Gecko - Gold Coast and Hinterland Environment Council

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1 March 2006

Committee Secretary
Senate Environment, Communications, Information Technology and the Arts References Committee
Department of the Senate
Parliament House
Canberra ACT 2600

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Dear Sir/Madam

RE: Gecko submission on Senate Inquiry into National Parks

Please find attached Gecko's submission on the Senate Inquiry into National Parks.

Gecko – Gold Coast and Hinterland Environment Council is the peak environment group in the Gold Coast region and a key stakeholder in the protected estate. We are working together with National Parks Association of Queensland (NPAQ), and we understand that they have requested and received an extension until 15 March 2006.

Our comments attached are intended to address only a part of the terms of reference of the Inquiry, particularly any threats to the objectives and management of our national parks.

We trust that our submission will be taken into account and that as a result of this review Queensland will be more adequately represented and resourced in future for its role in the protection of the biodiversity of the Australian continent.

We have also attached our submission to the DEH inquiry into the National Reserve System as an appendix in this document.

Yours faithfully

Sheila Davis
Gecko Campaign Coordinator

Summary of Contents

1. Threats to the objectives of our National Parks are multifarious. However, some of the main concerns deal specifically with management issues, including commercial tourism, feral animals, weeds, and fire management. Combining the effects of these elements leads to extreme threats to native biodiversity.
2. Many problems have arisen recently concerning commercial tourism and its effects on the conservation objectives of protected areas. Tourism has many effects on the natural functioning of the ecosystems it disturbs and recognition of this is clouded by the drive to gain money to maintain the functioning of the parks. However, the main concern is the biodiversity contained within these parks and if tourism has to be limited while also expending more money on these public lands to achieve the objectives of the CBD (Convention on Biological Diversity) then that is what should be done.
3. Feral animals harm the ecosystems within which they live and have a great impact on native flora and fauna. As it is no longer possible to eradicate them once they have become widespread, management plans to reduce their effects are necessary.
4. Weeds have invaded most parts of this continent wreaking havoc on natural landscapes, agriculture, and the health of native vegetation. The practices to reduce the effects of weeds have not been sufficient and other practices need to be developed and implemented to ensure that these insidious invaders do not cause more damage.
5. Managing fires is complicated by many factors. The constantly changing landscape requires individualized plans that allow for constant amendments to reflect arising issues.
6. In the end more research is needed in each of these areas and the combined effects and interrelation between them must be given due consideration.

1. Introduction

The primary objective of every conservation act that dictates the management of National Parks and other reserves is to "protect biological diversity and maintain ecological processes and systems."[1] However, many solvable threats to the objectives and management of our protected areas still exist, including but not limited to, commercial tourism, feral animals, weeds, and fire management. Expanding the protected area estate is also vital, but management practices will be the focus of this paper. The management problems listed often exacerbate one another to create a synergistic effect that is much worse than each individually.

It has been proven that preserving natural ecosystems in their pristine state is much more cost effective than attempting to regenerate them after damage has been done. It is apparent in table 1 that the benefit of maintaining nature considerably outweighs the cost, while repairing the landscape often does not even break even. Thus considerations of management of our natural areas must carefully weigh the actual costs and benefits rather than just looking at the immediate costs and benefits, which often create greater degradation leading to greater spending.

[1] The National Strategy for the Conservation of Biological Diversity.

Table 1: Options that we have to choose from in order to maximise long term biodiversity conservation.[2]

OPTION		No. species secured/$1m	Collateral benefit/cost	Maintenance or Repair
A	Prevent broadscale clearing of high ecological value communities in Queensland	26	20	M
B	Prevent broadscale clearing of communities in the MDB that have high multiple ecosystem service value	13	26	M
C	Restore ecological communities which have fallen below 10% back to 10% of their original area, in the 5 IBRA regions that have <30% native vegetation remaining.	25	0.6	R
D	Restore native vegetation in all IBRA sub-regions that have fallen below 10% back to 10% of their original area	13	0.6	R
E	Consolidate the National Reserve System to achieve comprehensiveness targets	42	5.7	M
F	Protect the health of rivers that are least disturbed	98	13	M
G	Restore river health to rivers in poor condition	2	0.3	R
H	Ensure environmental flows are at least 15% of sustainable water yield.	1	0.3	R
I	Limit the spread of Phytophthora	35	40	M
J	Eradicate new outbreaks of naturalised plant species with weedy potential	83	1.4	M
K	Biological control of weeds of national significance	16	10	R
L	Mechanical and herbicidal control of weeds (Mimosa example)	7	0.3	R
M	Biological control of vertebrate pests	57	9	R
N	Mechanical control of feral predators (Earth Sanctuary example)	2	0.7	R
O	Strategic revegetation to prevent salinity from further affecting remnant vegetation	19	0.5	R
P	Prevent grazing of 10% of all arid and semi-arid grazing lands	4	1	R
Q	Manage grazing for conservation in threatened grasslands in South East Australia	90	0.8	R+M
R	Implement fire management regimes in native vegetation which promote a diversity of fire patterns	95	9	R+M

2. Commercial Tourism

2.1 The Problem

Tourism can prove to be useful in gaining money, increasing the knowledge of natural areas in the population, and creating a base of support in the population that wants to protect these areas. However, it has been reiterated time and again that it is easier to conserve areas from the start than to restore them. There is an inherent contradiction between conservation and increased tourism: the people (and their money), drawn to natural areas by amazing natural attractions, degrade the level of biological integrity. As conservation of functioning ecosystems is the primary goal of conservation legislation there should be no hesitation in diminishing the number of tourists that big companies are permitted to bring into protected areas if there is evidence of degradation.

2.1.1 Tourist Operators versus Park Rangers

The conflict between managers of natural areas and tourist operators is multifaceted and has proven difficult to reconcile as each side firmly believes that their interests are not being

[2] *Setting Biodiversity Priorities*, Working group for the Prime Minister's Science, Engineering and Innovation Council in 2002.

adequately addressed by the other side. Tourist operators and their supporters often claim that they have as much of a stake in protecting these areas as anyone because their business relies on it. However, a tourist would probably not realize if there was one species less for them to observe. Additionally, an area may still appear pristine or natural to a tourist that does not know the topography or ecology but to a trained professional the viability of keystone species and populations may be rapidly declining. Thus, while claims by tourist operators may be genuine their main concern is always their business while rangers and managers can and are trained to focus primarily on the science that proves the health of an ecosystem.

Carrying capacity of national parks and conservation areas is another major contention between tourist operators and conservation managers. Tourist operators often declare, as in the Queensland 2004 TIPA initiative, that carrying capacity should consider seasonality of tourism, social carrying capacity along with physical carrying capacity, and that there should be greater certainty in the measurement of site capacities. However, wildlife and vegetation demand for a natural area and protection do not change with the seasons. Moreover, the use of the term social carrying capacity is vague and refers more to considerations of human want and need rather than what is essential to ensure the continuation of our unique heritage. Less than 5% of the land in Queensland is national park. Why push the limits on what precious areas can stand when climate change and other concerns may contribute to the already fragile nature of these areas? Management plans should be based on science and determination to preserve natural areas. Considerations of tourism, legally, should always come second.

2.1.2 Small Family Based Operations Versus Large Commercial Operators

Small businnesses are often listed as one of the main beneficieries of ecotourism: it brings money to small rural towns and the income should stay local. However, complaints that theses small operators can't advertise, pay the large fees, or have any sort of stability considering the precariousness of tourism are common.[3] However, Gecko is not particularly concerned about small operations with an understanding and personal stake in the area that take mini buses or small vehicles with limited tourists into protected areas. We are, on the other hand, concerned about large commercial operations that complain that roads in protected areas are not big enough to accommodate their large luxury busses, there are not enough visitor facilities, and that they have to pay fees while individual visitors do not. These large operators continuously attempt to make the case that if their business is profitable they can put resources back into conservation on the lands they are using. Several arguments can refute this idea. 1) Degraded areas are much more expensive to restore than simply maintaining natural areas. 2) There is scarce evidence of large commercial operators actually putting money into conservation efforts. Often money contributed back into the reserves goes to more infrastructure for their business. 3) Large groups of people cause more concentrated damage and disturb the wildlife, sometimes to a point where reproduction rates are lower and stress levels are higher.

2.1.3 Tourism as a Low Impact Industry

As a justification for demands for more easily accesible permits and greater visitor allowance to National Parks some people claim that it is a low impact industry. How is this being defined? Ecotourism effects include "food scraps and waste water add unwanted nutrients to waterways; facilities encroach on and destroy habitats; visitors can distrub feeding and

[3] Some examples can be found in *Pursuing Common Goals*, Commonwealth of Australia, 2003, Perspectives, pgs. 23-29. and throughout the TIPA document.

breeding behaviour of native animals; soil, beaches, and dunes are eroded by four wheel drives; reefs are trampled by snorklers; intertidal plants and animals are collected; wildlife and fisheries are depleted; seabeds are damaged by boat anchors and moorings; and pollution and vandalism have adversely affected many natural areas."[4] After perusing this list it is impossible to maintain that it is low impact. Arguments that it may be lower impact than mining or certain industries that pollute excessively may be understandable. However, ecotourism, particularly commercial ecotourism, is far from an income generating process free from detrimental impacts.

2.1.4 Tourism Businesses Based in National Parks

In October of last year Warren Entsch MP announced his support for the establishment of tourism businesses inside of National Parks. The partnership that has been repeatedly referred to in the last few years between tourism and the parks system is not as balanced as it may seem. Allowing tourist companies to operate within National Parks could feasibly further dimnish already lax regulations and ignores the primary purpose of these areas. The reason they are public lands is that often immediate profits will not be generated from essential ecological services, which ensure our clean drinking water, unique biodiversity, fertile soils, and clean air.

The case studies presented in *Pursuing Common Goals* list the benefits to both the business enterprise and to park management. However, the benefits to park management include things like a recreational and service facility for park staff, funding of two additional rangers, maintenance of on site visitor facilities, and new facilities add to the park's overall attraction, increasing visitation and entry fees to the park. This is just a sample of the benefits listed but it clearly demontrates that the benefits are mostly to people, whether it is park managers, tourists, or tourist operators and ignores the costs that often fall onto the species living within these areas.

2.1.5 Accreditation

Partnerships between tourism and conservation create a conflict of interest. The second key principle listed in TIPA is "The system should use codified performance (accreditation) as an aid to management." However, ecotourism Australia, the company that accredits tourist operators they deem to uphold the 'ecofriendly' characteristics necessary, is run by people with interests in tourism. This represents a major conflict of interests. Additionally, the accredation of companies as ecocertified is managed and decided by a company rather than the government, thus making the reliability, standards, and strictness of criteria for selection questionable at least.

2.2 Examples

2.2.1 General

Reports in the New Scientist have shown that results of ecotourism can include, "heart rates increase, reproduction decreases, and hormones go awry with contact, made ever more frequent by the growing numbers of holiday adventurers flocking to remote, biodiverse areas."[5]

2.2.2 Horse Riding in National Parks

[4] *The Effects of Tourism and Recreation on Biodiversity*, Katy Crass, Australian Museum.
[5] *Booming ecotourism is stressing animals to death: report*, New Scientist, March 4, 2004.

Hooved, large, herbivorous horses are not native to Australia and their hooves and grazing practices can cause great amounts of damage to the often arid soils in Australia's natural landscape. Allowing them into National Parks, where protection is the main objective, seems absurd. Horse riding can occur in designated areas with a limited number of people. However, free-range riding does occur and sometimes parties of up to 30 people on a tour can ride through protected areas. Some of the main impacts of horse riding include: "damage to vegetation, increased trail depth and width, soil compaction, soil erosion and the introduction of weed species," introduction of weeds, change in plant species composition, and accidental transport of fungal pathogens.[6]

Studies in Kosciusko National Park and Alpine National Park have shown that "low levels of horse trampling can cause a significant reduction in vegetation height with fewer plant species being found on trampled sites."[7] The researchers also noted that in place of these native plants weeds often proliferated, which were often introduced on the horses' hooves or their excrement.

In one study it was shown that the percentage of bare ground increased from 5.2% to 31% from 0 to 300 horse passes, the vegetation cover decreased from 144.7% to 60.7% in the same range, and soil depth decreased 24.8 mm.[8] These figures indicate more than just the effects on soil or vegetation. The soil is essential to grow native vegetation, which is eaten by native animals. The food chain within the ecosystem can be greatly disrupted by extensive damage occurring on the ground.

Queensland prohibits non-native animals, including horses, from National Parks. However, recently they have given in to pressures for the horse riding lobby and allowed newly tenured national parks (former state forests) to have strip conservation parks through them to allow horse riding to continue. In other cases, where the state forest has been declared "national park recovery" horse riding has been allowed to continue over the next nine years, contrary to the rules of the Nature Conservation Act, which allow for the continuation of existing activities for three years, and they have changed the legislation to allow this.

2.3 The Solution

2.3.1 Tourist Operators versus Park Rangers

Partnerships between park managers and tourist operators are extremely precarious. To begin with conservation groups should be included in decisions that relate to National Parks and tourism, such as the TIPA process. Excluding a group with a large stake in the outcome of certain processes diminishes trust that needs to be buttressed in any way possible.

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[6] *Effects of Horse Riding in National Parks and Other Natural Ecosystems in Australia: Implications for Management*, D. Newsome et al. Journal of Ecotourism, Vol. 1, No. 1, 2002. p.55.

[7] *Effects of Horse Riding in National Parks and Other Natural Ecosystems in Australia: Implications for Management*, D. Newsome et al. Journal of Ecotourism, Vol. 1, No. 1, 2002. p.57.

[8] *Effects of Horse Riding in National Parks and Other Natural Ecosystems in Australia: Implications for Management*, D. Newsome et al. Journal of Ecotourism, Vol. 1, No. 1, 2002. p.59.

It is conceivable that partnerships can be established that benefit both interest groups. However, current economic pressures are pushing rangers with limited resources into partnerships with companies that they may not trust, which inherently limits an equal interchange of information and mutual benfits. Openly entered partnerships would be more beneficial.

In consideration of the suggestion to change carrying capacity with seasons we suggest that the carrying capacity determined by current EPA surveys should represent the highest numbers of people permitted. During low seasons in tourism these numbers should be reduced thus providing a respite for disturbed wildlife.

2.3.2 Small Family Based Operations Versus Large Commercial Operators
Promotion of small scale local tourism would address several of the above mentioned concerns. Mini buses are much better able to navigate the small and often rough roads that lead to many of the tucked away areas. They require less space to be cleared to maintain roads in often fragile areas and are a good way to control influx into these areas.

2.3.3 Tourism as a Low Impact Industry
Visitor numbers should be more strictly controlled based on the scientific numbers reached by the EPA in its review of sustainable visitor capacity for each individual protected area.

2.3.4 Tourism Businesses Based in National Parks
Granted, the financial burden of National Parks on the government is great. However, it is the governments responsibility to preserve our national heritage. Additionally, there are many poorly managed resources, like the NHT (National Heritage Trust), that could be used to aid in this process. The government should not turn over public land to be managed by private companies. Instead it should reallocate resources and use them in a more efficient manner. The Nerang Forest Interpretive Centre is one proposal, which has not yet been accepted, that would provide quality educational resources and a hub from which small tours could congregate allowing better controls on visitor capacity.

2.3.5 Accreditation
The government should devise its own certification standards and process to designate worthy companies as 'ecofriendly.' The conflict of interest in businesses certifying their peers is apparent. The government should consider small businesses as well as large ones. The lack of advertisement by small, well run companies could be overcome by having them listed by the government as dedicated to tourism with the least impacts.

3. Feral Animals

3.1 The Problem
For over a century feral animals have invaded Australia through various routes and pose similar problems as invasive plants. Vertebrate pests now represent 10% of Australia's mammal population.[9] They threaten our soil, waterways, native vegetation, as well as native

[9] National Feral Animal Control Program.

wildlife through predation, competition for food and shelter, destroying habitat, and by spreading diseases.[10]

Most conservation acts specifically refer to conserving native species, which in many cases requires diminishing the numbers of invasive species. Much of Australia's native wildlife has been out competed or preyed upon by feral animals and has declined significantly as a result. Our National Parks and protected areas are supposed to provide a respite for native species. However, sufficient controls to limit the effects of these animals have not been implemented.

The specific effects of these animals has not been quantified and thus it is difficult to manage their impacts if we don't know specifically what they are and the most effective way to mitigate them. Additionally, the identified methods of control for feral animals are often cost restrictive.

3.2 Examples

Feral animals listed by the Australian government as a posing a significant concern include the cane toad, European wild rabbit, European red fox, feral cat, feral camel, feral goat, feral horse, feral pig, and the feral water buffalo. Each poses individual risks that should be assessed and mitigated with strategic and individualized programs.

The European Red Fox was introduced in the nineteenth century for recreational hunting and is now one of the most wide spread feral animals on the continent. Their presence has led to the decline of many native animals including ground-nesting birds, the greater bilby, the green turtle, the bridled nail tail wallaby, and the night parrot.[11] The foxes have been so successful because they reproduce abundantly and at a young age and can live in a wide variety of habitats, including urban, alpine, and arid regions. These are just a few examples where we can draw a direct correlation, other effects may be more indirect, such as out competing other animals for food or changing the natural landscape.

Many attempts have been made to regulate the damage caused by these mammals using various methods. Hunting has been unsuccessful. However, biological controls such as dingos, and other control methods such as fencing and poisoned baits have proven successful in certain areas, like Western Australia. Poisoned bait that attracts foxes is often buried underground to limit the occurrences of other animals being effected. The Australian government has developed a *Threat Abatement Plan for Predation by the European Red Fox* and steps must be taken to ensure that it is implemented and that reviews are performed to update the planning to reflect new information.

[10] DEH website for feral animals.
[11] DEH website for feral animals.

3.3 The Solution

As most experts state the inability to eradicate feral animals completely, most efforts focus on reducing the impacts these animals have. Methods included within this framework are 'localised eradication, periodic reduction of feral numbers, sustained reduction of feral numbers, removal of the most destructive individuals or exclusion of feral animals from an area.'[12] Options include shooting, trapping, fencing, baiting, and biological controls. Shooting, trapping, and fencing are all labor intensive and require extensive labor and monetary resources.

Between 1996 and 2002 the NHT provided 18.9 million dollars for the National Feral Animal Control Program. This program, managed jointly by Environment Australia and Agriculture, Fisheries, and Forestry, has undertaken significant research to determine the science behind the success of these animals and corresponding potential solutions to control their impacts. Continued and additional funding of this program and other projects that are similar are essential.

4. Weeds

4.1 The Problem

The definition of a weed is any plant that 1) has, or has the potential to have, a negative impact on a natural resource and 2) requires some form of action.[13] Weeds are so successful because they lack the biological controls that native plants have and can more readily adapt to damaged areas. Humans often bring weeds into the country and animals or the large number of seeds allow them to disperse widely. The primary concern is that weeds crowd out native vegetation and completely change the dynamics of natural ecosystems, thus affecting their smooth function. Even with management and control projects weeds are still expanding and threatening conservation and agriculture. Many of the control measures have indirect effects that may harm the things they are meant to protect. For instance herbicides can affect crops, soil, water in surrounding areas, and flora and fauna in the area.

4.1.1 Unnoticed Invaders

Weeds are often not noticed until they have gained a foothold in an area because a few different plants are either not noticed or not considered a threat. Changed hydrologic patterns, fire regimes, biological systems, and landscape often makes it difficult for native plants to survive much less thrive and that leaves room open for other species.
Disturbance of the natural environment, caused by urbanization, land clearing, agriculture, grazing, and tourism, produces the perfect environment for weeds that have adapted specifically to thrive in disturbed ecological areas.[14]

4.1.2 Lack of Focus

The focus on weed eradication has constantly been on ridding farms and agricultural areas of weeds that are economically detrimental to farmers. However, expert consultants, led by the

[12] DEH website for feral animals.
[13] Find citation
[14] National Weeds Strategy, March 1999, p 16.

indifference of the government, have not addressed the serious effects and need for management in conservation areas.

4.1.3 Do herbicides provide the answer?
People use herbicides because they seem like a quick fix. However, many weeds are now becoming resistant to it and there are concerns for public health and safety from the run off of these poisons.

4.1.4 Land Degradation
Weeds often invade areas after a fire has come through or an area is significantly degraded by erosion or an interference of other natural processes.

4.2 Examples

Weeds of national significance under the National Weeds Strategy are alligator weed, athel pine, bitou bush/boneseed, blackberry, bridal creeper, cabomba, Chilean needle, grass, gorse, hymenachne, lantana, mesquite, mimosa, Parkinsonia, parthenium weed, pond apple, prickly acacia, rubber vine, salvinia, serrated tussock, and willows.

Lantana is one blatant example that can be observed invading the landscape in Queensland and New South Wales. It "is a serious threat to biodiversity in several World Heritage-listed areas including the Wet Tropics of northern Queensland, Fraser Island and the Greater Blue Mountains. Numerous plant and animal species of conservation significance are threatened. It is listed as the most significant environmental weed by the South-East Queensland Environmental Weeds Management Group."[15]

The management priorities of DEH for Lantana are:

1. Restricting further importation of lantana into Australia. Any new varieties brought in could escape cultivation and naturalise, or could cross-breed with naturalised varieties, leading to hardier new varieties more resistant to control.
2. Restricting the sale and use of lantana in gardens as these are potential sources of new infestation and new varieties. There are native and less weedy exotic ornamental alternative species.
3. Strategically controlling infestations that threaten areas where lantana is not yet a weed. Control methods are outlined below.

Parthenium weed is also considered one of the worst weeds for similar reasons, but it has been managed relatively well and its spread has been hindered. Introduced after WWII, this weed was particularly insidious because of its ability to cause asthma and dermatitis in people.[16] A mixture of biological controls, herbicides, mechanical removal, pasture management, and cultivation have been used. This case, although not perfect, should be used in some cases as an example.

[15] DEH website for invasive species.
[16] National Weeds Strategy, March 1999, p 16.

4.3 The Solution

Commonwealth, State, and Territory environmental ministers, demonstrating the widespread recognition of the severity of this problem, endorsed the National Weeds Strategy in 1997. This provides a framework to encourage cooperation in combating this problem.

The main objectives include 1) to prevent the development of new weed problems, 2) to reduce the impact of existing weed problems of national significance, and 3) to provide the framework and capacity for ongoing management of weed problems of national significance. Between 1996 and 2002 the National Heritage Trust (NHT), the major source of governmental funding for combating weeds, contributed 28.5 million dollars.[17] This funding should be maintained and increased, concurrently monitoring progress to ensure that funds are used efficiently.

Similar to feral animals, invasive plant species are impossible to eradicate once they have become well established. Thus, initial monitoring and preventative measures for newly discovered invasive species is essential to prevent any more large scale spread. Park managers should stay alert to any new vegetation. Rangers are in the best position to notice and report these problems, along with proposed solutions, as they are intimately familiar with the terrain. Ensuring that sufficient resources are made available immediately following the discovery of an invasive species new to either Australia or to a region is essential.

As eradication is no longer an option after a certain point, management must become vigilant and constant. Several options exist to limit the effects of weeds: 1) herbicides, 2) cultivation, 3) biological control, 4) research to develop new eradication methods, 5) sound land management practices, and 6) monitoring and minimising soil and vegetation disturbance.[18] Herbicides should be one of the last resorts as there can be negative effects on other elements in an ecosystem. On the other hand, biological weed control has proven very effective and specifically targets the weed.

5. Fire Management

5.1 The Problem

Fire management presents a very precarious problem. While some native vegetation has adapted to fire and even rely on it to reproduce, another part of it can be irreparably harmed in the process of proscribed burns. Debates still occur between scientists that believe they are desirable and those that believe its harmful, but other affected parties, such as farmers also have concerns. Some plant species may have fire coping mechanisms but that in no way indicates that they are fire dependent. It is important for property to be protected but it should not be at the expense of plant and animals species. Fire can completely alter the landscape and the species dwelling on it. Burning can destroy habitat of threatened species and force them to migrate, which threatens their survival even more.

Many patches of wildlife habitat are already too patchy and burning can fragment animal populations after driving them of their land.

[17] *Australia State of the Environment 2001,* Table 63.
[18] find citation, from Env weeds in Aust paper.

Queensland, along with other states, has problems with over-reaction to bushfires, and unnecessary frequency, intensity, and inadequate planning for intentional fires in Brisbane's vicinity.

5.1.1 Excessive Burning:
Although necessary in some instances the rates and regularity of proscribed burns have been dictated by elements besides the scientific need for them. Burning of wet schlerophyll forests has not apparent backing and it was not practiced by aborigines.

5.1.2 Focus on Biodiversity
Many of the fire management plans that exist refer primarily to protecting property and human life. While these are obviously major concerns, protecting the animals whose homes are also at risk is essential. Fragmentation, edge effects, and feral animals already threaten wildlife habitats.

Increasing the fragmentation and stressing wildlife by pushing them to areas that may not be as suitable further threatens their survival. Plant biodiversity is also threatened. Hot fires prevent regeneration by plants that have characteristics to retard fire and instead extremely flammable grasses and weeds replace them. Burning in a sustained and predictable manner diminishes the biodiversity in many cases.

5.2 Examples

5.2.1 Mount Coot-tha
Mount Coot-tha, located in Brisbane, has quite a bit of degradation resulting from years of high impact use. Today it is still used heavily by visitors and tourists, highly fragmented, and invaded by weeds. Although it is in an urban area its biodiversity is high. The fact that it is located within an urban area makes the use of fire management a very delicate matter, but today 20-50 hectare patches are being burned as opposed to the more controlled practices believed to be performed by aborigines of burning very small patches.[19]

A fire management plan has been adapted, but it has not been able to fully protect the threatened species in the areas and has allowed for the further spread of weeds. After logging that occurred there in the early twentieth century, weeds and fire prone native species replaced native vegetation, thus increasing the threat of fire and decreasing the ability of the forest to naturally resist its effects. Rare animals that live in this region include unique insects, legless lizard, powerful owl, and greater glider. The regime currently implemented has not allowed native and retardant species to re-grow and instead permits the proliferation of flammable weeds.[20] Additionally, regions marked as "fire exclusion forest" have been burned, which diminishes the ability of retardant species to vegetate the area and create barriers to the spread of subsequent fires.[21]

[19] *Ecologically Sustainable Fire Management: An Advisory Code for Brisbane's Western Suburbs*, DPA Sands and CM Hosking, July 2005, p. 25.

[20] *Ecologically Sustainable Fire Management: An Advisory Code for Brisbane's Western Suburbs*, DPA Sands and CM Hosking, July 2005, p. 24.
[21] *Ecologically Sustainable Fire Management: An Advisory Code for Brisbane's Western Suburbs*, DPA Sands and CM Hosking, July 2005, p. 24.

The clear-cutting of Mount Coot-tha half a decade ago is still having effects today, including that many of the fire dependent vegetation, like the banksias, are no longer there.

Thus Mount Coot-tha represents a classic example of an area that has a history of fire. However, the history has not been properly studied and the regimes have not been adapted to changes in the landscape and new information. Just because an area has a history of fire and contains some vegetation that has adapted to fire does not mean that regular burning is necessary and often times it causes more harm than good.

5.3 The Solution

5.3.1 Excessive Burning

Fire is an inextricable part of the Australian landscape. However, it must be carefully managed and monitored for the results so that constant adaptation of planning can reflect the needs of the region.

5.3.2 Focus on Biodiversity

Fire management plans must include considerations of the species contained within a region. Studies must be done to determine whether the animals can survive and if there is sufficient habitat in the vicinity that is suitable for them to sustain themselves. Studies of the specific plants and their needs, as opposed to what they can withstand, are assessed. Many fires are unnecessary and greater planning and knowledge would help alleviate this problem. It is apparent from Table 1 that the benefits of implementing fire management regimes in native vegetation, which promote a diversity of fire patterns, greatly outweigh the costs. It can encourage greater biodiversity, reduce the amount of invasive species, and protect natural ecosystems. However, thus far most regions have not successfully designed or implemented fire regimes that reflect the needs of their regions.

5.3.3 Building Codes

As one of the main reasons people call for proscribed burns is that they are concerned for the safety of their houses and property, it is advisable to restrict new building to areas that are sufficiently removed from the bush. Although many building plan restrictions include a reference to this, it is not sufficient.

6. Conclusion

The threats to the objectives of our National Parks and Protected Areas in this paper have been treated individually. However, they are all part of one major threat and can exacerbate the effects and vulnerability to the others. What is most needed is a thorough management plan with scientific backing for each bioregion in order to ensure that each concern is addressed and their cumulative effects are considered.