



*Submission by the*

## **Victorian National Parks Association**

*In response to the Victorian Government's Green Paper*

## **Land and Biodiversity**

## **at a time of Climate Change**

*Submission on*

- **Terrestrial National Parks and Reserves  
in a landscape context**
- **Marine and coastal biodiversity conservation**

July 2008

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The human species has evolved from,  
and been nurtured by, the natural environment –  
we are a biological product of the earth itself.  
This deep connection is one that we must all remember.  
Our parks are the storehouse of our past and,  
more importantly, of our future.

Large national parks are the strongholds of our plants,  
animals and ecosystems with all the values and benefits  
they bestow, from protecting water quality to providing  
habitat for marine fisheries.

Their importance will only increase with time as the stresses  
of urbanisation, population growth, climate change and  
resource depletion impact on our societies.

It is our responsibility to ensure the ongoing protection  
and good management of parks for present and  
future generations to enjoy and cherish.

John Landy

in *The Value of Parks*.

IUCN World Commission on Protected Areas,  
People and Parks Foundation, Parks Forum. 2008

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# Main recommendations

## Terrestrial National Parks and reserves in a landscape context

**Recommendation:**

The Government should commit to greatly increase levels of reliable, recurrent funding for weed control in parks and reserves, such that all manageable invasive weeds are acted upon.

**Recommendation:**

All weed invasions in parks should be monitored, including the impacts of control actions on the invaded ecosystems.

**Recommendation:**

A strategic program to develop biological controls for weeds should be given urgent attention.

**Recommendation:**

The Government should commit to a program to significantly reduce feral animal invasions in parks to levels of minimal impact.

**Recommendation:**

Control of pest plant and animal imports be rigorously controlled through the establishment of allowable imports, rather than restricted imports.

**Recommendation:**

Pest plant animal and pathogen management should be planned strategically across land tenures, but undertaken by the appropriate agency.

**Recommendation:**

Fire management in Victoria should be thoroughly re-assessed through a process that includes solid input from a full range of ecologists and biologists, including fire ecologists, and their recommendations should be peer reviewed to ensure fire regimes give protection to the *full range* of Victoria's biodiversity.

**Recommendation:**

Fuel reduction burns, and ecological burns, should be subject to monitoring sufficient to establish short and long-term effects on biodiversity conservation.

**Recommendation:**

Fire management, including fire regimes, should be re-assessed regularly to allow enlightened adaptive management.

**Recommendation:**

Systematic and effective monitoring of ecological systems, including the monitoring of a range of species truly indicative of the full range of biodiversity, and including the monitoring of fire regimes, should be set up across the State.

**Recommendation:**

The park management agency should report to Parliament every four years on the condition of national parks, and that report should be based on reliable, consistent monitoring of ecological integrity.

**Recommendation:**

The park management agency should have a management structure with an expert and well-resourced ecological management stream, with integrated line management from top to bottom within the agency.

**Recommendation:**

There should be an immediate, significant and growing increase in recurrent park management funds, sufficient to establish secure management of the natural values of our national parks and reserves in the face of climate impacts

**Recommendation:**

An independent panel of experts should advise the Government on the best ways for the community and management agencies to build expertise in the various aspects of ecological management, including fire ecology.

**Recommendation:**

The Government should embark on a program to educate and inform the broad community on issues supporting biodiversity protection.

**Recommendation:**

That Parks Victoria's program for consulting with Indigenous communities, and employing Indigenous people, be expanded across the park system, and across Victorian land management programs generally.

**Recommendation:**

Generally, commercial activities requiring infrastructure or other impacts should be situated outside national parks and other nature conservation reserves

**Recommendation:**

Where licence and/or leasehold agreements must of necessity apply within National Parks or similar conservation reserves, there should be clear requirements in the agreements to completely satisfy biodiversity, and carbon neutral, outcomes.

**Recommendation:**

The National Parks Act must set clear objectives to secure the protection of biodiversity and ecological integrity in parks, and for bolstering the important role of parks in the broader agenda of biodiversity conservation across the State.

**Recommendation:**

The National Parks Act's objectives should not be compromised by other Acts.

**Recommendation:**

Accountability under the National Parks Act must be very clear.

**Recommendation :**

The National Parks Act must require effective management targets, require regular reporting to Parliament on performance against those targets, and identify an independent auditing process to assess the achievement of management objectives.

**Recommendation:**

The National Parks Act should allow for a range of Indigenous co-management arrangements.

**Recommendation:**

That the FFG Act be strengthened to allow the listing of “supporting processes” for biodiversity protection.

**Recommendation:**

That the existing park system be expanded, where possible, to give maximum representation to all EVCs.

**Recommendation:**

That the development of strategic connectivity of natural landscapes become an urgent priority.

**Recommendation:**

Planning regulations should be amended to allow for appropriate biodiversity and fire protection outcomes or, at a minimum, such that they do not impede biodiversity or fire protection outcomes.

**Recommendation:**

Licence agreements on public land, including for the use of riparian land, should be reviewed according to a Code of Practice encouraging biodiversity outcomes.

## **Marine and coastal biodiversity conservation**

**Recommendation:**

Provide appropriate funding to the VCC to ensure biodiversity protection in the marine and coastal environment. The VCC should ensure that all coastal action plans are implemented according to standardized criteria that focus on catchment management, wetland and estuary management, coastal development, fisheries with an overall all view to maintaining biodiversity

**Recommendations:**

- Develop a marine governance structure using Integrated Coastal Zone Management that includes stakeholder and community input to protect and manage marine areas (including MPAs) and to develop legislation and appropriate policy

- Assess vulnerable/valuable habitats and areas and include them in future policy-making decisions, such as the asset-based framework being developed by DSE
- Develop State legislated coastal town boundaries for coastal development and apply firmer coastal planning schemes, and appropriate planning controls, at a statewide level

**Recommendation:**

The State should be divided into marine and coastal management sections, each area with a dedicated marine and coastal team whose job it is to provide input into CMA planning, EPA monitoring, DSE assessment and management and council planning. No plan, monitoring or assessment should be completed without their input.

**Recommendation:**

The biodiversity paper needs to develop Coastal Plans that enable inland movement of intertidal and coastal species to occur. Plans should be included in the Coastal Spaces Strategy and in local town planning regulations, and allow for the acquisition of land where required.

**Recommendation:**

Develop guidelines and plans for the protection of Victorian estuaries. The EPA and DSE should be lead agencies responsible for ensuring water quality and sediment monitoring, as well as undertaking audits of licensed point source discharges that should be reported on regularly with results readily accessible to the public.

**Recommendation:**

The State Government, in consultation with research, community and industry organizations, should establish a framework for acquiring data relating to Victoria's marine, estuarine and coastal resources, and co-ordinate a program of integrated data collection. The research already in existence should be appropriately catalogued and archived, gap analysis undertaken and a future plan provided.

**Recommendation:**

The biodiversity paper should extend the *Fisheries Act 1995* and *National Parks 1975 Act* to include the protection of intertidal marine ecosystems.

**Recommendation:**

Investigations should be carried out to identify where sea walls will be needed and what type of walls will be able to accommodate intertidal communities, where possible.

# Terrestrial National Parks and Reserves in a landscape Context

## Summary

### What are we protecting?

Victoria's biodiversity, something over 100,000 different native species, sits primarily within our most intact native ecosystems. For the most part, these are our national parks and other conservation reserves. This 500 million-year-old heritage on land, and a far older evolutionary heritage in the sea, cannot be recovered once it is lost.

### What are the existing threats?

Probably the biggest threats to the survival of this great natural heritage are our complacency (thinking that nature will look after itself), our ignorance (a lack of knowledge of individual species and their ecosystems) and our helplessness (believing the task is too great to deal with). None of these positions are necessary, and all are dangerous.

The most significant current management threats to biodiversity are weed and pest animal invasion (though most of these could be highly manageable), fragmentation of natural areas, and inappropriate fire regimes.

### What threats does climate change add?

Decreased rainfall and snowfall and reduced streamflows, drier landscapes, increased fire frequency and severity, rising sea levels, and increased ocean temperature and acidity, will together put great stresses on ecosystems right across Victoria.

The capacity of species and communities to migrate to more suitable climates will be hindered by the fast rate of change of climate, and by the fragmentation of many ecosystems, which makes species migration problematic and sometimes impossible. Vertical migration of alpine species to a more suitable climate is virtually impossible because those species are already at the top of our mountains.

In addition, climate change is expected to bring new weed and feral animal invasions to most natural areas.

### What must be done to protect our prime natural areas?

We must:

- Firstly, urgently **establish a carbon-neutral economy**, as the reduction of greenhouse gases is a crucial step towards protecting biodiversity.
- Greatly **increase management resources**, allowing well-informed, strategic and cost-effective biodiversity management, giving our prime natural areas maximum resilience against climate change impacts.
- **Increase knowledge and expertise**, particularly in the fields of ecological management, fire ecology, and the ecology of fungi and invertebrates.

- Establish a dedicated **ecological management stream** within the park management agency, with the skills and capacity for management of ecological systems and the threats they face.
- Establish **clear management targets** and management accountability, and a regular audit of park biodiversity management.
- **Strengthen the legislation** protecting our national parks and other reserves, by clarifying the prime purpose of reservation and establishing clear accountability.
- **Expand the reserve system**, so that protected ecosystems are more viable under climate impacts.
- Establish **strategic connectivity across the landscape**, allowing species the capacity to migrate and supporting landscape-scale ecological processes.

### **How do we build knowledge?**

We must:

- urgently train fire ecologists, mycologists and entomologists etc. to fill crippling expertise gaps for the management of biodiversity.
- educate the broader community in issues relating to biodiversity protection, including schools, volunteer groups, etc, and offer training opportunities including to Indigenous communities.

### **What is the role of Government?**

The Government has a clear responsibility for the management of conservation values on public land, and for protection of biodiversity.

### **What is the role of the community?**

The community is already heavily involved in supporting biodiversity in many ways, but has the capacity, if supported by capacity-building programs and educational programs, to increase that support

### **What is the role of business?**

There are clearly roles for business in market-based activities, particularly if carbon trading schemes are linked to biodiversity connectivity programs.

## Introduction

National Parks and other conservation reserves play a critical role in the protection of biodiversity in Victoria. While this reserve system also makes important contributions to tourism, community health and wellbeing, and a range of critical ecosystem services such as water quality, the prime purpose of parks and reserves remains the protection of nature.

For over a hundred years, they have served Victoria well in all of these respects. Now, in the face of climate change, their importance as core refuges for biodiversity is greatly increased.

*“The National Reserve System is more important than ever. Protection of a wide range of different types of habitat is probably the most important strategy for reducing the negative impacts of climate change on biodiversity. To put it simply: protecting more ecosystems and the variation within each ecosystem now is likely to increase the prospects of more species adapting to and surviving under future climates.”*

*“The challenge now is to more effectively manage threats such as fire, weeds and feral animals in protected areas, to help native species respond and adapt to changing environmental conditions, so we minimize the loss of key species and habitats.”*

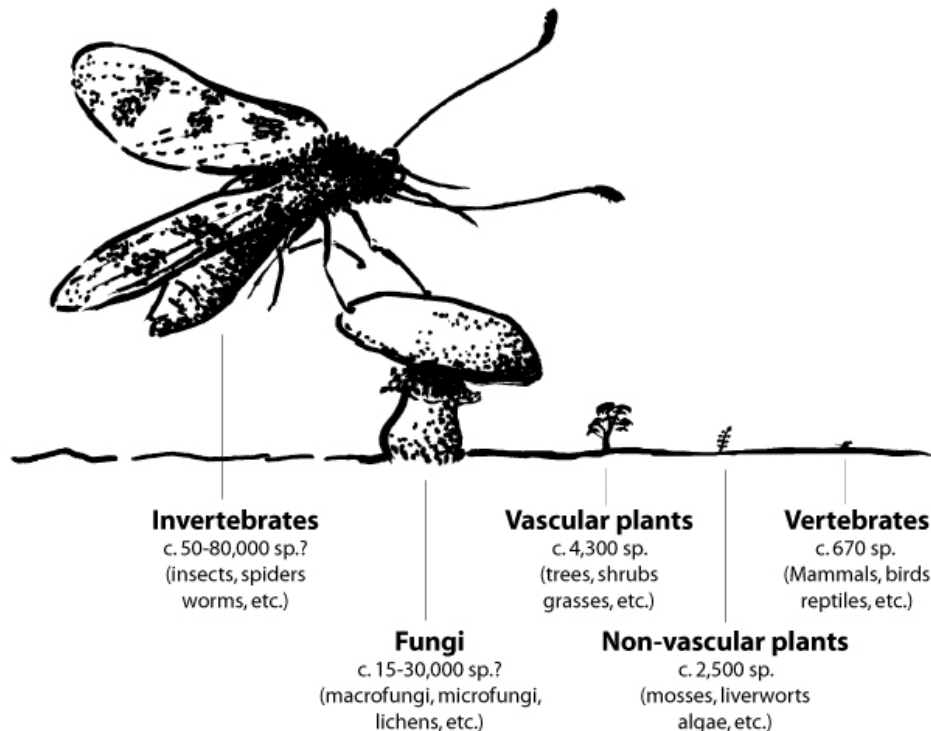
*Implications of Climate Change for Australia's National Reserve System: A Preliminary Assessment - Overview (March 2008). Department of the Environment, Water, Heritage and the Arts. p. 4, p. 16*

## Biodiversity: the whole caboodle

Victoria's inheritance of some 100,000 plus native species is a remarkable one, and by any account an important one. It is a gene pool of inestimable value to future generations of Victorians, but the broad Victorian community's knowledge of this inheritance is minimal, and even the scientific community's comprehension is sorely lacking.

We have a fairly good understanding of our mammals, birds and amphibians and reptiles, and a similar understanding of vascular plants – the trees, shrubs, herbs and grasses. But when it comes to the 60,000 plus invertebrates (the insects, spiders, crustaceans, worms etc.) or the c. 30,000 fungi, let alone the microscopic organisms, our knowledge is fairly dismal. Yet these species, the pollinators, decomposers and nutrient providers, are the backbone of ecological systems.

## Relative numbers of native species in Victoria's ecosystems (Size approximates relative no. of species. Total species number possibly approx. 100,000?)



The above diagram indicates the relative abundance of species within different groups of terrestrial species in Victoria. What it doesn't indicate is that for the two largest groups, invertebrates and fungi, our knowledge of the species within them is seriously lacking. Our prescriptions for the frequency of so-called "ecological burns", for example, are almost entirely based on rough data for the relationship of vascular plants to fire, yet vascular plants clearly make up only a small percentage of the total species range, and can't be considered a reliable indicator for the rest of the system.

### The "orphans"

The great bulk of Victoria's genetic pool consists of relatively small organisms: a vast range of invertebrates and cryptogams (fungi, mosses etc), sometimes called "orphan species" because no-one much looks after them.

The invertebrates form important relationships throughout our ecosystems. Pollination, seed dispersal and 'cleaning up' are all functions fulfilled by ants, for example, and soil is worked and enriched in many ways by worms and other invertebrates. But our knowledge of these species is abysmal, with most of Victoria's entomologists working on agricultural pests rather than native species.

And fungi are similarly important, and similarly scarcely studied, with almost all of Victoria's few mycologists engaged in research and management within the agricultural sector. Indeed when a second mycologist was employed recently to work on native fungi

at Melbourne's Royal Botanic Gardens, the original incumbent was heard to say "*We're lucky at the gardens because there are two of us. I actually have someone to talk to*".

There are, so far as we know, no mycologists currently employed within DSE, Parks Victoria or the CMAs. And, we believe, the only entomologists employed are those working on freshwater invertebrates at DSE's Arthur Rylah research institute.

## **Fungi: one of our gaping expertise gaps**

*"It is simply indisputable that there is a very large number of Australian fungi, and for the moment a figure of 250 000 is accepted as a reasonable estimate of the number likely to occur in Australia."*

*"Most fungal species (95%) are yet to be formally described and we remain in total ignorance of all aspects of their biology."*

*"No study has provided even a partial inventory of the fungi present at a single site in Australia, let alone comparative data for sites in different habitats."*

*A Conservation overview of Australian Non-marine Lichens, Bryophytes, Algae and Fungi. Wildlife Australia, May 1997, pp. 50, 51 & 54*

### **What role do fungi play in ecosystems?**

Fungi have important ecological roles, both in the efficient decomposition of plants and animals, and as distributors of nutrients through partnerships with other plants.

The tens of thousands of species of micro-fungi, such as leaf-spots etc., often specific to a particular plant or even a particular host insect, play important roles in shaping the size and structure of individual plant populations, and whole ecological communities. Fungi that form mycorrhizas or mycophyllas are very important as partners in mutualisms with many plants, including orchids and eucalypts. Fungi are also an important food source for many animals including insects, mammals, amphibians and reptiles.

Fungi affect soil nutrition as well as physical characteristics such as wettability and the integrity of the soil crust. Saprotrophic fungi are very important in the decomposition of plants and other substrates. They are among nature's most efficient recyclers.

### **Are fungi much use to people?**

While it should not be necessary to justify protection of our natural heritage by referring to its economic benefits, the current and possible future applications of fungi are vast, and shouldn't go unheralded.

Mycorrhizal fungi are important contributors to timber yields in agro forestry, and also in the rehabilitation of mining sites etc.

In medicine, a range of fungi are used for production of biologically active compounds, such as those used for anti-bacterial, anti-fungal, anti-protozoic, anti-viral, phytotoxic, and anti-tumor activity.

In industry, fungi are used for the production of enzymes, vitamins, amino acids and other biochemicals and chemicals, including ethanol for fuel. Yeasts and other fungi can readily be grown in large-scale fermenters, allowing large scale production without unduly impacting on natural systems.

Importantly, commercial applications include management of pollution through the degradation of petroleum hydrocarbons, coal tars and pesticides etc. Some fungi have potential in the accumulation of metals from contaminated wastes.

Fungi can also play important roles as plant pathogens in the eradication of weeds, for resisting pathogens of woody tissue, and in the control of insects such as locusts and termites. And fungi have potential uses in biotechnology (as a source of genes), and as indicator organisms for pollution, soil health, tree productivity etc. etc.

Oh, yes, and some are good to eat.

*“The Australian fungal biota is a large, mainly unexplored, source of biologically active components”*

*A Conservation overview of Australian Non-marine Lichens, Bryophytes, Algae and Fungi. Wildlife Australia, May 1997, pp. 58/9*

By any measure, we clearly should be doing a better job of looking after our fungi.

### **What threats do fungi face?**

Though our considerable ignorance of the ecology of fungi in Victoria doesn't allow a clear assessment of management threats, there are a number of ways in which fungi are likely to be threatened:

- Loss of host plants or animals (including host invertebrates). This is a considerable threat, as most native vascular plants (except for saltbushes, banksias etc) are likely to have several specific fungal species associated with them.
- Loss of mycorrhizal partner or loss of dispersal agent (such as the Long-footed Pororoo).
- Loss of substrate (e.g. a lack of fallen wood on the forest floor)
- Fire management. Some species are clearly fire-dependent, while others may be impacted upon by frequent or severe fire.
- The tendency towards even-aged forests is problematic, as some fungi only occur in older trees.
- Replacement by exotic (ie “weed”) mycorrhizal fungi, which may not serve the same supportive roles in the ecosystem they are invading.
- Increased fire frequency and severity under climate change is likely to impact greatly on Victorian rainforest areas, which are relatively rich in fungi species.

### **The other gaping expertise gaps**

Our knowledge of **invertebrates**, their role in our ecosystems, and their possible future uses is similarly deficient, and similarly important. Of the approximately 300,000 species

in Australia, some 100,000 have been described, with a further 100,000 known but so far undescribed. A fair proportion of these are likely in Victoria, because of our broad range of ecosystems. We do know invertebrates are important for pollination (bees, wasps, ants and flies), decomposition (esp. worms), and they have current and potential human uses in regard to agriculture.

And our knowledge of a vast number of individual species, of species behaviour and the ecological management of **marine biodiversity** is also sorely lacking.

Also, while there is some good work in, and good knowledge, of **fire ecology**, there is a great deal more we have to learn, and an urgent need for increased expertise within management agencies right across the State.

In all, there is a vast store of our inherited biodiversity of which we are largely ignorant, and for which our national parks and other relatively intact areas are the prime factors in their survival. The effective management of these core areas is crucial, and the management of biodiversity across the landscape is similarly important.

## **General priorities for biodiversity management**

The only relatively secure method of protecting biodiversity is habitat conservation – at the level of plant communities and associations. This requires the adequate protection of representative ecosystems across the State, but it is also necessary to protect a full range of age classes within each of those ecosystems if we are to allow for the conservation of related vertebrate and invertebrate associations, most of which are ill-understood.

## **The Park System**

Victoria's system of parks and reserves has long been framed to be representative, and we were the first place in the world to attempt a representative system of marine national parks. The system was designed, however, before the threat of climate change was understood or, in most cases, even contemplated, and the park system is now seen to be quite inadequate. Through the *Land and Biodiversity at a Time of Climate Change White Paper* Victoria has the opportunity to regain its lead in biodiversity management or, conversely the capacity to lose it almost irretrievably.

## **How will climate change impact on nature in Victoria?**

As a wise person once said about climate predictions:

***“The sceptic should take the estimate of lowest impact,  
the scientist should hold to the middle ground,  
but the manager must prepare for the greatest likely impact.”***

Following this precautionary principle, predicted climate changes here have been taken from the upper level. This is not just the expedient path to take from a management

planning point of view; the most extreme predictions for climate change are now increasingly observed to be true.

### **What can we expect?**

Victoria's natural systems as we know them will change.

As we might be expected when dealing with a range of ecosystems which together harbour well over 100,000 native species, the effects are complex, with many changes having feedback effects throughout the landscape.

Higher levels of carbon dioxide (CO<sub>2</sub>) in the atmosphere, for example, can effect plant growth, favouring some species over others particularly where nutrients are available. Effects are varied, but some eucalyptus leaves have shown decreased protein, and higher levels of tannin. And increased CO<sub>2</sub> in the atmosphere is absorbed by the ocean, increasing ocean acidity.

### **Some predicted climate changes\***

#### **Carbon Dioxide**

CO<sub>2</sub> levels were around 280 ppm in 1750 and climbed to 379 ppm in 2005, with 70% of that increase happening since 1970. Atmospheric CO<sub>2</sub> could reach an astonishing 970 ppm by 2100.

#### **Temperature**

Australia will become hotter, with an increase up to 2.2 degrees by 2030, and up to 6.7 degrees by 2070.

#### **Rainfall**

In general Australia will very likely be drier overall, with southern South Australia and most of Victoria very likely to be drier.

#### **Water resources**

Stream flows in the Murray Darling Basin have been estimated to reduce by up to 20% by 2020, and up to 50% by 2050.

#### **Oceans and coast**

Sea levels could be 59 cm higher by 2100. Sea surface temperatures are predicted to continue to increase in the Southern Tasman Sea up to 0.9 degrees by 2030.

#### **Storms**

There is likely to be an increase in storm intensity, with both wind and rain occurring in more intense events.

#### **Snow**

Snow cover can decrease by up to 54% by 2020, and up to 93% by 2050.

#### **Fire**

The frequency of days with very high and extreme fire ratings can increase by up to 25% by 2020, and up to 70% by 2050.

\* Climate impact predictions here are drawn from:

Dunlop, M. & Brown, P.R. 2008. *Implications of Climate Change for Australia's National Reserve System: A Preliminary Assessment. Report to the Department of Climate Change, February 2008.* Department of Climate Change, Canberra, Australia

## **How will this affect parks and reserves?**

### **Fire: a burning question**

More frequent and more intense bushfires are predicted for Victoria in coming years, as our weather warms and dries and lightning storms increase. This will affect all terrestrial ecosystems in varied ways. Just two are discussed here, but the effects of increased fire on the many tens of thousands of Victorian native species remains scarcely understood.

#### **An ancient fiery relationship**

Over the last 50 million years, since Australia broke away from Gondwanaland, fire has been part of the natural landscape. Since that time, most of Australia's remarkable plants and animals have evolved to live with fire, and many now depend on occasional fire for survival or reproduction. However species react differently to varying fire intensity and/or fire frequency.

In more recent times, say the last 50,000 years, Aboriginal people have been using fire in the landscape for a variety of reasons and, in Victoria, are often credited with "opening up" the grassy woodlands of much of Victoria. There is little evidence, however, that pre-European Aboriginal communities habitually burnt the tall wet forests of eastern Victoria, or alpine regions.

This long fire history has left us with a remarkable and complex relationship between fire and Victoria's biodiversity. Unfortunately, this very complex relationship is sometimes trivialised in park management, with inadequate efforts to monitor and hence learn from the effects of wild or management burns, even the so-called "ecological burns".

### **Mountain Ash forests**

Standing in awe in a towering eucalypt forest is one of the great experiences natural Victoria offers.

The Mountain Ash (*Eucalyptus regnans*) is the world's tallest flowering plant, and the tallest hardwood tree (trees can grow to over 500 years old, and have reached heights of over 100 metres). At one time Victoria probably had the world's tallest trees, but the greatest giants have since been cut down or destroyed by fire. Mountain Ash are still common, however, in the tall, wet forest areas of the Otways, the Strzeleckis and Victoria's eastern highlands.

#### **How does fire affect them?**

Mountain Ash forests like very occasional fire, but collapse when fires are frequent. Unlike most eucalypts, they are easily killed by bushfires but, paradoxically, they also generally need that same fire for regeneration. The fire-killed tree drops lots of seed, and new seedlings grow prolifically in the sun-drenched bed of ash.

Importantly, the young seedling trees do not produce seed for about 10-15 years, so if a fire comes again within 10 years of a previous fire, there is no regrowth, and the Mountain Ash forest can be replaced by trees like Silver Wattle. Also, if a fire happens

within about 50 years, the trees will not be old enough to produce hollows, which are essential for a great range of birds, mammals, bats and insects.

The 2003 fires in eastern Victoria were overlapped, in some areas, by the 2005 fires, and some extensive areas of Mountain Ash forest regrowth were destroyed. It is possible to sow seed manually, but when fires become more frequent, this becomes increasingly impractical, and somewhat pointless.



Ancient Mountain Ash were once common in Victoria, but fire and logging have killed most since European settlement.

Isaac Whitehead: Mountain Ash at Sassafras Gully, Dandenong Ranges. c. 1875. National Library of Australia

The relationship of such forests to fire gets even more complex when we look at individual species of birds or animals, which often require specific understory species or even certain fungi etc. These relationships, so critical to biodiversity, are seldom studied and rarely monitored, even in “ecological” management burns.

*(Mountain and Alpine Ash Forests are found in Great Otway, Tarra Bulga, Central Highlands, Wilsons Promontory, Alpine, Baw Baw and Errinindra National Parks, and State Forests.)*

## What's an old tree worth?

Fires can help the development of hollows in old trees, but regular or intense fires (or logging) can greatly reduce the number of trees of hollow-bearing age. Different species need hollows of differing size, shape and aspect.

### Species needing tree hollows in Brisbane Ranges National Park:

Sugar Glider *	Crimson Rosella *	Brown Treecreeper
Brush-tailed Possum *	Eastern Rosella *	Striated Pardalote
Brown Antechinus *	Red-rumped Parrot *	Southern Whiteface *
Brush-tailed Phascogale *	Powerful Owl	Tree Martin
Yellow-tailed Black	Southern Boobook	Gould's Wattled Bat
Cockatoo	Barking Owl	Little Forest Bat
Sulphur-crested Cockatoo	Barn Owl	Lesser Long-eared Bat
Galah	Australian Owlet Nightjar	White-striped Freetail Bat
Little Lorikeet *	Laughing Kookaburra	Native Bees and other
Purple-crowned Lorikeet *	Sacred Kingfisher	invertebrates *
Musk Lorikeet *	White-throated Treecreeper	

*The above list was compiled by members of the Geelong Field Naturalist Club. The asterisks identify species that act as significant plant pollinators, suggesting that reduced tree hollows can have impacts well beyond the species seeking shelter.*

## Rainforests

### Pockets of rainforest are *extremely* vulnerable to fire

Rainforests are remnants of the old Gondwanan forests, widespread before Australia separated from Gondwana Land about 50 million years ago. Since that time, fire became a feature of the Australian continent, and the "Australian flora" (eg eucalypts and a whole host of other plants) evolved which can survive, or even depend on, occasional fire.

Today, in Victoria, rainforests mostly inhabit the deep, shady streamside valleys of tall wet forests where they have been, until now, fairly protected from fire.

There are two main types of rainforest in Victoria:

- **Warm-temperate rainforest.** This is mostly found in East Gippsland lowland forests, and is typically canopied by Lilly Pilly, Pittosporum or Kanooka Trees. This sort of forest often has jungle-like tangled vines.
- **Cool-temperate rainforest.** This sort of rainforest has lots of treeferns, and mosses and fungi etc. on the ground layer, and can be found at higher elevations in East Gippsland, such as in Errinundra National Park. On the Errinundra Plateau the rainforest is typically canopied by Sassafras or Black Oliveberry trees. A more common type of cool-temperate rainforest is canopied by Myrtle Beech forest, and can be found in the Central Highlands, the Strezeleckis (eg Tarra-Bulga National Park) and the Otways.

With climate change, the eucalypt forests that surround rainforests are likely to become drier and more fire-prone, leaving the rainforests also more prone to fire.



Myrtle Beech canopied cool-temperate rainforest in Victoria's Central Highlands.

Photo: David Tatnall

Just one bushfire can effectively destroy a rainforest, or leave it so depleted it will take many, many years to recover. Burnt rainforests are generally invaded by the neighbouring eucalypt forest.

*(Different rainforests can be found in Great Otway, Tarra Bulga, Central Highlands, Wilsons Promontory, Alpine, Snowy River, Mitchell River, Baw Baw, Alfred, Lind, Errinundra, Cooracambra and Croajingolong National Parks and State Forests.)*

## **Rising sea levels**

### **Coastal Salt Marshes**

Coastal salt marshes are generally found at low elevations, at the edge of the high tide line around bays and tidal estuaries. They are flat, wet, saline areas, generally with low-lying salt tolerant plants like Glassworts etc. They are important breeding and feeding areas for a range of birds, many of which are seasonal migrants – some from the far corners of the earth. For example, the Double-banded Plover flies from New Zealand to spend the winter in these salt marshes, and the Eastern Golden Plover migrates here from

Siberia and Alaska. They are also important feeding grounds for the highly endangered Orange-bellied Parrot, which migrates across Bass Strait from its breeding grounds in Tasmania.

Salt marshes are considerably restricted in area these days, and are usually backed by roads and farms and/or housing etc. Many are listed in international migratory bird treaties, such as the Ramsar Convention.

### **What happens with climate change?**

Because coastal saltmarshes are generally very low-lying, they will be among the first Victorian natural areas to be affected by rising sea levels and/or storm surges. These days salt marshes are more often than not backed by developed land, roads or farmland, so they cannot easily retreat inland as waters rise – the “pincer effect”.



The Cheetham Wetlands, a few kilometers south-west of Melbourne sit only centimetres above high tide levels in Port Phillip Bay (on the right). Backed by extensive housing developments (just visible on the horizon), they will be drowned by predicted sea level rises.

Photo: Phil Ingamells

*(Coastal saltmarshes are in French Island and Croajingolong National Parks, Gippsland Lakes, Nooramunga and Point Cook Coastal Parks, Cheetham Wetlands, Port Phillip Heads and Yaringa Marine National Parks, Jawbone Flora and Fauna Reserve, Edward Point State Faunal Reserve, Corner Inlet Marine and Coastal Park and elsewhere.)*

### **Other sea-level impacts**

Many other coastal areas will be impacted by predicted rising sea levels and increased storm surges. Low-lying Snake Island east of Wilsons Promontory, for example, holds a valuable remnant of the once common coastal Sheoak and Banksia woodlands. Mangroves will also be affected, with possible increases in some areas (due to temperature rises), but flooding in others.

Freshwater aquifers can suffer saltwater intrusion, especially where recharge is reduced, or extraction for human use increased.

## **Reduced rain and reduced snowfalls**

### **The water dilemma**

Reduced rainfall and snowfall means reduced river flows, and that has repercussions across the landscape, affecting towns and farms as well as Victoria's natural areas.

River health is a growing problem for most of Victoria's rivers now, from the alps through to estuaries along the coast. And a lack of big flood events, or flood events at unusual times, effects natural systems in floodplains and wetlands throughout the State.

Victoria's Red Gums, for example, generally require a flood event to reproduce and they also need reasonably regular flooding to survive. River Red Gum wetlands, mainly along the northern-flowing rivers such as the Ovens and Goulburn as well as the Murray River, traditionally flooded each spring when snow-melt in the alps caused swollen rivers to burst their banks. Each year, these flood waters would harbour huge flocks of wetland birds, with the waters slowly receding over two months or more.

The Murray River flows are now heavily regulated, and flooding of wetlands like the Barmah Forest is now artificially contrived to accommodate conflicting demands for water allocations. Large floods are rare. But wetland birds will not breed unless a flood is a big one, and will last long enough to provide food for their hatchlings. And Red Gum wetlands in the Wimmera and Mallee, such as at Lake Albacutya and Wyperfeld National Park, are now struggling, dying or dead.

Water rights (allocations) essentially have similar legal status to land ownership, and our rivers are already widely acknowledged to be over-allocated or over-used. Without intervention from Government, the environment will lose out with reduced water inflows under climate change. Irrigators with high-reliability water entitlements will get first take. It is critical that environmental water has similar security of supply to irrigation, and that the amount of water available for the environment is increased dramatically.

A drier climate will put stresses on most natural systems across Victoria, affecting ecosystems in many ways.

*(Reduced rain and/or snowfalls will affect all national parks and reserves across Victoria in varying ways.)*

# Species migration

## A moving problem

Over millennia, as the earth successively warmed and cooled, species and whole plant and animal communities have migrated up and down mountains, or north and south across lowlands, to a climate that suited them. As they moved, to avoid extinction, they would slowly evolve new capabilities and defences suiting them to their new surrounds.

With predictions of uncommonly rapid warming ahead of us, and fragmented ecosystems across the landscape, many of Victoria's plants and animals are in a real pickle.

## Reaching for the sky

Because Victoria's alpine plants and animals are already at the very top of our mountain ranges, they can't migrate vertically to a cooler climate (and they can't migrate south without going downslope).

Alpine areas in Victoria are mainly found roughly above 1200m, such as in the Alpine, Mount Buffalo and Baw Baw National Parks. They are generally just above or near the "tree-line" (ie the height at which trees no longer grow), and consist of wildflower-rich grassy plains or mixed shrubby and grassy areas, often with peaty mossbeds at the headwaters of alpine streams. They are surrounded by Snow Gum woodlands, and there is already evidence that the Snow Gums are encroaching on these areas.

## What happens with climate change

Victoria's alpine areas are listed by the International Panel on Climate Change (IPCC) as among the three most climate-vulnerable ecosystem types in Australia (the others are the Great Barrier Reef and the Wet Tropics).

Alpine plants and animals must try to survive:

- A warmer, drier climate and much reduced snow falls.
- Shorter periods of snow, which change seasonal events (flowering times, feeding periods etc)

They must also cope with increased weed invasion and competition from new native plant and animal species migrating up the slopes. There are already many threatened species and plant communities in the high country, and most of them will find life very tough. The remarkable and highly specialised Mountain Pygmy possum, for example, is facing the dual dilemmas of increased predation and reduced food sources.

*(Alpine parks include the Alpine, Mount Buffalo, Baw Baw and Snowy River National Parks.)*

## Heading south

Down on the lowlands, in an ideal world, plants and animals faced with increased temperatures would simply head southwards to a place where soil types were much the same, and the climate suited them.

Things have always been more complex than that in the past, of course. Topography varied, rivers and even oceans intervened, and with whole ecosystems on the move thousands of species had to re-arrange long-standing relationships with their neighbours. Indeed the climate-induced migration of complex ecological communities makes the not inconsiderable journey of Moses and his exiled people look like a holiday.

Unfortunately, this time around, the situation is even more complex. Climate change is moving more rapidly, making evolutionary adaptation difficult, and many of our natural areas are now fragmented, and surrounded by farmland, towns and cities. They are effectively locked in climate jails, forced to tough out climate impacts where they are.

### *All at sea*

Remarkably, some 36 New South Wales fish species, never before seen in Tasmanian waters, have turned up there in recent years. They have been using the southerly flow of the Eastern Australian current to move away from the now warmer waters off the coast of NSW. Black sea urchins are also moving along the NSW coast and should soon reach Victoria.

Victoria's coastal waters and shorelines are likely to experience numerous climate change impacts, such as increased acidity, increased temperature and changes in ocean currents as well as rising sea levels. Changed ocean currents, will determine how food moves around the coast and changes in temperature will also impact on current upwellings that generate marine biodiversity hot spots. Other likely impacts are:

#### **Increased ocean acidity:**

- Species with calcareous (calcium carbonate) shells such as echinoderms, crustaceans and molluscs (especially sea butterflies or pteropods) may not be able to produce viable shells in a more acidic ocean.
- Research has shown that a decrease in ocean pH by just 0.25 units can cause a reduction of 50% in the oxygen-carrying capacity of many species, affecting growth and survival. Larger organisms which have high oxygen demands are likely to be affected, particularly species like fish and squid. Such changes may have important flow-on effects for fisheries.

#### **Increased ocean temperatures:**

- **Kelp forests, which are highly temperature sensitive, will shrink or disappear from Victoria.** They are currently breeding grounds for many Victorian marine species. Other temperature-dependent species will be greatly reduced in extent in Victorian waters
- Tropical coastal species can move south, but temperate species have few or no options as there are no coastal areas south of Tasmania .

#### **Rising sea levels:**

- Fast rising sea levels can cause a population crash in intertidal marine communities. Rocky shore habitat will be particularly impacted as the band of habitat in some places will be small until new rock platforms are established. Estuarine waters will also be affected. (See page XX for recommendations.)

# Managing threats to parks and reserves

The first thing we must do if we are to give our prime natural areas resilience to climate impacts, is to successfully manage existing threats such as weed and pest animal invasions. We must radically increase our management expertise, and our resources, if we are to halt, let alone reverse, the decline in our finest natural areas.

## Pest plant management

*“Weeds are considered second only to land clearing as a major cause of biodiversity loss.”*

*Victoria’s State of the Parks Report.  
Parks Victoria, 2007*

There are a number of short-comings in weed management within the park system. Many of our finest natural ecosystems are deteriorating from weed problems alone – some fast, and some slowly but inexorably. The following recommendations for weed management in our parks and reserves are based on *An Assessment of the Weed Management Program in land managed by Parks Victoria*, a report to the VNPA by Biosis Research, 2008. (The full report is attached as an appendix to this submission.)

**1/ Reliable recurrent funding for weed control is essential. Initiative funding can actually be harmful.** This particularly important recommendation is, in our experience, supported by people involved in weed management throughout the State, from park rangers to contractors to LandCare groups.

*“We consider that an effective weed control program requires a guaranteed funding stream. Therefore, we believe that the reliable recurrent annual appropriation should be the primary source of funds for the weed control program. The increasing use of initiative funding is considered inappropriate for a weed control program and could even lead to an overall deterioration in natural values across parks.”*

Biosis, p. 31

Also: *“PV field staff are more likely to attack a weed infestation if they have the confidence that the funding will be available for follow-up works in ensuing years.”*

Biosis, p. 21

**2/ Funding for weed management should be increased overall.**

*“It is recognized that current funding levels do not allow actions to be taken for all manageable threats and that some invasive species are almost impossible to manage with current resourcing.”*

Biosis, p. 18

*“Resourcing for weed control is currently inadequate, leaving many treatable weed infestations untreated or inadequately treated.”*

Biosis, p.32

Generally, the scale of Parks Victoria's incapacity to manage manageable weed invasions is indicated in the State of the Parks Report 2007, but it requires a careful reading of that report.

**3/ Staffing levels for weed management are low, particularly at prime weed management periods.**

*"[P.V. staff] thought it would be beneficial if there were an increase in the number of staff dedicated to the management of weeds during summer to ensure that significant weeds will be treated during peak weed control periods such as November to April... This is particularly relevant in parks with high summer visitor numbers that also have significant summer-growing weeds but is also relevant in the event of a major bushfire season as occurred in 2006/7."*

Biosis, p.25

**4/ Parks Victoria's Levels of Protection Framework (LoP) intelligently identifies priorities across the State, but does not guarantee success in weed management.**

*"In essence, the LoP process and the park prioritisation process determines where the line will be drawn between weed control programs that will be funded and addressed and those that will not. The location of the line is entirely dependent on the amount of money made available from the Government for the funding of the weed control program."*

Biosis, p. 18.

*Also: "The LoP process is an admission that resourcing for weed control is inadequate and results in many treatable weed infestations being untreated due simply to the lack of resources."*

Biosis, p. 19

It is clear that PV's LoP process will only produce the results it is capable of producing if funding for weed management is radically increased.

**5/ Monitoring of weed distribution in parks is far from comprehensive.**

*"We do not have baseline knowledge of the magnitude and distribution of weeds across the parks system. Some individual parks have undertaken weed mapping and have a reasonable understanding of weed distribution, but this is the exception, not the rule."*

Biosis, p. 31

This finding is supported by evidence (or rather the lack of it) in parks Victoria's SoP report. Essentially, all figures supplied for weed management in the SoP report are based on what *"Parks Victoria staff reported..."* (PV, p. 125), rather than consistent and comprehensive monitoring.

Parks Victoria, at the present moment, has been unable to conduct systematic mapping of weed distribution across the land it manages, and most particularly not even for parks under the National Parks Act. This is essentially caused by a lack of funds, but greatly compromises the cost-effectiveness of programs. (A doctor who didn't track distribution of a cancer in a patient before treating it, for example, wouldn't be able to manage the problem effectively, if at all.)

**6/ There is negligible monitoring of the effect of weed control programs on natural values.**

*“The impact of weed control on natural values is not measured...” and “It is not sufficient to simply record the species, number and area of weeds treated and then extrapolate that to a statement on the impact on natural values. Monitoring and then reporting on natural values should be an integral and essential component of the weed control program.”*

Biosis, p.30-31

*Also “The current level of botanical knowledge within PV field staff indicates that the measurement of biodiversity improvement would be difficult. To make this possible, there would have to be skilling of field staff or the introduction of botanical experts in a park or a region...”*

Biosis, p. 27

While some PV field staff have a very good knowledge of the natural areas they are managing, it is also clear that many lack this knowledge. This is a particularly worrying finding of the report. The reasons for this deficiency should be explored as part of the White paper process. That is, to what extent this deficiency is budget-based, or caused by a lack of on-ground experience when rangers contract out management actions, or a reflection of Parks Victoria’s diverse responsibilities in managing a great variety of land & waters, many of which are of low biodiversity conservation value but may nevertheless be management intensive. This is a situation that must be remedied, if parks are to get the management they need.

The SoP report heralds the special case of an adaptive experimental management (AEM) program for English Broom in the Alpine National Park, which is looking at the effects of the program on native species:

*“The AEM project [for Broom in the alps] is one of the first in Australia to quantify the effectiveness of control and the response of native species.”*

PV, p. 126

The understanding that national standards in this respect are extraordinarily low does not justify any lack of action in Victoria. Importantly, the AEM Broom program resulted from post-2003 fire initiative funding which is unlikely to be followed up adequately, possibly rendering any “adaptive management” futile. (See point 1/ above.)

**7/ Research on biological controls needs proactive support.**

*“Currently biological control research is largely directed towards weeds that impact on agricultural systems. PV is generally happy to accommodate researchers wishing to trial biological control vectors in parks but currently does not directly sponsor or promote biological control research... A more proactive approach by PV to research into the biological control of environmental weeds in parks could have major beneficial and long-lasting impacts on natural values.”*

Biosis, pp. 29,30

This situation must be addressed, as many highly invasive environmental weeds cannot be dealt with effectively by other means. While biological control of pests is unlikely to lead to eradication, it can tend to make them “behave” in the landscape. A commitment to

this sort of research is almost certainly highly effective, and very cost-effective in the long-term.

**Recommendation:**

The Government should commit to greatly increase levels of reliable, recurrent funding for weed control in parks and reserves, such that all manageable invasive weeds are acted upon.

**Recommendation:**

All weed invasions in parks should be monitored, including the impacts of control actions on the invaded ecosystems.

**Recommendation:**

A strategic program to develop biological controls for weeds should be given urgent attention.

## Feral animal control

Many feral animals are rampant across much of Victoria, and the damage they do is often considerable.

**Feral horse** numbers, which fell after the 2003 fire, are again out of control in the alps. They are having a considerable effect on peat beds and wetland areas around the Cobberas and Limestone Creek areas, near the NSW border. Current management efforts are concentrated on the small (but more visible) population on the Bogong High Plains, leaving the bulk of the damage unattended. The alps are internationally recognised as highly vulnerable to climate impacts, and need all the help they can get.

**Sambar Deer**, possibly in the high tens of thousands, are on the march across eastern Victoria – throughout the Central Highlands, the alps and into East Gippsland. Current management arrangements Parks Victoria has with deer hunting associations are not stemming the tide. Sambar Deer have recently been listed as a Potentially Threatening Process under Victoria's Flora and Fauna Guarantee Act, yet they are also a protected game species under the Wildlife Act, which is absurd status to give eastern Victoria's most rapidly spreading pest animal. Sambar particularly damage moist rainforest pockets, which are also highly vulnerable to climate impacts.

Other feral animals, such as **wild pigs, dogs, goats and cats** as well as **invertebrates**, also need committed action across the State, particularly in relation to new invasions under climate change.

**Recommendation:**

The Government should commit to a program to significantly reduce feral animal invasions in parks to levels of minimal impact.

## **Federal control of pest species**

There is also a need to greatly increase vigilance over the possible importation of feral plant and animal species to Australia through stronger Federal controls. A proposal that has great merit is for Australian customs to operate from a list of *permitted* imports, rather than the insecure process of operating from a necessarily incomplete list of *prohibited* imports. This is certainly the most effective, and most cost-effective, method of controlling pest species.

**Recommendation:**

Control of pest plant and animal imports be rigorously controlled through the establishment of allowable imports, rather than restricted imports.

## **Pathogens**

Management of pathogens such as Phytophthora and Myrtle Wilt needs increased resources, and monitoring of these and other pathogen introductions under climate change is imperative.

## **Cross-tenure pest plant and animal management**

It is important that management programs for pest plant, animal and pathogen control should be planned and conducted co-operatively across land tenures. A good example of this is the trial weed management program recently conducted by DSE and Parks Victoria in the Otways, and the post-fire alpine parks Broom control program conducted between Victorian and NSW park management agencies. These programs are few and far between however. Most weed programs (for example Sallow Willow control in the Alpine National Park) suffer from a lack of cross-tenure planning.

Importantly, such programs should be co-operative, rather than involving one agency operating across tenure boundaries.

**Recommendation:**

Pest plant animal and pathogen management should be planned strategically across land tenures, but undertaken by the appropriate agency.

## Fire management

The management of fire in the landscape is particularly problematic. Essentially, we are fooling ourselves if we believe that fire management is currently based on sound ecological grounds. Fire regimes for fuel reduction, and for ecological burns, are based on minimum and maximum tolerances for vascular plant communities. Unfortunately, these are not good indicators for the tolerance of vertebrates, many of which need the hollows in old trees, for example, which don't appear in fire intolerant trees (e.g. Mountain and Alpine Ash, Snow Gums etc.) for many years after a fire. Burn regimes based on vascular plant tolerances are also very poor indicators for the survival of invertebrates and fungi.

We must urgently increase our understanding of the ecological impacts of different fire regimes, and different fire intensities, for the full range of ecological communities. Otherwise we will be relying on the scarce research and modeling currently available, such as cited (not very appropriately) in the Green Paper.

The Green Paper suggests 2-5% of 'the landscape' should be burnt strategically or 4-10% if randomly applied. These same levels were proposed by DSE to the recent Parliamentary Committee. These levels of burning appear to be based on flawed information provided to Parliament and in the Green Paper process in the 'using and managing fire for biodiversity and asset protection' reference paper which quotes scientific papers on computer simulations of fire behaviour in Tasmania and America. However apart from the quite different fire environments in these regions (involving button grass plains and pine forests) the scientific papers appear to be mis-quoted. In fact the American research suggested a far lower level of burning; 1-2% year of strategic burning or 2-4% of random burning while the Tasmanian research involved burning of 3% of only the button grass plains which occupy 23% of the landscape - leaving the remaining 77% unburnt - i.e. burning of only 0.9% of all vegetation.

The current 'target' of 130,000ha in Victoria is about 2% of the public land once some areas that are unavailable for burning (e.g. wet forest, rainforest, native pine, logging regrowth) are subtracted. We are concerned that any increase (or indeed the present level) must be based on what is ecologically sustainable and are extremely worried about the suggested level of 380,000 ha/year from the Parliamentary committee or 5%/yr of public land.

Although in south-west Western Australia about 6% is burnt annually (outside of silvicultural burns), this region has a largely flat topography with relatively uniform mainly dry forests. In addition, the ecological effects of this level of burning in South-western WA is currently the subject of a research project by the Bushfire Cooperative Research Centre.

At present, fire regimes for ecological burns in Victoria, are based mainly on minimum and maximum tolerances for vascular plant communities. Unfortunately, these are not good indicators for the tolerance of vertebrates some of which need factors such as a deep litter layer (for instance Mallee Fowl) or hollows in old trees which can be lost in prescribed burns, particularly if these are frequent. Burn regimes based on vascular plant tolerances are also very poor indicators for the survival of invertebrates and fungi which

Any program of prescribed burning must also take into account the degree and pattern of wildfire. We are concerned that at present prescribed burning ‘targets’ do not take this into account. Taking the Grampians as an example, over 56% of the park is now less than 6 years old and is highly fragmented by recent fire history and yet significant prescribed burns have been undertaken without a clear understanding on what effect this in having on the fauna

As a reaction to the large wildfires since 2002/3 prescribed burning has been stepped up in some regions. When wildfires are added to prescribed burns, about half of all public land that is suitable for prescribed fire<sup>1</sup> has already been burnt in the last 5<sup>1/2</sup> years or about 10% per year. This does not take into account the additional areas burnt for timber regeneration. Rather than an increase, there is instead a need to wind back burning in many regions until fire regrowth matures sufficiently to support a wider range of fauna species.

We must urgently increase our understanding of the ecological impacts of different fire regimes, and different fire intensities, for the full range of ecological communities. Otherwise we will be relying on the scarce research and modeling currently available, such as those cited (not very appropriately) in the reference paper for the Green Paper.

It is imperative that the ‘vital fire attributes’ for fauna be determined ( an important project initiated but as yet far from complete) and together with our growing knowledge of the flora, the fire requirements and limits for all our ecosystems determined with the fire regimes, outside of highly strategic areas, based on this knowledge. From this, the true ‘targets’ for each region and individual areas can be determined after also adding the areas of wildfire.

To confirm that our understanding of the fire needs and responses of species and ecosystems is correct, adequate representative before and after fire monitoring is essential.

## **Fire Breaks**

The construction of hundreds of kilometers of fire breaks through wet forests, National Parks and rare flora and fauna habitat is a knee jerk reaction to recent major fires. Unfortunately no sound scientific basis for their effectiveness has been presented to the general public with their usefulness in wetter forest debateable. In addition there has been no proper environmental assessment of their impact on rare species such as Leadbeaters and rare plants with no site specific surveys to determine exactly where populations are located currently.

Compounding their impact, there appears to be less than adequate management of their construction with potential habitat for rare species often not entered into the ‘construction and environment management plans’ and prescriptions for rare species vague and effectively unenforceable and examples where the fire break was constructed through mature forest rather than through logging regrowth.

The continuation of construction of fire breaks in the wet forest of the central highlands should be discontinued and should be not be expanded into other regions of Victoria.

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<sup>1</sup> Excluding wet forest, rainforest, native pine and logging regrowth. Note that because of logging regrowth, this may well be more than the rough estimate of 20% using ‘zone 5’ burning exclusion zone.

**Recommendation:**

Fire management in Victoria should be thoroughly re-assessed through a process that includes solid input from a full range of ecologists and biologists, including fire ecologists, and their recommendations should be peer reviewed to ensure fire regimes give protection to the *full range* of Victoria's biodiversity.

**Recommendation:**

Fuel reduction burns, and ecological burns, should be subject to monitoring sufficient to establish short and long-term effects on biodiversity conservation.

**Recommendation:**

Fire management, including fire regimes, should be re-assessed regularly to allow enlightened adaptive management.

## Visitor impacts

There is an ongoing need to plan appropriately to minimise visitor impacts in parks. Importantly, visitors can greatly exacerbate weed and pathogen invasions. Good management allows great visitor experiences and excellent ecotourism opportunities in parks while maintaining ecological integrity, but it does require well-informed, and transparent, planning processes.

## Monitoring

Victoria is well behind anything resembling adequate practice in monitoring ecological systems in our parks and reserves. According to Park Victoria's 2007 SoP report, we have an inadequate understanding of:

- appropriate fire and water regimes
- viability of threatened species
- weed and pest management
- restoration of degraded landscapes
- visitor impacts
- climate change impacts
- condition assessments.

The Victorian Catchment Management Council's *Catchment Condition Report 2007* says that we do not monitor natural systems in our national parks and reserves sufficiently to accurately report on their condition. Importantly:

*"Few comprehensive replicated assessments to demonstrate trends in condition have been completed." (VCMC, p.70) And "Whilst a snapshot of condition of selected parks can be produced... it is not possible to provide an overall consistent statewide assessment of the condition of land and water resources in the parks." (VCMC, p.70)*

Similarly, the Biosis study points out that:

*“It is not possible to report on the state of parks and improvements to natural values if there is no baseline data on the actual weed problem, how that impacts on natural values and how the distribution and impacts have changes as a result of management actions.”* (Biosis, p. 26) And: *“...there would have to be a skilling of field staff or the introduction of botanical/ecological experts in a park or a region to enable an effective biodiversity monitoring program to be developed.”* (Biosis, p. 27)

And the 2007 State of the Parks report says:

*“Prior to 2000, a large proportion of Parks Victoria’s evaluation of management was based on staff observations or anecdotal information... Protocols were trialed in a number of parks from 2000 and formally release in 2005... Twenty per cent of monitoring activity was based on formal monitoring protocols, largely due to the recent introduction and limited number of protocols available.”* (SoP, pp. 71/2)

*“The condition of [streams] in parks was mostly determined by extrapolating information collected at monitoring sites outside parks”* (SoP, p. 104)

*“Measuring changes in condition across Victoria’s park network is a significant challenge as there is currently no single definition of ecological condition within or even across habitat types.”* (SoP, p. 73)

And: *“A need exists to improve and apply monitoring systems to more readily determine trends. Some of these tools and protocols were recently introduced [but] it will take some time and improved staff skills and training to benefit from these new tools.”* (SoP, p. 84)

The 2007 State of the Parks Report dispensed with the reports on individual National Parks and State Parks that were a significant component of the first (2000) SoP report. This omission was apparently largely due to the paucity of effective monitoring programs which made it difficult, or impossible, to reliably identify changes in the condition of individual parks. That situation must change.

We need to set up effective and consistent monitoring of ecological systems throughout our parks, and throughout the rest of the natural landscape. This is not just a fundamental tool for current management, but will be an invaluable tool for future managers, who may well be dealing with considerably greater problems as climate change impacts increase.

**Recommendation:**

Systematic and effective monitoring of ecological systems, including the monitoring of a range of species truly indicative of the full range of biodiversity, and including the monitoring of fire regimes, should be set up across the State.

**Recommendation:**

The park management agency should report to Parliament every four years on the condition of national parks, and that report should be based on reliable, consistent monitoring of ecological integrity.

## **Increasing park management capacity and effectiveness**

### **Institutional arrangements**

Perhaps the most important recommendation is in regard to the appropriate institutional arrangements for management of biodiversity in Victoria.

**The most important thing in regard to park management is to have a management structure with an expert and well-resourced ecological management stream, with integrated, line management from top to bottom within the park management agency. Line management of biodiversity in our national parks and reserves is essential.**

Real expertise in management of ecological systems should exist within head office, at regional office level, and at a local (ie park) level.

Each major national park, or each group of lesser reserves, should have fire ecologists, and other expertise appropriate to the systems being managed. This would include soil scientists, fire ecologists, freshwater ecologists, rainforest ecologists, marine ecologists etc., as well as pest plant and pest animal managers. Importantly, the presence of solid teams of ecologists on the ground doesn't just directly inform management, it also allows the establishment of natural cultural links between park management and scientists within other institutions (universities, CSIRO etc.). This can effectively act as a multiplier of useful management information. Such a team will also greatly help the community education function of park and regional offices, with a broad range of staff clearly qualified to justify management prescriptions.

The local management team should work with, and be accountable to, a team comprising a similar range of ecologists at the regional office level, co-ordinating ecological management, research and monitoring.

A similar team overseeing the whole operation, and responsible for State of the Parks Reporting, should be housed in Head Office. This should be a considerably larger team than currently exists in PV's head office, and with a greater range of expertise.

Given that our parks and reserves also have other functions, there must be good integration horizontally with other management functions, such as visitor services, visitor

safety, community relations etc. There should also be good integration with DSE, CMAs and managers of private land, where appropriate. But the situation we have at present, whereby a ranger entrusted with management of biological systems in a park might report directly to a person whose prime role and experience is visitor management, is seriously flawed.

There must also be a clear ecological management budget line, allowing reliable, and transparent, recurrent budget planning to guarantee good biodiversity outcomes.

The current arrangement, where biodiversity management and expertise is shared (though not well communicated) between DSE, Parks Victoria and the CMAs is clumsy, and the incompatibility of regional boundaries is scarcely functional. But any restructure should take into account the generally damaging loss of expertise that has happened in the past during restructures. Much better than a radical re-arrangement is simply to build capacity and expertise, particularly within Parks Victoria.

**Recommendation:**

The park management agency should have a management structure with an expert and well-resourced ecological management stream, with integrated line management from top to bottom within the agency.

## Resourcing management

It is clear that resources for managing our national parks and reserves must be radically increased to reverse current degradation, and build the capacity of ecosystems to be resilience to climate impacts. Our current estimate is that that would involve an investment in the vicinity of \$90 million a year, over the next three years, though it might be expedient to build those management resources over a longer period. This would allow effective management of invasives, better management planning, effective monitoring and reporting, Most importantly, it would buld a large, effective and skilled biodiversity management team within our park management agency.

**Recommendation:**

There should be an immediate, significant and growing increase in recurrent park management funds, sufficient to establish secure management of the natural values of our national parks and reserves in the face of climate impacts.

## Building Expertise

Resourcing alone won't solve the problem. A serious lack of expertise, particularly in relation to understanding the vast range of fungi and invertebrates in our natural systems,

means we don't actually know whether our management actions are protecting the bulk of biodiversity. We are also seriously lacking in fire ecologists sufficiently qualified to recommend fire regimes for ecological integrity throughout Victoria's ecosystems, and in many other areas of the natural sciences.

Currently, one of the few people teaching entomology, particularly the taxonomy of invertebrates, in Victoria is retiring. There is a similar paucity of opportunities for training people as mycologists.

Probably the best way to deal with that situation is to set up an independent panel of experts, able to advise on how the community and our management agencies would build expertise in fire ecology and the other areas where expertise is sorely lacking.

The sorts of things that could be looked at by such a panel, or panels, could be:

- The development of a centre of fire ecology at a suitable institution or institutions, where the necessary cross-disciplinary studies are available, possibly under a chair of fire ecology.
- A program of dedicated research grants, particularly for fire ecology but also for the full range of ecological studies (mycology, soli science etc.).
- The setting up of suitable employment opportunities for fire ecologists and other ecologists, within biodiversity management agencies.
- The commissioning of independent, peer-reviewed research papers on areas such as fire ecology.
- Development of programs to build knowledge in the general community. One such possibility would be to resource Organ Pipes National Park, the site of Victoria's longest running volunteer ecological rehabilitation program (and currently with an unoccupied visitor centre), as a training ground for LandCare groups and other volunteer groups.

**Recommendation:**

An independent panel of experts should advise the Government on the best ways for the community and management agencies to build expertise in the various aspects of ecological management, including fire ecology.

## **The responsibilities of Government in public land management?**

- **Management:**  
The Government is clearly responsible for the management of public land, for the protection of biodiversity, and for monitoring species and the health of ecological systems. It must ensure that protection of our national parks and reserves is appropriately resourced, and there must be a process for auditing the effectiveness of park management.

- **Education:**  
The Government has a clear role in educating the community about the importance of our natural heritage, and the steps needed to ensure its protection.

**Recommendation:**

The Government should embark on a program to educate and inform the broad community on issues supporting biodiversity protection.

## **The role of the broader community in public land**

### **Volunteers:**

There are currently more than 300 “Friends of” groups formally part of the Friends network, and many other volunteer groups working in national parks across Victoria. LandCare, Land for Wildlife and a host of other organisations have grown rapidly in recent years. In addition, volunteer programs by many other groups (including NGOs such as Bushwalking Victoria and the VNPA) work on rehabilitation programs around the State.

Other avenues for volunteer participation, such as control of feral animals by hunting organisations, is potentially useful, but also problematic as these organisations have a vested interest in maintaining abundant prey. There are also clear issues in regard to public safety.

There is also considerable potential for the involvement of volunteers in monitoring programs. A range of programs like Fungi Map, ReefWatch, NatureWatch etc have been set up, and should be given every encouragement and support.

This vast and growing community interest in active conservation should prompt a corresponding scale of action from Government. The Green Paper’s assumption that increased Government action is unlikely, but that the community can do far more, is lacking in responsibility, and \ not based on solid strategic grounds, and if implemented would fail to produce biodiversity protection in Victoria. Community participation is a very good thing, but it cannot (and should not be expected to) be the mainstay of biodiversity management.

### **Charitable trusts**

Charitable trusts are similarly already involved and heavily committed, particularly in regard to possibilities for supporting research, supporting education programs, and supporting the development of volunteer programs, including those engaging disadvantaged sections of the community. These areas, however, are also clearly the prime responsibility of Government.

### **The Indigenous community**

There are a number of ways in which the Indigenous community can contribute to park planning and management. There is a clear role for communities with recognized Native Title rights. But there are also completely appropriate roles for other traditional owner groups, and also for other people within Victoria’s Indigenous community. In particular,

there is a clear need to increase employment and training opportunities for people within these communities.

**Recommendation:**

That Parks Victoria's program for consulting with Indigenous communities, and employing Indigenous people, be expanded across the park system, and across Victorian land management programs generally.

**The corporate sector**

There is clear potential for the involvement of the corporate sector, in similar roles to those of charitable trusts. There are also clear instances when commercial licences are effective ways to operate some services within parks and reserves. There are, however, also real problems with commercial arrangements in national parks and reserves. In particular, claims that park management can be significantly funded through fees or royalties for commercial operations are seldom justified, and always fraught. It is generally difficult enough for a commercial operator to remain viable within a national park, given the necessary constraints on such an operation, let alone produce funds sufficient to contribute to the management of the area.

There is also a very real danger that commercial operators, once established in a park but facing financial difficulties, will make demands to increase the size or nature of their operation, leading to damaging and difficult to manage impacts.

As long ago as 21 May 1975, an Age editorial said:

*"The comment of the Conservation Minister, Bill Borthwick, that the originally planned development [at Mount Buffalo National Park] was no longer in keeping with community wishes is a fair judgement....buying back a long lease which should never have been granted is just another sharp reminder that conservation policies must be far sighted and well founded. A trickle of ill-judged compromise soon becomes a lake of regret."*

**Commercial leases at Mount Buffalo National Park remain highly problematic today.**

**Recommendation:**

Generally, commercial activities requiring infrastructure or other impacts should be situated outside national parks and other nature conservation reserves

**Recommendation:**

Where licence and/or leasehold agreements must of necessity apply within National Parks or similar conservation reserves, there should be clear requirements in the agreements to completely satisfy biodiversity, and carbon neutral, outcomes.

# National Park legislation

## Is Victoria's National Park legislation working?

### The problem

Victoria's national park legislation, once groundbreaking, no longer sets the bar for nature conservation in Victoria. Though the protection of nature is the clear purpose of Victoria's National Parks Act (1975), this is not articulated well in the Act, and accountability, once clear, has been confused by a series of amendments over the years.

There is also confusion stemming from the fact that Victoria's National Parks Act (1975) is unclear on levels of protection for natural systems under the Act. Now over 30 years old, it was framed long before the Flora and Fauna Guarantee Act, the EPBC Act and the acts empowering Parks Victoria and the CMAs. It was also enacted long before Victoria's Native Vegetation Framework came into being.

While the N.P. Act has not been legally compromised by these developments, on-ground park management under the Act has become confused by them. Essentially, the 1975 Act makes no attempt to define ecological condition and sets no targets for management. Given the increasing calls for evidence-based management actions, managers tend to refer to the FFG Act or the Federal EPBC Act, or to the Native Vegetation Framework, all of which have much clearer targets and management prescriptions.

The problem here is that these are all minimal prescriptions, generally designed to protect threatened or species or sometimes degraded communities right across the landscape, and do not usefully guide management within a national park, where the very highest protection levels should apply.

The Act should also clearly state the crucial role parks play within statewide management of biodiversity, particularly in the face of climate change.

### What should happen?

There are four main issues in regard to park legislation that must be resolved if we are to have effective management of Victoria's most valuable natural areas.

#### **ISSUE 1: Clear objectives for protection for ecological systems under the National Parks Act**

The N.P. Act should provide a clear definition of what it is protecting, and call for specific management targets and performance objectives to ensure that protection actually happens.

In this regard, a comparison between Victoria's current (1975) Act and the Canada National Parks Act (2000) is useful.

Victoria's legislation sets the main "object" of the Act as the "*preservation and protection of the natural environment*". But it offers no definition or clarification of "*the natural environment*", which leaves the whole thing very much open to interpretation.

The Canadian Act is far stronger here, establishing that:

*"Maintenance or restoration of ecological integrity, through the protection of natural resources and natural processes, shall be the first priority of the Minister when considering all aspects of the management of parks"*.

The Canadian Act strengthens this in its definition of "ecological Integrity":

*"'ecological integrity' means, with respect to a park, a condition that is determined to be characteristic of its natural region and likely to persist, including abiotic components and the composition and abundance of native species and biological communities, rates of change and supporting processes."*

Importantly, this clearly protects all plant and animal communities within the park (not just threatened species or communities) as well as "natural processes", which would include natural fire regimes etc. The Victorian Act would be greatly strengthened by such an improvement, and further improved, no doubt, by requiring management to maximise resilience to climate impacts.

## **ISSUE 2: The National Parks Act should not be compromised unnecessarily by other Acts**

Over the years since 1975, amendments to the Parks Act link it to a number of other Acts, and other Acts impinge on the parks Act in various ways, sometimes confusing management programs. Some references to the Parks Act by other Acts are completely appropriate, such as the clauses in the Coastal Management Act (1995) that defer to national park management.

However other situations need urgent review. For example, Sambar Deer have rapidly advanced across eastern Victoria, are probably now in the high tens of thousands, and have recently been listed as a Potentially Threatening Process under the Flora and Fauna Guarantee Act. Yet they have long been listed as a protected game species under the Wildlife Act, so national park managers, though faced with deteriorating rainforests etc in parks across the State, have had to apply for a licence to deal with them. This situation has led to chronic inaction, and allowed Sambar to multiply and spread to an extent where effective management is now unnecessarily difficult and expensive.

## **ISSUE 3: There must be clear accountability under the Act**

Victoria's National Parks Act and the associated Parks Victoria Act divide accountability between DSE and Parks Victoria in ways which are clumsy, hard to comprehend and unworkable in practice.

Under the N.P. Act, the "Director of National Parks" is the CEO of Parks Victoria who, under the P.V. Act is appointed by the Parks Victoria Board and is obliged to report to the P.V. Board. Under that same Act the Director of N.P. is also required to "*to advise*

*the Minister and the Secretary about the operational elements of management of land to which this Act applies”.*

But under the N.P. Act the Secretary of DSE has prime responsibility for parks, and is required to “*ensure that each national park and State park is controlled and managed in accordance with the objects of this Act*”.

Again, according to the N.P. Act, the Secretary of DSE may “*enter into a management agreement with Parks Victoria for the management of the whole or any part of a national park or State park*” etc. In practice, this means that DSE controls Parks Victoria’s overall budget, and signs off management plans, but has little or no involvement in the actual development of park management plans, park management decisions or park condition monitoring.

After some eight years of these divided responsibilities, we have ended up with a situation where prime policy, budget and management responsibility for our finest natural areas *officially* rests with DSE, an agency which now has little current experience in the management of these areas (other than through cross-tenure arrangements for fire control operations). So by default the management of these important areas rests with Parks Victoria, effectively a contracted management agency which now sets its own policy and management objectives.

The Act, and management arrangements, must change so that policy development and management accountability are clear, rigorous and effective in the long-term. Management processes from policy development to implementation should be seamless.

#### **ISSUE 4: Effective management targets and independent management audits are necessary**

Victoria’s Act, while it requires managers to exterminate or control exotic flora and fauna etc., simply calls for preparation of “*a plan of management in respect of each national park and State park*”. There is no requirement for the setting of specific targets or performance objectives. This is unfortunate, and has allowed the current situation to develop whereby there is no obligation to actually manage according to plans, and no obligation to report on the implementation of plans.

The Canadian Act, on the other hand, calls for objectives, indicators, and performance evaluation. It also calls for a biennial “state of the parks” report.

The Canadian Act says:

*“The Minister shall, within five years after a park is established, prepare a management plan for the park containing a long-term ecological vision for the park, a set of ecological integrity objectives and indicators and provisions for resource protection and restoration, zoning, visitor use, public awareness and performance evaluation, which shall be tabled in each House of Parliament.”*

And further:

*“At least every two years, the Minister shall cause to be tabled in each House of Parliament a report on the state of the parks and on progress made towards the establishment of new parks.”*

Despite the fact that there is no legislative requirement in Victoria to report on park condition (only to “*advise about the operational elements*”) Parks Victoria has, to its credit, adopted a State of the Parks reporting process. However there were no ecological condition indicators in the first (2000) report, and in the second (2007) report condition indicators were mostly vague or, where specific, were not supported by rigorous data. Also, while the 2000 report gave a degree of information on each park, there was no corresponding information on individual parks in the 2007 report.

There is currently no rigorous process for reporting on the effectiveness of park management in Victoria. This must be remedied, and to be effective that remedy must be called for in the N.P. Act.

There must be a clear requirement for a report on the state of the parks, including rigorous and measurable assessments of the condition of ecological integrity, for each national and State park and wilderness park, for marine national parks, and for the park system overall. This reporting should take place every five years. (The Canadian Act’s requirement for biennial reporting is probably unreasonable, leading to imprecise or otherwise inadequate reporting.) There must also be a requirement in the Act for a regular independent audit of the management of ecological systems protected under the National Parks Act.

#### **Indigenous co-management arrangements**

There are a number of other reforms that should be made to the National Parks Act. Most importantly, there has been a long-standing need to make appropriate allowances in the Act for the involvement of Indigenous communities through a range of co-management agreements.

#### **Recommendation:**

The National Parks Act must set clear objectives to secure the protection of biodiversity and ecological integrity in parks, and for bolstering the important role of parks in the broader agenda of biodiversity conservation across the State.

#### **Recommendation:**

The National Parks Act’s objectives should not be compromised by other Acts.

#### **Recommendation:**

Accountability under the National Parks Act must be very clear.

#### **Recommendation :**

The National Parks Act must require effective management targets, require regular reporting to Parliament on performance against those targets, and identify an independent auditing process to assess the achievement of management objectives.

#### **Recommendation:**

The National Parks Act should allow for a range of Indigenous co-management arrangements.

## Other Acts

There is room to improve the strength of other Acts. For example, the FFG Act can list a “potentially threatening process”, but can’t call for protection of a “supporting process”.

The VNPA rejects the suggestion in the Green Paper that the protection of threatened species is problematic. A well-educated, well-resourced community like ours can act to protect threatened species, and should. Most particularly, threatened species are generally an indicator of threatened ecosystems, or threatened processes, so effective management of a threatened species generally increases support for a range of species in natural systems.

### **Recommendation:**

That the FFG Act be strengthened to allow the listing of “supporting processes” for biodiversity protection.

## Expanding the park system, and establishing connectivity

*The National Reserve System forms an excellent base, but many ecosystems remain unprotected and should be targeted for inclusion. The National Reserve System also needs to be complemented with other habitat protection schemes. Some species will need protected 'islands' of habitat, while others will need connected chains of reserves. In addition, larger areas and larger numbers of individual plants or animals will be needed to provide the same viability for species as could be expected without climate change.)*

*Implications of Climate Change for Australia's National Reserve System:  
A Preliminary Assessment - Overview (March 2008).  
Department of the Environment, Water, Heritage and the Arts. p.16*

### **The importance of strategic connectivity.**

Probably the most worrying (and also the most intriguing) issue with biodiversity and climate change is that of species and community migration.

Looking at the situation fairly simplistically, species and communities can be expected to migrate south or vertically, some more than others, to compensate for changing temperatures.

*“Global meta analyses documented significant range shifts averaging 6.1 km per decade towards the poles (or metres per decade upwards), and significant displacement of spring events by 2.3 days per decade.”*

*Globally Coherent Fingerprint of Climate Impacts Across Natural Systems,*  
by C. Parmesan and G. Yohe. *Nature*, Vol 421, 2 Jan. 2003

These predictions are already out of date, and will have been surpassed.

For alpine and sub-alpine systems and species in Victoria, this is almost catastrophic, and cannot be resolved by connectivity. Resilience can only be assisted by carefully doing as much as we can to mitigate other threats, thereby reducing overall pressures on ecological systems.

Throughout most of Victoria, however, the situation is far more complex. As species are faced with increased temperatures, decreased rain and ground water, increased fire frequency and severity and changed season times etc, they will tend to move towards their preferred bioclimatic envelope – a place which matches the conditions that suit them. For some that might be the other side of the hill, or the edge of a stream, for others it might mean a very considerable migration to find appropriate soil types etc. The process will favour some species and communities and disadvantage others.

It is not the intention of this submission to come up with detailed recommendations here, other than to say we should do all we can to avoid any further clearing of native vegetation (including adopting range of schemes to support private landholders in this regard). In addition, a comprehensive science-based strategy for connectivity across the landscape (including across State borders), building on the existing impressive range of largely community-based initiatives, is essential for the survival of biodiversity in Victoria.

The need for connectivity has been known for years, and we should have (and could have) been acting much earlier:

*“For Victoria, climate change will have significant impacts on protected areas and their management... it will be vital to understand clearly the dynamics of patches of remnant vegetation, and the need for appropriate linkages between protected areas.”*

*Victoria’s Flora and Fauna: Can it Survive the Greenhouse Effect?*  
VNPA **1991** Conference Proceedings. *Global Warming and Nature Conservation*,  
Peter Bridgewater, Director, Australian National Parks and Wildlife Service.

Since then there have been many projects, mainly community-based efforts, across parts of Victoria.

The recently announced VEAC “Remnant Native Vegetation Investigation” will, importantly, put resources and intelligence into the identification of useful climate refugia in small reserves outside the main parks system, their significance to connectivity, and future management needs and possibilities.

Further information on the need for strategic connectivity, and ways in which that might be achieved, can be found in the submission of the Victoria Naturally alliance, which is hosted by the VNPA, and of which VNPA is also a member.

**Recommendation:**

That the existing park system be expanded, where possible, to give maximum representation to all EVCs.

**Recommendation:**

That the development of strategic connectivity of natural landscapes become an urgent priority.

## **Planning regulations, licence agreements etc.**

Planning laws, regulations and licence agreements can be improved considerably, particularly in relation to lands and waters adjacent to or connecting parks, or otherwise affecting the integrity of the reserve system. In particular:

- There is a need to make appropriate planning arrangements for land directly affected by sea level rises, but also for land adjacent to natural areas affected by sea rises, which might act as refugia for migrating systems such as saltmarshes.
- There is a crying need to need to discourage, or prohibit, new developments in fire-prone areas, to allow more strategic management of fire, and less emphasis on the very costly management of fire around inappropriately sited houses or other developments.
- The current discredited process whereby some 500+ kilometres of firebreaks have been carved out of Victoria's forests needs urgent revision. The apparent disregard of the necessary offsets, the scant observance of EPBC requirements, and almost complete absence of public consultation, have not produced very good results. Fire is clearly an issue under climate change, but that is surely reason to put its management through a transparent and well-informed planning process. The current operation, if performed by a private land-holder, could not have gone ahead.
- The management of rivers and streams adjacent to parks clearly impacts on the quality of streams within parks and reserves. The very old arrangements for several thousand licences for use of riparian land (most of which are due to be renewed in 2009) must be reviewed. The task of reviewing conditions for each licence is huge, and probably needs something like a *Code of Practice for Riparian Land* to ensure consistency. Such a code could also govern current licence-holders' use of riparian land.

**Recommendation:**

Planning regulations should be amended to allow for appropriate biodiversity and fire protection outcomes or, at a minimum, such that they do not impede biodiversity or fire protection outcomes.

**Recommendation:**

Licence agreements on public land, including for the use of riparian land, should be reviewed according to a Code of Practice encouraging biodiversity outcomes.

## **Economic benefits flowing from effective biodiversity management**

There are two main areas of economic benefit from effective management of national parks and biodiversity generally.

### **Healthy ecosystems**

The economy depends in all sorts of ways on healthy ecosystems: tourism, water quality and abundance and agriculture all benefit in different ways. In addition, the protection of a gene pool of over 100,000 species will be of inestimable benefit for current and future generations.

### **Community well-being**

In addition, community physical and mental health all benefit from contact with healthy natural areas.

### **A training hub**

Given that climate change is impacting on ecosystems around the world, there will soon be a great deal of interest in more effective management of these systems. If Victoria set up a well-resourced management agency, demonstrably capable of truly delivering biodiversity outcomes, and training institutions capable of delivering the expertise and research outcomes necessary to support that management, it would attract interest far and wide.

**There is very real potential for Victoria to market itself internationally as a training ground for national park, biodiversity, fire ecology etc. management.**

## References for Terrestrial National Parks and Reserves in a landscape context:

### Main references include:

Dunlop, M. & Brown, P.R. 2008. *Implications of Climate Change for Australia's National Reserve System: A Preliminary Assessment. Report to the Department of Climate Change, February 2008.* Department of Climate Change, Canberra, Australia

*A Conservation overview of Australian Non-marine Lichens, Bryophytes, Algae and Fungi.* Wildlife Australia, May 1997, pp. 50. 51 &54

*Globally Coherent Fingerprint of Climate Impacts Across Natural Systems,* by C. Parmesan and G. Yohe. *Nature*, Vol 421, 2 Jan. 2003

*Victoria's Flora and Fauna: Can it Survive the Greenhouse Effect?*  
VNPA 1991\_Conference Proceedings. *Global Warming and Nature Conservation,*

*An Assessment of the Weed Management Program in land managed by Parks Victoria, a report to the VNPA by Biosis Research, 2008.*

*The Catchment Condition Report 2007.* Victorian Catchment Management Council 2007

*Victoria's State of the Parks Report.* Parks Victoria 2007

Also pers. com.:

- Geelong Field Naturalists,
- Field Naturalists Club of Victoria
- FungiMap

# Marine and Coastal Biodiversity Conservation

## 1. Introduction

We have reached a crisis in biodiversity. While it may not be noted as such, the plethora of research on individual species and habitats shows a consistent trend, that of decline. The picture shows dwindling numbers of fish and frogs, degradation of habitats and diminishing river health. While the VNPA congratulates the Government for recognising the urgent need to address issues of biodiversity, the base upon which life and society exist, the Green Paper appears to skirt around many of the critical issues, and almost completely ignores the marine environment.

The present biodiversity crisis is no surprise. It is not because market-based instruments have failed but because there has been a slow and steady whittling away of resources allocated to flora and fauna protection and management. The solution is an immediate investment in Victoria's marine, coastal and terrestrial biodiversity, with the development of appropriate legislated frameworks, institutional arrangements and resources.

The Green Paper's focus on land is little different from that of the discussion paper, and only makes a small mention of the \$10 billion brought in by local and international tourism.

This focus on land continues throughout the document, highlighting the limited resources available to present even a basic understanding of what is happening in the marine and, in certain cases, the coastal environment. This approach must surely be rectified in the White Paper, and an acknowledgement made of how much we depend upon healthy seas for every second breath we take, the fish we eat and the beautiful places we visit.

## 2. Overall Comments on the Framework of the Paper

The vision of the document to:

*“Actively conserve and restore ecosystems to ensure our land, seas and waterways are healthy, resilient and productive”*

establishes a good framework from which to set out a document that must seriously address the biodiversity crisis being experienced by Victoria. What is not evident in the vision, however, is that the rest of the document focuses on how Victorians can benefit from ecosystem services, rather than on what actions the ecosystems need in order to sustain themselves. The environment is compartmentalized and the whole picture is lost.

Many habitats are degraded and numbers of species are in decline as a result of this perspective. Climate change will further exacerbate stresses already experienced.

The Green Paper all but ignores the marine and coastal environment. The incredible endemism of our marine areas are briefly touched on, with no comment made about the high diversity of red and brown seaweeds, sea mosses, crabs and shrimps, and sea squirts. The Paper, instead of drawing people's attention to the fact that there is poor habitat mapping and no EVC mapping for the marine environment, chooses to ignore this significant environment almost entirely.

The reason for the exclusion of the marine environment could hardly be argued on the basis that it does not provide services to humanity, and yet they are by and large ignored throughout the document. The Southern Ocean acts as an important carbon 'sink', containing about 40% of the total anthropogenic CO<sub>2</sub> stored in the global ocean. Southern Ocean processes are important regulators of atmospheric CO<sub>2</sub> and the stability of global climate patterns<sup>i</sup>.

Phytoplankton produce half of the oxygen on the planet and zooplankton are the main oceanic secondary producers. Plankton directly and indirectly support all of the world's fisheries and play a central role in the global carbon and nutrient cycles, removing large quantities of carbon from the surface layers of the ocean and distributing it to the deep ocean. Much of the socioeconomic value of the oceans – estimated at US\$21 trillion/year globally – depends on plankton<sup>ii</sup>.

Wetlands are very important for water purification, climate regulation, nutrient cycling and the provision of food such as fish, and yet the map in Section 2.2 makes no mention of these services.

We cannot continue to pay lip service to protecting the marine environment, viewing it as just a pretty blue place - as evidenced by the number of underwater pictures that have virtually no corresponding text in the Green Paper. While the current condition of the marine environment is often unknown it is becoming increasingly evident that estuaries and bays are suffering from a multitude of threats including poor water quality, overfishing and invasion of pest species. It is evident from the 2007 catchment condition report that many catchments, especially the Glenelg Hopkins, are in poor condition. The state of these catchments is directly impacting upon marine and coastal environments.

Unless the White Paper develops clear, achievable management strategies to address the impacts associated with the key drivers of change such as climate, fishing practices, coastal development, pest species and catchment management, biodiversity in the marine and coastal environment will be gone before we have even realized it needs protecting.

### 3. The way forward

The following aims should form the basis from which the White Paper develops a structure for protecting, managing and restoring the marine and coastal environment:

- Protect, enhance and restore the natural marine and coastal ecosystems of Victoria.
- Ensure that 20-30 percent of each habitat type in the marine and coastal environment is protected.
- Minimise, and where possibly prevent, the impact of exotic terrestrial and marine organisms.
- Maintain and improve coastal and marine water quality to meet the requirements of ecosystem health and human use.
- Facilitate the development of coordinated, integrated planning and management systems for the coastal and marine environment.
- Ensure that adequate resources are available for coastal and marine planning and management.

The Victorian Coastal Strategy notes that while there is reasonably well developed coordination arrangements for terrestrial issues, consideration needs to be given to future governance arrangements for marine and coastal environments.

#### **3.1 Improving marine and coastal governance structures**

Victoria has no decision-making or planning framework for the marine environment outside Marine National Parks and Sanctuaries. The default management falls back onto Fisheries, which focuses on single species with little or no emphasis on ecosystem or habitat health.

The overarching act, the *Victorian Coastal Management Act 1995*, requires certain amendments to make it more functional. For example, a definition of 'the coast' is nowhere to be found in the Act. Such a definition should be included. It needs to be clearer that the Act also includes the marine environment within three nautical miles of the coast.

Coastal actions plans also need to be clearly defined in the legislation. These plans were developed to be powerful expansive plans that dealt with the increasing issues experienced in marine and coastal regions. The Act should also be amended to include Integrated Coastal Zone Management, which is now part of Victorian Coastal Strategy documents. In addition, it should be more clearly articulated that the Victorian Coastal Council (VCC) is responsible for covering water quality and education and should be funded appropriately so these important tasks can be undertaken.

The VCC was set up to be an independent advisory committee to the minister. In order to fulfill this role, the Council needs sufficient funding, which it currently does not receive.

It is presently required to get funding from other departments, which is not always forthcoming where there is a conflict of interests.

**Recommendation:**

Provide appropriate funding to the VCC to ensure biodiversity protection in the marine and coastal environment. The VCC should ensure that all coastal action plans are implemented according to standardized criteria that focus on catchment management, wetland and estuary management, coastal development, fisheries with an overall all view to maintaining biodiversity

**Recommendations:**

- Develop a marine governance structure using Integrated Coastal Zone Management that includes stakeholder and community input to protect and manage marine areas (including MPAs) and to develop legislation and appropriate policy
- Assess vulnerable/valuable habitats and areas and include them in future policy-making decisions, such as the asset-based framework being developed by DSE
- Develop State legislated coastal town boundaries for coastal development and apply firmer coastal planning schemes, and appropriate planning controls, at a statewide level

### ***3.2 Ensuring Victoria's catchments, coasts and marine environments are underpinned by healthy ecosystems***

To ensure a healthy marine and coastal environment, Victoria needs to undertake the following actions.

1. Establish a strong protected core in order to maintain a healthy and functioning marine and coastal system. At the WSSD in 2002 and the World Parks Congress in 2003 Australia signed off on the need to protect between 20 and 30 percent of each habitat in the marine and coastal environment by 2012. These no-take zones should sit within a framework of multiple-use zones and be managed according to the principles of ecosystem-based management. Multi-use zones should contain special management areas for breeding nurseries, haul-out areas for marine mammals such as seals, breeding and roosting areas for sea and shorebirds, areas that contain threatened or endangered species, isolated areas of habitat, stressed ecosystems, intertidal areas, coastal wetlands, estuaries, and areas of particular significance for wildlife such as offshore islands and for protection of fish species that are less mobile.

2. Improve resources to manage the marine and coastal environment so that it can continue to provide important ecosystem services to the environment and to people.
3. Draw up a comprehensive list of threats to marine and coastal environments, together with clear and well-resourced management strategies to address each threat.



Kelp Forests are important breeding sites for many marine species, and will be impacted upon by temperature changes.

David Bryant: Sea Pics

### 3.2.1 Improving Catchment management

The Senate inquiry into Marine and Coastal Pollution (1997) concluded that the most serious threats to Australia's marine environment stem from catchment activities. Diffuse sources of sediments, nutrients and toxicants drain from catchments to the coast, posing a significant risk to the environmental quality of estuaries and shallow embayments<sup>iii</sup>.

Uncontrolled runoff from catchments and urban and agricultural areas has a negative impact on water quality and marine and coastal habitats, particularly on important bay and estuarine habitats such as seagrass. These runoff inputs include:

- agricultural runoff containing high sediment, fertilisers, pesticides and other pollutant loads
- urban stormwater containing litter, oil, animal droppings, fertilisers, pesticides, sediment from erosion or construction works
- ocean outfalls from sewerage treatment plants with high nutrients, freshwater and potentially harmful bacteria
- sediments that smother seagrass, macroalgae and other substrates, block sunlight for photosynthesis of marine flora through turbidity, and cause uncontrolled epiphytic algae growth and eutrophication of water from nutrients
- litter that can kill or injure birds, fish and marine mammals by strangling or when they mistake it for food.

Catchment management has traditionally focused on water supply and extraction for human needs, resulting in economically important coastal resources often being ignored. Hence there needs to be an integrated system in which management across the State is undertaken with a catchment-to-coast perspective. Management should address threats such as soil erosion, salinity, water quality and agricultural practices. Regional Catchment Strategies should be the mechanisms for driving this and each regional catchment strategy should have input from a dedicated marine and coastal person. These strategies need to be standardized in order to be audited by Government.

Regional catchment strategies should include the following:

- integration across the catchment-coast-ocean continuum
- land and marine based sources of pollution
- climate change
- pest plants and animals
- planning for population change
- capacity building

**Recommendation:**

The State should be divided into marine and coastal management sections, each area with a dedicated marine and coastal team whose job it is to provide input into CMA planning, EPA monitoring, DSE assessment and management and council planning. No plan, monitoring or assessment should be completed without their input.

### 3.2.2 Managing wetlands

Coastal wetlands are critical for the health of adjacent coastal and marine waters. They play a significant role in reducing nutrient, sediment and pollutant loads to the coast, as well as providing breeding areas for marine animals, and feeding areas for both local and migratory wader birds.

These areas are subject to increased pressures from adjacent developments, land reclamation, catchment inputs, recreational activity, dams, irrigation, coastal urban development and pollution of waterways.

As sea levels rise, areas previously occupied by mangroves and saltmarsh will be flooded. This in itself is not a problem, as changes in sea level have occurred many times in the past and species have simply migrated inland. However, in many places this is no longer possible as coastal development now acts as an impenetrable barrier. The inundation of coastal freshwater wetlands as a result of a rise in sea level will also have significant impacts on species which have highly specific salinity thresholds.

**Recommendation:**

The biodiversity paper needs to develop Coastal Plans that enable inland movement of intertidal and coastal species to occur. Plans should be included in the Coastal Spaces Strategy and in local town planning regulations, and allow for the acquisition of land where required.

### **3.2.3 Looking after our Bays and Estuaries**

Bays around Victoria are already experiencing a stresses as a consequence of human activity such as dredging, trampling, pollution from towns and cities and the introduction of pest species. Bays and inlets have already suffered from a major loss of species biodiversity, according to scientists.

Future water allocations will need to take into account the amount of water needed to maintain wetland and estuary health. These need to be dedicated volumes specific to each area. In Gippland, where water levels from the Thomson and other rivers fell significantly, the salinity of the lakes also changed, resulting in huge fish kills a few years ago.

Bays and estuaries provide an important ecosystem service as fish nurseries. For example, snapper breed in Port Phillip Bay.

**Recommendation:**

Develop guidelines and plans for the protection of Victorian estuaries. The EPA and DSE should be lead agencies responsible for ensuring water quality and sediment monitoring, as well as undertaking audits of licensed point source discharges that should be reported on regularly with results readily accessible to the public.

### **3.2.4 Improving scientific understanding of marine environment, increasing riparian vegetation to build estuarine health**

In order to plan for change, agencies need to have access to appropriate information. The State Government should host a marine and coastal research centre where all research specifically relevant to Victoria marine and coastal environment would be housed and catalogued and a gap analysis undertaken.

The current information vacuum limits our ability to manage and care properly for the marine and coastal environment. The loss or over-harvesting of one species may eventually result in critical changes to entire ecosystems. This is particularly true of rare, sensitive or vulnerable habitats such as estuaries and sponge gardens. The recent habitat mapping in marine national parks found square kilometres of rhodolith beds at Point Addis that were previously thought to exist only in small areas in Western Port Bay. This new knowledge has had implications for the management of Point Addis and surrounding areas.

There will always be gaps in scientific knowledge, but it is important that protection is not hindered by these. Decisions must be based on best available knowledge about habitats, ecosystems and species requirements, and further protection must go hand-in-hand with ongoing research, as highly protected areas along the coast are vital to maintaining the biodiversity of Victoria's waters.

**Recommendation:**

The State Government, in consultation with research, community and industry organizations, should establish a framework for acquiring data relating to Victoria's marine, estuarine and coastal resources, and co-ordinate a program of integrated data collection. The research already in existence should be appropriately catalogued and archived, gap analysis undertaken and a future plan provided.

### **3.3 How does Victoria need to respond and adapt to climate change?**

1. This section is lacking in specific suggestions as to how policy makers, planners and managers can incorporate biodiversity protection, ecosystem services and sustainability into their everyday decision making.

2. Governments should have specific achievable goals in relation to marine, coastal and estuarine environments. These should include targets for estuarine water quality, legislated boundaries for coastal development, and action plans associated with fragile areas evident from the climate mapping.
3. The nature of potential impacts of climate change should be understood by planners, and information from mapping of ecosystems identified as being vulnerable to climate change should be incorporated into all planning and development schemes.

### 3.3.1 Supporting species and ecosystems to adapt to climate change

Areas most likely to be affected by climate change along the Victorian coast are intertidal areas, which will be submerged. While it can be argued that this is a natural process which has occurred many times before, the situation is now substantially different. When sea levels rise in future, natural communities which would normally follow the water inland will be restricted by coastal development. This barrier will prevent the movement of habitats such as saltmarsh and mangroves. Sea walls may have to be built and rocky shores will cease to exist in some areas.

Decreases in stream flow will impact on coastal underground water and intertidal habitats, and increased salinity will be a critical issue for management. These areas will also be affected by changes in water level and temperature. Increased CO<sub>2</sub> levels may also affect certain species.

**Recommendation :**

The biodiversity paper should extend the *Fisheries Act 1995* and *National Parks 1975 Act* to include the protection of intertidal marine ecosystems.

**Recommendation:**

Investigations should be carried out to identify where sea walls will be needed and what type of walls will be able to accommodate intertidal communities, where possible.

### 3.3.2 Building ecological connectivity

Building connectivity is vital if species are going to survive the changes associated with climate change. As sea levels rise, shoreline erosion and realignment, and damage to human and natural amenities and assets, are likely to occur. Rocky shores, estuaries and wetlands will be submerged, along with coastal dune systems. While this in itself may not be problematic, problems will occur coastal development blocks their migration inland.

Ensuring that there are connections between where species are now, and where they will need to migrate to, will be critical to their future survival. Developing such connections

will certainly help to build resilience, along with ensuring that existing ecosystems are healthy and therefore more able to adapt to future changes.

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## Marine and Coastal references

<sup>i</sup> Newton G, 2006, *Climate change on Australian coasts and oceans*, vol. 13 summer 2007, viewed on the 15<sup>th</sup> June 2007,

[http://www.mccn.org.au/content/1462/Waves%20Vol%2013\(1\).pdf](http://www.mccn.org.au/content/1462/Waves%20Vol%2013(1).pdf)

<sup>ii</sup> Marine and Coastal Community Network Waves Magazine,

[http://www.mccn.org.au/content/1462/Waves%20Vol%2013\(1\).pdf](http://www.mccn.org.au/content/1462/Waves%20Vol%2013(1).pdf)

<sup>iii</sup> ECC 2000, Marine Coastal and Estuarine Investigation, Environment Conservation Council, Victoria.