and permanent depletion of the follicle population in the ovaries (Mayer *et al.* 2004). VCD appears to be ovary specific and only targets elimination of the primordial and primary follicle populations. There is no evidence of a regenerating follicle pool, and thus without any primordial follicle pool, the ovary ultimately runs out of follicles and the individual is sterile. Similar results are being observed in current experiments in cats and dogs (Loretta Mayer, personal communication). This chemical is not species specific; however, it appears to have significant potential for fertility control in a range of species. Future studies will need to concentrate on developing formulations to deliver VCD orally. Although this is likely to be feasible, the remaining challenge will be to include the formulation in a bait system which can specifically target the chosen pest species at a population level.

In conclusion fertility control has potential and obviously appeals to the public as a humane technique. Unfortunately the development of fertility control approaches which can be delivered effectively at a population level will not be available for several years. Continued research and development investment is essential.

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Table 1: Summary of the characteristics and effects of a range of potential fertility control agents, including potential for feral horses

| Agent | Site of action and effects | Route of administration | Duration of effect | Species specificity | Potential for broad scale management of feral horses |
|---|---|--|--|---|---|
| Hormone – steroid; Oestrogens, progesterone; synthetic progestagens (e.g. Levonorgestrel) androgens, | Disrupts gonadal function; pituitary function | Oral – limited palatability at concentrations required for efficacy Implants – efficacy good but individuals have to be captured | Short-term if stop treatment. Implants can be effective for >2 years | Q | LOW |
| Non-steroid (e.g. GnRH agonist or antagonist) | Disrupts hormone release from the pituitary | Implants – individuals have to be captured | Dependent on longevity of implant; >2 years | No | POW |
| Prostaglandin | Disrupts pregnancy, implantation, lactation | Failure of implantation; induces abortion, failure of lactation | Single event | No | NIL |
| Immunocontraception using reproductive antigens (zona pellucida proteins, ZP) Specific ZPs (e.g. ZP3) | Ovary and oocytes, uterus; disrupts oocyte development, blocks fertilisation | Intramuscular, but administration by injection, may require boosts Viral vectored Oral – bacterial ghosts | Permanent or semi-permanent | Potential if delivery system and antigen is specific | MEDIUM if delivery system could be developed |
| Sperm proteins | Testis | As above | | | Would need to treat all males to achieve effect |
| Barrier methods (Mechanical devices, e.g. IUDs) | Uterus to prevent implantation | Requires individual placement in utero | As long as device remains in place | | Limited, unless small population and need to retain potential to breed later. |

Table 1: Summary of the characteristics and effects of a range of potential fertility control agents, including potential for feral horses (continued)

| Agent | Site of action and effects | Route of administration | Duration of effect | Species specificity | Potential for broad scale management of feral horses |
|--|---|--|-----------------------|--|--|
| Chemicals, VCD | Ovary | Intraperitoneal, subcutaneous, intramuscular, oral under development | Permanent | | MEDIUM- HIGH if can be demonstrated to have effect; and oral delivery can be established. |
| Abortifacients (Ru486, cabergoline) | Binds to progesterone receptors or prolactin receptors; blocks hormone action leading to abortion | | | Delivery potential low; welfare concerns? | |

17. Understanding Community Perspectives to Improve Feral Horse Management

Guy Ballard, Invasive Animals CRC

In 2002 the author attempted to address the knowledge gap surrounding community preferences for feral horse management. That case study (see Ballard, 2005) used the Guy Fawkes River National Park and the adjacent electoral division of New England as the management focus and human population of interest, respectively, in a survey of community experiences, beliefs and management preferences related to feral horses. In addition to outlining the need for social research in feral horse management this summary paper presents an outline of the case study methods, some selected results and the key outcomes of that research.

It has long been apparent that the success of feral horse management can, and arguably should, be measured in more than just ecological terms. Both here in Australia, and overseas, efforts to control feral horses have faced significant community opposition. Consequently, horse management has become highly politicised, increasing the burden on managers.

Accounting for community preferences in the design and implementation of policy is an important challenge for feral horse management. Meeting this challenge will rely heavily upon the development of a thorough understanding what people want with regard to feral horse management and further, understanding why they want it. This can only be achieved if an investment is made in social research.

It is important to acknowledge that some efforts have been made to understand the human dimensions of feral horse management. In NSW, for example, managers have tried to engage stakeholders, prompted by the outcry following an aerial culling operation in Guy Fawkes River National Park in October, 2000. Unfortunately these efforts, based on observations of the Guy Fawkes and Oxley Wild River National Park processes, have been confined to methods that are narrowly focussed, e.g. calls for expression of interest, non-inclusive community meetings, and therefore likely to favour the involvement of stakeholders with extreme opinions and/or vested interests.

Context must be sought for the views of these individuals because ultimately the individuals who have traditionally been considered the key stakeholders in feral horse management are likely to constitute only a small proportion of the wider community. Feral horse management has a sphere of influence that includes a greater range of people than, for example, the members of horse/equestrian organisations, landholders impacted by feral horses and regular visitors to National Parks.

The Human Dimensions of Feral Horse Management: A Case Study

There are many options for involving the community in wildlife management. One of the simplest is termed the inquisitive approach (Decker and Chase, 1997). The 2002 case study on human dimensions of feral horse management (Ballard, 2005) was an inquisitive study that sought to obtain information about what the community wanted with regard to horse management in Guy Fawkes River National Park using a survey of experiences, knowledge and management preferences.

Methods

A self-administered questionnaire was developed and distributed to a random selection of 1000 urban and 1000 rural adults in the New England region of NSW. Stratification was based on the suggestion by Berman (1991) that city and country people could be expected to differ in their views of horse management. Questions covered issues of experiences with horses, beliefs about horse impacts and preferences for management in Guy Fawkes River National Park.

Results

49% of rural and 45% of urban people returned a survey. Selected results are presented below.

Horse related experiences

- 47% urban and 67% of rural respondents had owned a horse at some time
- 24% of urban and 48% of rural respondents had at least weekly contact with horses
- 6% of urban and 14% of rural respondents were members of horse interest groups
- 39% of urban and 48% of rural respondents had seen feral horses in Australia

Beliefs about feral horses

- 77% of urban and 83% of rural respondents believed that feral horses eat plant species that are also consumed by stock and native animals
- 15% of urban and 13% of rural respondents believed feral horses were native animals (22% and 12% were unsure)
- 37% of urban and 43% of rural respondents believed that feral horses cause significant damage to Australian soils (31% and 23% were unsure)

Management preferences

- 41% of urban and 40% of rural respondents would prefer horses in some National Parks
- 42% of urban and 56% of rural respondents supported aerial culling of feral horses in NSW National Parks under various circumstances
- Urban respondents preferred control methods (top 3): removal to private property (53%), removal for consumption (44%), contraception (30%).
- Rural respondents preferred control methods (top 3): removal for consumption (48%), removal to private property (47%), ground shooting (34%)
- The same 3 methods were the most unacceptable for urban and rural respondents poisoning (~75%), no control (~56%), aerial shooting (~49%)

Three Major Outcomes

Firstly, this case study revealed that a large proportion of the community were interested in feral horse management. This reinforced the notion that narrow consultation, and the use of methods that are biased towards achieving it, is inappropriate.

Secondly, significant variation was found between rural and urban respondents on many issues relating to feral horse management. Managers will need to account for these differences when dealing with these groups as stakeholders.

Lastly, and most importantly, it was demonstrated that it was possible to use an inquisitive approach to engage the community about feral horse management and gather data that could be used to improve management.

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18. Australian Pest Animal Strategy

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Introduction

Vertebrate pest animals have major economic, environmental and social impacts in Australia. A conservative estimate of the annual cost of 11 major pest animal species in Australia (wild populations of foxes, pigs, rabbits, mice, goats, carp, dogs, cane toads, camels, cats and horses) is \$720 million (McLeod 2004). Other significant pest species not included in this estimate are exotic birds like starlings, sparrows and mynas, and mammals including deer and donkeys.

Pest animals have major impacts not only for landholders but also for state and local government agencies and regional NRM bodies. Considerable money and effort is spent combating these pests. At the same time, many in the community have little or no awareness of pest animals, whose impacts are often less visible than other threats to natural resource issues such as salinity or weeds. In some areas, past management efforts have seen significant reductions in both pest numbers and their impacts, but in many instances the problems caused by pest animals continue unabated, as do introductions of new species or the expansion of the range of existing pests.

Until now there has been no national strategy to deal with this issue. Given the scale of the problem a national strategy is needed to better focus attention on the critical issues and to establish some national priorities. The Natural Resource Management Standing Committee (a national committee comprising the Chief Executive Officers of state and commonwealth government agencies) recognised this problem and in 2004 tasked the Vertebrate Pests Committee (VPC), with coordinating the development of an Australian Pest Animal Strategy. A draft strategy was prepared by 2006 for public comment.

Scope of Strategy

For the purposes of the strategy a pest animal is defined as any animal having or with the potential to have an adverse economic, environmental or social impact. The focus of the strategy is on exotic vertebrate animals in Australia and prevention of introductions of new species: mammals, birds, reptiles, amphibia and fish. The strategy does not cover native species that undergo marked spatial and temporal fluctuations in abundance. Actions to be covered in the strategy range from preventing the introduction of new species to management of widespread feral animals.

The strategy does not deal with exotic diseases, although the strategy recognises that pest animals can be disease vectors. The strategy does not include invertebrates, marine species or genetically modified organisms.

Process to Date

In 2004 the VPC developed a consultation paper which it circulated to an extensive range of stakeholders as well as publishing it on the <u>www.feral.org.au</u> web site to start discussion. Stakeholders from state and federal governments, New Zealand, industry organisations and non government organisations then came together for a national workshop which provided the direction and detail for the plan.

The draft strategy was prepared following the workshop and was released for public comment in June 2006. Thirty submissions were received from a range of stakeholders including a number of freshwater fishing groups, conservation groups and rural industry bodies. A VPC working group will review all comments on the draft Australian Pest Animal Strategy and use these to revise and finalise the plan. The final strategy will then pass through a number of steps before being ratified by the Natural Resource Management Ministerial Council for implementation.

As part of the implementation process it is envisaged that a number of species specific pest management strategies will be developed to support the Australian Pest Animal Strategy (pest animals of national significance) as well as a number of asset based strategies.

The Draft Strategy

The vision of the draft strategy is to **`Ensure Australia's biodiversity, agricultural assets** and social values are secure from the impacts of pest animals."

To achieve this, the draft strategy has set 3 goals:

• Goal 1: Provide leadership and coordination for the management of pest animals.

This includes the development of institutional arrangements for effective pest animal management, encouraging planning at all levels and increasing national awareness and building capacity.

• Goal 2: Preventing the establishment of new pest animals

Prevention, early detection and a rapid response to new invasions are the most cost effective methods to counter pest animal invasions. Also important is reducing the further spread of recently introduced or spatially isolated populations.

• **Goal 3:** Manage the impacts of pest animals

This includes the prioritisation for action on both the impacts of pest animals and the protection of assets e.g. high conservation value sites, endangered species, primary production. Coordination of pest management action across tenures and catchments is critical.

Implications for Planning

The draft strategy accords with a number of other national invasive species activities; it is consistent with the direction of the Australian Weeds Strategy and the National Marine Incursion Response Plan, and it is linked within the framework of the National Biosecurity System. Together these documents will assist landholders, local government, regional NRM bodies and state government agencies in developing pest management plans.

The strategy is an important step towards putting pest animals into a national framework for managing invasive species. National collaboration is already underway for the management of marine incursions and weed management. It is important that the actions stemming from this plan are integrated with these other activities aimed at improving invasive species management across Australia. Improved coordination between jurisdictions and the increased emphasis on prevention and early response to pests will improve the return on investment in pest management and assist jurisdictions to achieve more within resource constraints. The strategy will also support increased targeted investment in pest management.

Relevance of Strategy to National Feral Horse Workshop

Species specific national management programs/strategies, including one for feral horses (Dobbie *et al.* 1993), have already been developed for a range of species through the Bureau of Rural Sciences. These were based on the original principles outlined by Braysher (1993). These documents do not recommend a specific management approach; rather they identify principles and guidelines for management programs to operate under. It is not necessary for these documents to be reviewed to sit under a national strategy such as the Australian Pest Animal Strategy. However what is required is the continued identification of issues that require national agreement or national decisions, such as nationally endorsed Codes of Practice.

It is anticipated that the development of this Australian Pest Animal Strategy will provide a better framework than currently exists for these agreements to be made. A national strategy will also provide the direction to identify those species, issues or assets where no strategic thinking or planning is available.

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Workshop Outcomes

Many of the issues surrounding feral horse management were discussed during the two day workshop. The facilitators kept records of proceedings and regularly presented them back to the participants throughout the workshop. These records are presented in Appendix 1. Themes that emerged throughout the workshop discussions and from papers presented included: control techniques; animal welfare; community perceptions; reducing impact; and knowledge transfer. Two key issues also identified in the objectives of the workshop and considered in detail were research priorities and a national approach to feral horse management. Outcomes on all of these issues are summarised below.

Control Techniques

There was a strong focus on the "*how to*" of feral horse control. The participants thought that this was an important area where a national approach would be beneficial. The participants recommended a national accreditation process for the development and maintenance of skills relevant to feral horse control (in particular aerial shooting and transport of horses), and adoption of national standards for feral horse control. National accreditation and standards would lead to high quality control being implemented, any animal welfare issues would then be partly addressed, and the public could therefore be more confident in the skills of the operators. There would also be a pool of qualified people that could be accessed and operate around Australia.

The topic of aerial shooting was visited many times by the participants. It is a control technique used in many areas, and wildlife managers believe it is essential that the technique is kept available. Areas that cannot currently use this control technique would like to have it available as a management option. The argument for aerial shooting is that it is humane, efficient and more cost effective than many other techniques. There was a strong emphasis on the need for highly skilled marksmen to carry out the work.

There was general agreement that the costs associated with all available control techniques were currently limiting the ability to effectively manage the impacts of feral horses and that further development was required.

Accreditation

A national feral horse control accreditation scheme (and register) of shooters, horse handlers, pilots and transport operators would ensure that operator skills are maintained at a high level. The benefits of national accreditation are that it would provide a larger pool of qualified operators (identified as a priority), operators could be mobile between states and territories, it would provide scope for outsourcing control operations, improve emergency response capabilities, and assist in ensuring public confidence. While the workshop discussed feral horse accreditation specifically, such a scheme would have similar applications for other species such as feral pigs and feral goats.

A focus group within the workshop suggested that responsibility for development of such a scheme should be within the auspices of Vertebrate Pests Committee (VPC) and be supported by the Invasive Animals CRC, and community groups such as the Australian Horse Alliance (AHA). It would also require engagement with all existing schemes (e.g. FAAST in NSW). Short term actions would include:

- 1. Consultation and documentation of all current pest control accreditation programs,
- 2. Submission of a detailed paper through VPC to the Primary Industries Committee, and
- 3. Once agreed in principle, commence organisation of an accreditation process.

The focus group thought the resources required would be minimal to gather information and gain consensus. There may be a cost at the train the trainer level but most training could be run on a cost recovery basis.

National Standards

National standards for feral horse control and management would include codes of practice, standard operating procedures, guidelines for handling and destruction, land transport of horses, and best practice. Setting national standards would lead to national adoption, defendable animal welfare standards and uniform best practice. National standards would also improve public acceptance and endorsement from stakeholders in feral horse management, and would lead to more cost-efficient techniques.

A Code of Practice for the humane control of feral horses and Standard Operating Procedures for feral horse management and control techniques already exist (see Sharp and Saunders 2004) and are well regarded by many states and territories. The IA CRC is currently working through the process of getting them adopted at all state and national levels.

A best practice feral horse management strategy and a land transport of horses (feral) Standard Operating Procedure need to be written and/or updated, which will require specific funding.

Animal Welfare

Animal welfare issues relating to feral horse control techniques were frequently raised during the workshop, and were identified as an essential component of control programs. Horses evoke greater animal welfare concerns than most other pest animals, which can limit the control techniques available to managers. There are differing views and understanding on the humaneness of control techniques. Aerial shooting was accepted by most participants as a humane technique for controlling feral horses. However, the Australian Horse Alliance for example, could not accept shooting *per se* as a management option. The use of aerial shooting is complicated by concerns over leaving horses to waste where they could be utilised or rehomed. This is particularly important in areas where horses have a strong cultural value. It was agreed that feral horse welfare should become a research priority and a consideration for all steps leading towards a national strategy.

Community Perceptions

Strong and varied community perceptions of feral horses can complicate feral horse management programs. Positive public perception and inclusiveness in feral horse management programs is extremely important for successful outcomes. There have been several examples of control programs (involving aerial shooting of horses) that have received negative press, and have had ramifications for feral horse management across Australasia. Horses are a highly regarded species by many people, and sections of the community do not perceive them to be a pest. Many aboriginal community groups view feral horses as a resource that should be utilised and not shot and left to waste. A significant proportion of feral horse populations in Australia occur on Aboriginal owned land. A program of community education on the benefits of feral horse management and engagement of stakeholders in the planning and implementation stages of management were thought to improve the success of feral horse management in some way.

The participants considered many opportunities to improve public awareness of feral horse issues including education on why they are a pest, the costs of control, and change in impact and benefits arising from control programs. There was a recognised need for a co-ordinated effort to raise the general public's awareness of these feral horse management issues.

Reducing Impacts

Negative impacts of feral horses include hazard to motorists; environmental damage and grazing competition with livestock. The purpose of feral horse management is to reduce negative impact to acceptable levels. Management at a national scale could be viewed as successful if the distribution and abundance of feral horses is reduced in priority areas.

Demonstration sites were identified as being very useful to exemplify the reduction of feral horse impacts humanely, effectively and efficiently. At demonstration sites, community consultation, control techniques and change in impact arising from control programs would be well documented and would provide lessons and direction for future management programs. They would also provide a focus for research efforts. There are a range of feral horse management problems and circumstances across Australia; demonstration sites should cover this range.

Eradicating small populations and new populations was also identified as a good management strategy to minimise feral horse impact and to prevent any expansion. Small feral horse populations have been completely removed off conservation areas (e.g. Coffin Bay, SA), and this is a management aim for other populations. These cases present specific management issues and there are opportunities to share information for this management scenario.

Knowledge Transfer

There are many opportunities for all stakeholders to become better informed in order to achieve a balance of control effectiveness and community acceptability in the need to reduce the impact of feral horses. Information packages to better educate the community are needed.

This workshop was an excellent forum for information sharing and exchange. There is a lot of scope for more information sharing between wildlife managers. Knowledge gained from past control programs should be documented and incorporated into the design of future control programs using best practice principles.

It was recognised that there is also a lot of knowledge and skills held within the community, which could be better incorporated into planning and management processes.

Research

There is a surprising lack of peer reviewed research on feral horses in Australia. There have been a small number of post-graduate research programs, and government agencies collect information relating to ongoing management but these results are not readily available or published. There are many opportunities for research, which should feed back into a knowledge base and be used in informing management decisions and the community.

Specific areas identified at the workshop as requiring research are:

- 1. Describe the distribution and abundance of feral horses across Australia. Many of the maps presented during the workshop were not thought to be accurate or include all land tenures.
- 2. Evaluate different control techniques in terms of animal welfare and humaneness.
- 3. Develop VCD (see L. Hinds' paper) and assess its suitability as a fertility control agent for feral horse management.
- 4. Document community and stakeholder perceptions on feral horse impact and management.

- 5. Quantify the relationship between density, impact and population control of feral horses.
- 6. Establish benchmarks for control program success.
- 7. Quantify the triple-bottom-line impact of feral horses, i.e. environmental, economic and social.
- 8. Assess whether feral horse impacts threaten native species or ecological communities.

National Priority of Feral Horses

One of the workshop objectives was to determine whether a national strategy for feral horse management was required. The participants did not answer this question directly, although it was agreed that a National Strategy would improve feral horse management in Australia and address many of the concerns raised during the workshop.

It was evident that there is currently no 'champion' or national leadership for feral horse research and management, making the development of a national approach difficult. Workshop discussions were inconclusive on where feral horses fit into the national priorities for management of vertebrate pests partly because of the paucity of information on feral horse impact. Having feral horses correctly prioritised in regards to their impacts will ensure appropriate resources are allocated and nationally coordinated. Such a process would initially require the adoption of the Australian Pest Animal Strategy and a review of known feral horse impacts. It should also explore the possibility and merits of the impact of feral horses being listed as a Key Threatening Process under the *EPBC Act.*

Appendices

Appendix 1: Facilitators Record of Workshop

Setting the Scene for the Workshop

Workshop Objectives

- Understanding about management approaches, issues, barriers and successes
- Identify research needs
- Identify where a national approach and/or collaboration will be beneficial
- Identify actions required to improve feral horse management

Workshop Process

- · Hear from others different perspectives
- Think about what that means for you and others in managing feral horses
- So what workshop conclusions?
- Determine which matters would benefit from a national strategy and/or collaborative approach

Working Together

- Focus on the purpose
- Make an effort to understand different views
- Make the most of this opportunity
- Tell us how its going

Presentations

- Scope of the feral horse issue in each area
- Management strategies and approaches
- What are the barriers and what works well?
- Where a national approach could be beneficial

Questions – To ask yourself during the presentations and workshop discussions

- 1. What did you learn that you can apply to your management approach or organisation?
- 2. What management issues could be addressed more effectively through a national approach or collaboration?

Questions at Tables

- 1. What have you learnt today?
- 2. What needs to happen to improve feral horse management in Australia?

Each table to produce its answers to each question.

Objective: Understand Current Situation

- 1. Animal welfare is an essential factor in control programs
- 2. Social issues/public education are very important to address
- 3. Stakeholders are willing to be engaged on feral horse management
- 4. Management programs must involve genuine community engagement
- 5. Environmental impacts of horses are known but TBL impact of horses is not well quantified
- 6. Relationship between population and impact not well understood
- 7. Differing views/understanding on the humaneness of control techniques
- 8. Concerns that aerial shooting as a control technique might be threatened
- 9. Can successfully manage horses relative to other vertebrate pests
- 10. A Code of Practice does exist, and is well-regarded, but not nationally adopted
- 11. Different landscape settings require different management solutions
- 12. Costs of control techniques limits extent of management
- 13. Level of political will limits extent of management
- 14. Multi-species management appropriate to some regions/asset protection focus

To Improve Feral Horse Management in Australia?

- 1. Plan and implement control programs using best practice principles
- 2. More sharing of information; one stop shop (this could be achieved for instance through a web or emailed based Australian/Australasian feral Horse Network)
- 3. National COPs and SOPs (consider existing COP)
- 4. New national strategy (review 93 strategy; WONS model; engage stakeholders)
- 5. Public awareness (why feral horses are pests; real costs of control; etc.)
- 6. National accreditation (and register) of shooters, pilots, transport, etc.
- 7. Maintain skills of shooters, etc. via cross-state rotations
- 8. Quantify impacts of different control techniques on horse welfare
- 9. Recognise skills in community and engage in planning and management
- 10. More multi-species control programs
- 11. Articulate issues around 'museum populations'
- 12. Monitor change in impact arising from control programs
- 13. Investigate benchmarks of control program success
- 14. Deal with new populations quickly
- Develop new or use existing tools to prioritise between pest species (up take of 'PEST Plan' for instance)

Opportunities for Collaboration

- 1. National aerial survey
- 2. Training people in control
- 3. Sharing equipment/personnel
- 4. Clear guidelines for management programs
- 5. Federal and state policy
- 6. Feral Horses listed as a Threatening Process: EPBC Act

- 7. Consistent messages to public/media (+ materials)
- 8. Agreed national consultation principles
- 9. COPs and SOPs adopted at national level
- 10. Vehicle for cross-border agency processes
- 11. Sectoral working groups (Aust. Animal Welfare Strategy)
- 12. Research on

National Objectives- 5 Years

We will have been successful if, in five years, we have?

- 1. National access to all control techniques/national standards and accreditation/national recognition of COPs and SOPs
- Public trust is restored and maintained through 'agreed quality' managed control programs/ no public crisis arising from management programs
- 3. Impacts reduced to acceptable levels/impact reduced in key areas across different landscapes (with demonstration value)
- 4. Distribution and abundance reduced
- 5. Knowledge gaps addressed impacts/ humaneness of techniques/distribution and abundance/effectiveness of re-homing horses/community perceptions
- 6. National leadership and champion/knowledge network
- 7. National assessment of feral horse impact relative to other species

National Priorities

To achieve success, the most important things to do are?

For each Theme:

- Purpose
- Rationale
- Responsibility/Involvement
- Short-term Actions
- Resources

1. Public Confidence

- Purpose: To minimise the frequency of Public Relations crises in the media arising from feral horse management
- Rationale: To enable consistent and successful management programs that are supported by the public
- Responsibility/Involvement: Government agencies. Local steering committees
- Short-term Actions:
 - Develop a communication strategy cover all types of stakeholders and all scales of operations (local to national)
 - Be proactive and on-going in communicating
 - 4 phases planning/preparation: operations; afterwards; between
- Resources: Communications needs to be part of a local management program budget, and not a big additional cost (exception if facilitator required). Important to note that additional time will be required

2. Accreditation

- Purpose: Endorsement for level of training applicable in all jurisdictions; provides scope for outsourcing (covers all species)
- Rationale: Need larger pool of qualified people. Retention of skills nationally. Ensuring public confidence for skills to control pests. Mobility of trained personnel between states. Emergency response capabilities
- Responsibility/Involvement:
 - AHA and IA CRC in conjunction with VPC
 - Level of engagement with all existing groups, e.g. FAASTS
- Short-term Actions:
 - Consultation and documentation of all current accreditation programs
 - Paper submitted through VPC to Primary Industries Committee
 - Consultation period once agreed in principle
- Resources: Minimal to gather information and gain consensus. May be a cost at train the trainer level. Then most training on a cost recovery level.

3. National Standards

(Including COPs & SOPs; capture, handling and destruction; land transport of horses; best practice)

- Purpose: National adoption, uniform welfare standards, uniform best practice
- Rationale: Public acceptance; endorsement from all stakeholders; use of most cost-efficient techniques
- Responsibility/Involvement:
 - IACRC, then individual agencies have to accept before claiming national acceptance (SOPs & COPs)
 - Best practice needs to be updated BRS?/VPC?/ CRC?
- Short-term Actions: Update for acceptance of SOPs and COPs happening now through IACRC then go back through committee process and eventually would require Ministerial endorsement. Also across to Primary Industries Ministerial Council and Animal Welfare Working Group.
- Resources: Minimal for COPs and SOPs but rewriting best practice would require additional funding

4. Knowledge

- Purpose: To be better informed in order to achieve a balance of effectiveness and stakeholder and community acceptability in reducing the impact of feral horses
- Rationale: Need to determine where community and stakeholders 'are at'. Need information to educate community and stakeholders so that it is feasible to raise control effort (i.e. lethal control) sufficiently to reduce impact
- Responsibility/Involvement:
 - Scientists/managers to collect impact data
 - CRC Triple Bottom Line (TBL) assessment is about to be conducted (feral horses as a case study?)
 - CRC has an objective of integrating approaches across jurisdictions?
 - Desert Knowledge CRC
 - State/Federal Threat Abatement Plans?

- Short-term Actions: On-going collection of impact data as part of routine state control programs. Liaison with CRCs, VPC and conservation agencies. Stock take existing knowledge about impacts, community consultation approaches, etc. Relative costs of different management approaches
- Resources:
 - Catch 22. Can't attract dollars until have information
 - CRCs
 - State/Federal Threat Abatement Plans

5. Feral Horse Impact

- Purpose: To reduce the TBL impact of feral horses and to show that this can be done humanely, effectively and efficiently
- Rationale: Demonstration sites to keep it workable and to examine/demonstrate management across various political/environmental landscapes. To provide lessons for future programs to build on.
- Responsibility/Involvement: Two levels: Local and Overall. Local = land managers and agencies
 - Overall = unclear but perhaps under the draft Aust. Pest Animal Strategy, some capacity for coordinated team/role.
- Short-term Actions:
 - Stratify management problems then for each strategy
 - Identify suitable focus best bet sites (existing)
 - What are the holes try to plug (new sites)
 - Biosecurity analysis projecting possible costs/benefits of management and nonmanagement at target sites (re containing existing populations, preventing new)
- Resources: How long is a piece of string? Piggyback on existing programs. Spread across states and agencies. Link to catchment management plans and NHT. Costs for management, monitoring and communications

6. National Priority of Feral Horses

- Purpose: To determine where the management of horses fits into the priorities of management of vertebrate pests in Australia and where does it fit into a national framework.
- Rationale: To ensure appropriate resources are allocated and nationally coordinated
- Responsibility/Involvement: All jurisdictions, through the VPC (including the IACRC), and in cooperation with stakeholders
- Short-term Actions:
 - Progress adoption of Australian Pest Animal Strategy (APAS)
 - Ensure that the impacts of feral horses are appropriately recognised in the assessment of priority vertebrate pest species.
 - Assuming horses are considered a priority, then prepare the species strategy under the APAS
 - Progress adoption of the COPs and SOPs
- Resources: probably very little mostly government process. For point b. approx. \$50,000.
 Long term resources cannot be quantified at this time.

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Appendix 3: Further Reading and Resources

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http://www.ntis.gov.au/





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