

Victoria:  
STATE OF THE  
**ENVIRONMENT**  
**2013**

GOALS AND RECOMMENDATIONS

REPORT PART

## INTRODUCTION PART B: GOALS AND RECOMMENDATIONS

*Part B: Goals and Recommendations* is underpinned by four key principles: ecosystem services, ecological resilience, social resilience and Strategic Adaptive Management. In this part we also propose recommendations for the Victorian Government's action.

### Ecosystem Services

Our wellbeing as a society depends on the natural world. We depend on ecosystem services – the goods and services we receive from functioning ecosystems as a result of the biophysical processes that occur. The way we manage our natural environment needs to reflect the benefits we receive from ecosystem services. It is crucial that we understand Victoria's ecological processes<sup>1</sup> to ensure that we continue to benefit from ecosystem services in the long term. The long-term condition of environmental assets becomes much harder to maintain if the ecological processes that support those assets are not managed appropriately.<sup>2</sup> We do not, however, sufficiently understand whether our ecosystem services are improving or deteriorating, because the quality of our information on the trends of our environmental condition is inconsistent across scales, land tenures and ecological assets.<sup>3</sup>

### Ecological and Social Resilience

**'Resilience is the capacity of a system to absorb disturbance and still retain its basic function and structure.'**<sup>4</sup>

Resilience can be broadly considered as the ability of natural and social systems to respond, and adapt to, external shocks while remaining within critical thresholds and retaining desired functions.<sup>5</sup>

Victorian ecosystems within the National Reserve System<sup>6</sup> appear to be relatively resilient, although natural hazards intensified by climate change, and invasive plants and animals are significant challenges. Furthermore, vulnerability assessments remain incomplete making our understanding of the ecological resilience of our ecosystems partial. Ecological resilience is much harder to establish in landscapes beyond the National Reserve System.

Over the coming decades, Victorian communities will need to adapt to the hazards of a changing climate. Climate hazards that are expected to increase in frequency and intensity will include bushfires, heatwaves, floods and seasonal drought. There are numerous complex elements that underpin social resilience and these are often unique to particular communities. These are factors that influence the vulnerability of populations to hazards, their social cohesion, and their capacity to adapt to repeated shocks. The challenge lies in identifying common factors that can be monitored over long time scales and then used to determine the relative resilience of communities.

### Strategic Adaptive Management

In Part B, strategic adaptive management (SAM) is proposed in several sections as a critical principle in developing policy interventions and responses, particularly in relation to target setting.

# CONTENTS

GOAL <b>ONE</b> RESILIENT ECOSYSTEMS	220
GOAL <b>TWO</b> SUSTAINABLE NATURAL RESOURCES	290
GOAL <b>THREE</b> SUSTAINABLE ENERGY	350
GOAL <b>FOUR</b> SUSTAINABLE COMMUNITIES	384
GOAL <b>FIVE</b> UNDERSTANDING THE ENVIRONMENT	498
EPILOGUE	543

# GOAL ONE RESILIENT ECOSYSTEMS



## DETAILED CONTENTS GOAL ONE

<b>RESILIENT ECOSYSTEMS</b>	<b>220</b>		
<b>1.1 Managing the Landscape for Ecosystem Services</b>	<b>220</b>	<b>1.3 Effective Protection and Delivery of Environmental Water</b>	<b>259</b>
Proposition	220	Proposition	259
Context	220	Context	259
1.1.1 The importance of ecosystem services	220	1.3.1 The importance of environmental water in providing ecosystem services for all Victorians	259
1.1.2 Incorporating ecosystem services into decision making	221	1.3.2 Threats to environmental water	260
1.1.3 Current Victorian NRM programs by theme	223	1.3.3 National Water Initiative	261
1.1.4 Challenges of the existing NRM framework	227	1.3.4 Water rights	261
<b>RECOMMENDATION 1</b>	<b>232</b>	1.3.5 Sustainable water strategies	263
<b>RECOMMENDATION 2</b>	<b>238</b>	1.3.6 Defining environmental water	264
<b>1.2 Improved Protection, Extent and Connectivity of Native Vegetation</b>	<b>239</b>	1.3.7 The Victorian water law review 2014	266
Proposition	239	<b>RECOMMENDATION 5</b>	<b>267</b>
Context	239	1.3.8 Formation of the VEWH	268
1.2.1 Protection of areas of high natural capital	239	1.3.9 Future challenges – monitoring and demonstration of outcomes	272
1.2.2 Protection on private land: permitted clearing and landholder obligations	241	<b>RECOMMENDATION 6</b>	<b>275</b>
1.2.3 Permitted clearing: recent reforms to regulations	242	<b>1.4 Review of Impacts on Ecosystems Due to Planned Burning</b>	<b>276</b>
<b>RECOMMENDATION 3</b>	<b>247</b>	Proposition	276
1.2.4 Permitted clearing: an alternative to the current offsetting framework	248	Context	276
1.2.5 Additional requirements for native vegetation protection	250	1.4.1 A future bushfire regime that protects life, property and ecosystem services	276
1.2.6 Increasing native vegetation on private land	251	<b>RECOMMENDATION 7</b>	<b>284</b>
1.2.7 Improving connectivity	252	1.4.2 Identifying risks from fire	284
<b>RECOMMENDATION 4</b>	<b>256</b>	<b>RECOMMENDATION 8</b>	<b>286</b>
		1.4.3 Fire preparedness and management in an appropriate planned burning regime	287
		<b>RECOMMENDATION 9</b>	<b>287</b>
		References	580

# GOAL ONE RESILIENT ECOSYSTEMS

## 1.1 Managing the Landscape for Ecosystem Services

### Proposition

In Victoria we do not have a comprehensive understanding of the condition of our ecosystem services; whether they are improving or deteriorating. As demonstrated in Part A of this report, we can claim with some certainty the condition of some ecosystem services, but that certainty does not extend across the whole state or all of our natural assets. In many instances we cannot demonstrate that our investment in environmental programs is in fact delivering environmental outcomes.

The critical reforms required to enhance our current management regime are:

- (a) integrated priority setting that places ecological processes and ecosystem services at the centre of the decision making process
- (b) better implementation of key conservation tools
- (c) improved data and monitoring regimes to inform decision making, adaptive management strategies and target setting.

### Context

Our wellbeing as a society depends on the natural world. We depend on ecosystem services – the goods and services we receive from functioning ecosystems as a result of the biophysical processes that occur.

#### 1.1.1 The importance of ecosystem services

The definitions of these ecosystem services were formalised by the 2005 Millennium Ecosystem Assessment, which was coordinated by the UN Environment Program. The services we receive, from both natural and modified ecosystems, include:

- provision of food, fresh water, fuel and fibre
- benefits from the regulation of ecosystem processes, such as climate regulation, waste decomposition, crop pollination, pest control and air purification
- basic ecological processes such as nutrient cycling and seed dispersal
- cultural services, such as recreational opportunities and aesthetic enjoyment.

The Millennium Ecosystem Assessment also examined the way in which ecosystem services contribute to ‘constituents of wellbeing’, which include:

- security
- basic material for a good life
- health
- good social relations
- freedom of choice and action.

The way we manage our natural environment needs to reflect the benefits we receive from ecosystem services. It is crucial that we understand Victoria's ecological processes<sup>1</sup> to ensure that we continue to benefit from ecosystem services in the long term.

We understand, as analysed in Part A, that the main drivers of change that impact our natural assets and ecosystem resilience are:

- climate change
- human population growth
- loss of biodiversity
- land-use change
- loss or fragmentation of habitat
- invasive species
- over-exploitation of natural resources
- pollution.

The long-term condition of environmental assets becomes much harder to maintain if the ecological processes that support those assets are not managed appropriately.<sup>2</sup>

We do not, however, sufficiently understand whether our ecosystem services are improving or deteriorating, because the quality of our information on the trends of our environmental condition is inconsistent across scales, land tenures and ecological assets (see Part A).<sup>3</sup>

## **1.1.2 Incorporating ecosystem services into decision making**

There is a growing body of theory and practice that considers how ecosystem services can underpin decision making and improve socioeconomic, cultural and environmental outcomes.

Such an approach would also improve data and information collection. It would provide a clear outcomes framework – to sustain and improve ecosystem services that contribute to constituents of wellbeing – and thus the leadership required to prioritise research and monitoring to inform decision making.

### **1.1.2.1 Valuing ecosystem services**

In order to base decision making on ecosystem services, an evaluation of each ecosystem service is required.<sup>4</sup>

A legitimate concern over attempting to value ecosystem services is that this will effectively put a price on nature. Quantification can be helpful in determining Natural Resource Management targets, but explicit monetisation can be a double-edged sword.

One perspective<sup>5</sup> is that applying financial values to a service is a way of ensuring ecosystems are included in cost-benefit analyses – such that, hypothetically, the potential loss of \$50 million worth of natural water purification might be cited as evidence for not allowing development of a hotel that might only produce \$30 million of economic value.

There are, however, significant concerns around such an approach. Can all ecosystem services be fully valued? If a price is put on an ecosystem service, it suggests it can be traded. But who has the right to sell the service? And who might be buying it?<sup>6</sup>

Community consultation is required to answer these and other questions because it is the community who ultimately receive the benefits of the ecosystem services, who suffer the loss of an ecosystem service, and to whom the constituents of wellbeing apply.

5.3 *Community Awareness* addresses the need to engage people with the concept of ecosystem services, which can then help inform community participants in this process.

### 1.1.2.2 Trade-offs

Another key aspect of ecosystem-services-based decision making is the need to appreciate the trade-offs that are involved. There may be trade-offs between different services, and these trade-offs may occur at different scales.

For example, boosting food production may decrease drinking water quality. More timber harvesting in one area might diminish the recreational opportunities of others. These trade-offs can occur over time (i.e. benefit now, loss later), geographically (i.e. benefit here, loss there), or across different spatial scales (i.e. reduce benefit locally to increase broader benefit).

Research is being undertaken into the understanding and management of these trade-offs.<sup>7</sup> There is also potential for identifying positive synergies between some ecosystem services: improvements to one service might also lead to greater provision of another service.<sup>8</sup>

### 1.1.2.3 Recent examples

A recent project in the South East Queensland (SEQ) Catchment has developed a pathway for establishing an ecosystem services framework for decision making.

The project followed these steps:

1. Identify the ecosystems in terms of the Millennium Ecosystem Assessment reporting categories.
2. Map the ecosystems.
3. Identify and describe the ecosystem processes occurring in those ecosystems.
4. Determine the link between ecosystems and ecosystem processes.
5. Relate ecosystem processes to data and then map those ecosystem functions.
6. Identify and describe the ecosystem services provided by those processes.
7. Determine the link between ecosystem processes and the services they provide.
8. Explore the linkages between ecosystem services and the constituents of wellbeing that they support.<sup>9</sup>

A key attribute of this process is the prioritisation of the constituents of wellbeing (the aspects of human wellbeing that are derived from ecosystem services – see above 1.1.1). While focusing on this creates an anthropocentric assessment of nature and its values, it also helps to make explicit precisely how dependent we are on the environment for our wellbeing.

On the topic of valuing ecosystem services, the participants in the SEQ Catchment project (a wide range of stakeholders, including community members) unanimously agreed that 'attempting to seek monetary values of ecosystem services was not a meaningful or achievable task'.<sup>9</sup> Instead, the process attempted only to prioritise and identify the relative value of the various ecosystem services and constituents of wellbeing.<sup>9</sup>

There is also evidence that management of natural resources in Victoria is starting to shift to an ecosystem-services-based approach. The Soil Health Strategy is explicitly aimed at treating soils 'as complex systems that produce services that we benefit from'.<sup>10</sup>

### 1.1.3 Current Victorian NRM programs by theme

The following is a brief overview of management of Victoria's ecosystems. Terrestrial ecosystems is considered in 1.2 Improved Protection, Connectivity and Extent of Native Vegetation.

For detailed analysis, data and trends pertaining to these ecosystems see Part A.

#### 1.1.3.1 Marine and Coastal Environments

The health of Victoria's marine ecosystems is partly dependent on activities in adjacent catchments. They are significantly impacted by the inflow of pollutants and nutrients. Marine ecosystem health is also compromised by invasive species and over-fishing of some species.

Marine biodiversity – and the underlying processes that affect biodiversity – is not consistently and comprehensively monitored across the state leading to gaps in analysis and understanding. See Part A: Marine and Coastal Ecosystems for a detailed discussion of these issues.

As on land, management of the public reserve system is vital for sustaining ecosystem services. The Victorian Auditor-General has found the management of marine protected areas (MPAs) could not be shown to be effective.<sup>11</sup> Parks Victoria had a plan for management of MPAs, but it had not been fully implemented when it ceased in 2010, largely because funding intended for MPA management was used on other activities.<sup>11</sup>

VEAC is currently conducting an investigation of MPAs and their effectiveness. A discussion paper has been released, and the final report is due in February 2014. The report is expected to focus on improving management effectiveness and on assessing environmental threats.<sup>12</sup>

Bays and ports are monitored relatively well, chiefly for water quality by the EPA and for pests by DEPI. Most other monitoring, however, is in response to events such as algal blooms and pest incursions, rather than as part of any ongoing data collection. Specifically, a strategic, fit-for-purpose, cross-agency monitoring, evaluation and reporting program for marine ecosystems is required to deliver the data necessary for a focused and effective management intervention.



*Pelican, Gippsland*

A key weakness in the management of our marine environment, outside protected areas, is the absence of a strategic plan. While some aspects of the marine environment are covered in other documents (e.g. Victorian Coastal Strategy 2008, policies for water quality), and RCSs provide for regional risk-based management, 80% of Victoria's marine waters fall outside the boundaries of existing statewide planning policies or management strategies.<sup>11</sup> Such a marine management plan was also a key recommendation of the 2009 Land and Biodiversity White Paper,<sup>13</sup> *Securing Our Natural Future*, receiving broad support among the community and academia.

Proper integration of policy and planning frameworks that affect the marine environment is also needed.

### 1.1.3.2 Inland waters

Freshwater aquatic ecosystems are impacted by, among other things, loss of in-stream habitat, runoff of agricultural chemicals from farms, barriers (such as dams), and extraction of water for consumptive uses. Unfortunately, only limited data exists for statewide water quality. See Part A: Inland Waters for a detailed discussion of these issues.

As the point of intersection between terrestrial and aquatic ecosystems, riparian vegetation plays a critical role in providing ecosystem services. It supports a wide range of flora and fauna, provides breeding habitat, generates organic matter for in-stream biota, acts as drought refugia, adds stability to river banks, prevents erosion, and helps to filter nutrients, sediment and pesticides from catchment runoff, thus improving water quality.<sup>14</sup>

Riparian vegetation is also often the only remaining vegetation in some areas.<sup>15</sup>



*Snowy River*

The degradation of native riparian vegetation is therefore considered to be a 'threatening process' under the FFG Act.

Despite its acknowledged importance to ecosystems and their resilience (e.g. as drought refugia), and despite a decade of active management,<sup>15</sup> riparian vegetation is still in poor condition in most parts of the state, with the exception of East Gippsland.

Recent policy is attempting to address this. The 2 Million Trees program is partially designed to address this problem, with 500,000 trees to be planted along waterways in regional Victoria.<sup>16</sup>

The draft Victorian Waterways Management Strategy lists proposed changes in management to improve the condition of riparian vegetation. This includes progressively introducing voluntary agreements for fencing, weed management and revegetation, as well as reviewing and clarifying governance arrangements over riparian zones.<sup>15</sup> The Victorian Waterway Management Program provides an example of how adaptive management is being used to improve outcomes.<sup>17</sup>

Water quality in the Yarra and Port Phillip Bay is addressed in a new strategy (A Cleaner Yarra and Port Phillip Bay), which focuses on more effective coordination between agencies and the prevention of pollution.<sup>18</sup> The strategy also tries to improve the link between monitoring and reporting efforts and management action – as well as recognising the importance of engaging with community.

Estuarine and bay systems such as Port Phillip Bay, Western Port and the Gippsland Lakes are subject to reduced water quality. Poor water quality usually occurs after episodic storm events when high pollutant levels are discharged from rivers and drains. Water quality is also reduced during periods when reduced mixing and flushing of water occurs.

There is limited data available on the ecological condition of estuaries, although it is evident that most of Victoria's estuaries have been degraded.<sup>19</sup>

### 1.1.3.3 Soils

Monitoring for land health and soil condition has been very limited. See Part A: Biodiversity and Land for a detailed discussion of available soil data.

A report by the Auditor-General concluded that soil health programs across the state have generally been implemented effectively. However, the report says that individual programs have focused on 'delivery of outputs rather than achievement of outcomes', with the consequence that it cannot be demonstrated that soil health in Victoria has actually improved as a result of these programs.<sup>20</sup>

In response to recommendations in that report, the government released a Soil Health Strategy in 2012.<sup>10</sup> The strategy recognises that soils are the fundamental support system for Victoria's \$9 billion worth of agricultural productivity, and explicitly addresses the role of soil in providing ecosystem services.<sup>10</sup>

Soil health is generally more of a problem on private land, and is related to how we use land for agriculture. Issues specifically related to soil ecosystems are dealt with in Part B: 2.1 Sustainable Food Systems.



*No till farming north west Victoria*

### 1.1.3.4 Pest plants and animals

Ecosystem disturbances, such as human settlement and agricultural production, often facilitate the spread of invasive species between landscapes and habitats. Colonisation by pest species is believed to cause loss of biological diversity, even though cause and effect can be difficult to determine.<sup>21</sup>

Agriculture is vulnerable to introduced species given its dependence upon the ecosystem services provided by biological diversity.

Once the habitat of natural predators is removed, 'population explosions of pest species can colonise productive as well as reserved landscape.'<sup>22</sup>

There is considerable literature and research on the issue of eradication of pest species and their impact on biodiversity and the ecosystem services that biodiversity provides,<sup>23</sup> but this research is labour intensive, can be expensive and will take time to produce clear longitudinal studies to inform decision making.

A major problem for management is the lack of understanding of the impacts caused by pest plants and animals (PPA). There is limited data for where pests occur from year to year, what the environmental and economic impacts are, and the extent of private landholder compliance with legislative requirements. There is also a paucity of social data that would help to better understand who does what with respect to PPA and why they do it. Finally, the impacts of invasive species on ecosystems do not occur in isolation: other drivers are commonly at play simultaneously.

See Part A: Biodiversity and Land for a discussion of available pests, plants and animals data.

Some good progress has been made in some terrestrial areas, but Parks Victoria is now forced to rely heavily on short-term funding to solve a long-term problem, with the result that efforts are often ineffective.<sup>24</sup>

New invasive species management legislation designed to improve the effectiveness of the policy framework is being developed by DEPI.

### 1.1.4 Challenges of the existing NRM framework

Healthy ecosystems are needed in order to receive all the benefits and services that Victoria's natural capital can provide.



*Swamp wallaby, Strzelecki Ranges*

Healthy ecosystems often have complex food webs, high levels of biodiversity and strong resilience to disturbances. These ecosystems have evolved under certain conditions and are capable of tolerating specific disturbances. Ecosystem services are likely to be diminished when the disturbance is outside the range or type that ecosystems can withstand.<sup>25, 26</sup>

The drivers that impact our ecosystem resilience and natural assets are outlined above, and in detail in Part A.

As all of these are largely, if not entirely, driven by human behaviour, it follows that we take an active role in managing these drivers and reducing the stressors acting on our ecosystems. Climate change exacerbates many existing stressors, and this combination significantly magnifies the pressures on Victoria's biodiversity – particularly threatened species.<sup>27</sup>

Climate change also influences the way in which conservation management is approached, since the key is not necessarily to maintain the status quo of ecosystems in all respects, but to facilitate changes – adaptations – that will preserve ecosystem processes.<sup>28, 29</sup>

As demonstrated in Part A (and elsewhere),<sup>30</sup> our terrestrial, aquatic and marine ecosystems are under stress.

Management changes are necessary for our ecosystems to become more resilient and continue to provide services that are the foundation of human wellbeing.

The critical reforms required to enhance our current management regime are:

- (a) integrated priority setting that places ecological processes and ecosystem services at the centre of the decision making process
- (b) better implementation of key conservation tools
- (c) improved data and monitoring regimes to inform decision making, adaptive management strategies, and target setting.

#### 1.1.4.1 Integrated priority setting that places ecological processes and ecosystem services at the centre of the decision making process

Victoria currently has a number of strategies and frameworks to manage environmental assets and respond to the impacts of the range of stressors outlined above.

Some of these interventions are issue-specific – such as the draft Victorian Waterway Management Strategy and the Native Vegetation Framework – while others are place-based – such as the Victorian Coastal Strategy and the regional catchment strategies (RCSs). The RCSs integrate environmental management by multiple stakeholders across issues at a regional level.

It is also important to note that these strategies and frameworks do not conform to a standard scope. They work across different land tenures and scales, often overlap, and may have competing objectives.

This matrix of statewide and regional strategies also intersects with federal policies in environmental management and investment, such as the Australian Biodiversity Conservation Strategy and the *Environment Protection and Biodiversity Conservation Act 1999*.



*Alpine high country brumby*

## Case Study: South Australian NRM Plan

In 2004, the South Australian Government introduced legislation, the *Natural Resources Management Act 2004*.<sup>31</sup> The Act stipulates that the NRM Council must prepare and maintain a State Natural Resources Management Plan to:

- assess the state and condition of the natural resources of the state
- identify existing and future risks of damage to, or degradation of, the natural resources of the state
- provide for monitoring and evaluating the state and condition of the natural resources of the state on an ongoing basis
- identify goals, set priorities and identify strategies with respect to the management of the natural resources of the state
- set out or adopt policies with respect to the protection of the environment and the interests of the community through the operation of this Act, including through the control of pest species of animals and plants
- promote the integrated management of natural resources
- include or address other matters prescribed by the regulations or specified by the minister.

The first state NRM plan was released in February 2006 and the NRM Council must review the state NRM plan at least once in every five years. *Our Place. Our Future. State Natural Resources Management Plan South Australia 2012–2017* is the current document that sets a long-term vision, goals and priorities for the management of South Australia's natural assets.<sup>32</sup>

The plan is nested towards the top of the policy hierarchy, informing the regional NRM plans.

## Lessons learnt and relevance to Victoria

The Government of South Australia undertakes ongoing evaluation through an implementation reporting project to assess the effectiveness of the previous NRM plan.

A similar plan in Victoria would provide a key link between the Victorian Government's Environmental Partnerships policy, statewide issues-based environmental strategies, and the CMAs regional catchment strategies.

Catchment condition and management reporting currently undertaken by the VCMC in Victoria could also be included.

The responsible agencies in Victoria for developing and implementing a state NRM plan would be:

- Department of Environment and Primary Industries
- Victorian Catchment Management Council
- catchment management authorities.

The critical gap in Victoria's current NRM policy landscape is leadership.

There is currently no clear articulation of statewide priorities and objectives for managing the state's natural resources as a whole\* – a vision for future management that protects and enhances environmental services.

The State Government released its *Environmental Partnerships* document in 2012. This is described as 'a pathway for action by government, communities and businesses in Victoria to maintain a healthy environment'. Although it contains eight high-level priorities 'to help strengthen our environmental partnerships and achieve our vision of a healthy Victorian environment that supports our prosperity and wellbeing',<sup>33</sup> it lacks any detail on how the subset of natural resource management priorities are to be operationalised through the matrix of statewide and regional strategies.

A comprehensive statewide NRM plan has been advocated by the Victorian Catchment Management Council (VCMC) in each of its Catchment Condition Reports (2002, 2007, 2012).<sup>30</sup> In its latest report, the VCMC argues for an Integrated Catchment Management Plan, suggesting that its absence is a 'major weakness of our current approach'.<sup>30</sup>

The existence of a statewide NRM plan will also provide a clear indication of state priorities to the Federal Government, to maximise Victoria's advantage in federal processes such as Caring For Our Country.

It is envisaged that a statewide NRM plan would be designed to coordinate, rather than integrate, the existing issue- and place-based strategies by providing overarching goals and by establishing a process for determining how trade-offs will be made between competing priorities. These other strategies can continue to operate autonomously, but the rolling-out of programs will be integrated across the strategies by the overarching plan.

\* The Victorian Investment Framework (VIF) Statement of Priorities 2012/13 did provide an overview of the investment priorities for the six participating programs that worked together through VIF:

- Land health
- Victorian River and Wetland Management Program
- Sustainable Irrigation Program
- Biodiversity Program
- Victorian Landcare Program
- Natural Resources Investment Program.

VIF is no longer used by the government and has ceased as a program.

By its very nature, a statewide NRM plan would integrate management across private and public land, as well as include coastal and marine environments. Continuity of funding will be critical for the necessary long-term monitoring that allows continuous adaptive management of the plan.

Another important feature of a NRM plan would be standardised terminology and consistent language. This language could be developed and used in the preparation of the overarching plan, and then disseminated through all existing state and regional NRM strategies for the sake of clarity and comparison of objectives.

Ideally, the first iteration of a NRM plan would be completed in time to guide the development of the next round of regional catchment strategies. Also, once complete, a plan could guide development of the currently outstanding issue-specific strategies, such as for biodiversity and marine management.



*Mount Arapiles via Halls Gap*

## RECOMMENDATION 1

It is recommended that the Victorian Government establish a statewide Ecological Processes Management (EPM) Plan.

### ATTRIBUTES

The EPM Plan will integrate the natural resource management of Victoria to improve ecosystem services outcomes. The State Government will amend legislation to recognise the EPM Plan and the plan will be based on:

- systematic environmental data collection
- statewide targets for ecological processes and ecosystem function
- broad-based community consultation to identify relative values of ecosystem services and constituents of wellbeing
- a sound scientific evidence-base and ground-truthing that includes linking ecological processes and ecosystem function with the services they provide.

#### 1.1.4.2 Better implementation of key conservation tools

An important piece of Victorian legislation to protect biodiversity is the *Flora and Fauna Guarantee Act 1988* (FFG Act). This Act, among other things, requires a list of threatened species to be maintained, requires management intervention ‘action statements’ for each of those species to be prepared, and provides for several management controls to prevent various threats to biodiversity.

The FFG Act also allows for the listing of ‘threatened ecological communities’ and ‘threatening processes’. While not exhaustive in scope, the listed threatening processes<sup>34</sup> address, to some extent, each of the drivers impacting on our natural assets and ecosystem resilience listed above (1.1.1).

A report by the Victorian Auditor-General’s Office (VAGO) into DEPI’s administration of the FFG Act found, among other issues, there was too much emphasis on the listing of threatened species.<sup>35</sup>

**An authorising environment for the proposed Ecological Processes Management (EPM) Plan is necessary.**

**The Commissioner for Environmental Sustainability notes the review undertaken by VAGO and regards it as authoritative and therefore endorses the recommendations of the Auditor-General regarding the more efficient implementation of the FFG Act.**

**It is critical that there is legislative reform to facilitate better implementation of key conservation tools.**



*Bush Stone Curlew, Horsham*

The FFG Act threatened species list is similar to two other species lists – an advisory list maintained separately by DEPI, and a federal list under the *Environment and Biodiversity Conservation Act 1999*. Thus, VAGO suggests that Victoria's limited resources are not being used in the most efficient or effective way by maintaining multiple lists.

The Hawke review of the EPBC Act also recommended a single national list of threatened species and ecological communities.<sup>148</sup> Efforts towards this end are to be supported on the condition that the federally maintained list also makes allowance for the listing of species that are threatened regionally. Administrative efficiencies that do not compromise effectiveness could be found so that resources can be better directed towards implementing the Act in full.

These lists, while valuable for some purposes, can be poorly suited to setting management priorities – 'a high risk of extinction does not imply high priority for an action'.<sup>36</sup>

A report by the Environment Defenders Office published two years after the release of the VAGO report found that very little has changed at DEPI in response to the Auditor-General's recommendations.<sup>37</sup>

Furthermore, the preparation of action statements has not kept pace with the listing of new species. These action statements are also unenforceable – there is no way to compel DEPI to take the action that is identified by the action statement. There is also some evidence to suggest that recovery plans under the federal *Environment Protection and Biodiversity Conservation Act 1999* (comparable to FFG Act action statements) do not result in any statistically significant improvement in a species' status.<sup>38</sup>

**VAGO recommended that the Victorian Government assess the extent to which existing State Government policy is inconsistent with listings of threatening processes and threatened communities, and then identify ways in which policy can be changed to be consistent with those listings and their associated action statements. For example, the current practice of riparian grazing is at odds with the listing of 'degradation of native riparian vegetation' as a threatening process.**

**Ultimately, parliament would amend the FFG Act to make mandatory the listing of all threatened ecological communities and all threatening processes that meet the listing criteria. This could be achieved by removing ministerial discretion from s. 10.**

As part of this shift towards greater emphasis on whole ecosystems rather than individual species, existing and new action statements for threatened ecological communities and threatening processes require action.

If the above reforms are implemented, it is possible that some resources could be saved through a commensurate reduction in the need to list (and develop action statements for) every individual species.

Initially, DEPI needs to make a concerted effort to improve the efficiency of the listing process – through consultation with the Scientific Advisory Committee (legislated for in the FFG Act) – and then use the full suite of management tools available to government in the Act.

This process begins with making critical habitat determinations (CHDs) and management plans mandatory.

The more powerful elements of the FFG Act – CHDs, management plans, and interim conservation orders – have been underutilised, if used at all, according to the Auditor-General.<sup>35</sup>

The US *Endangered Species Act*, unlike the FFG Act, has mandatory CHDs. While these are not always completed within the required 12 months, a study has revealed that those species with critical habitat determinations are twice as likely to improve in status, and only half as likely to get worse.<sup>39</sup>

With the impact of climate change for individual species still to be determined, these CHDs provide a mechanism to include future habitat areas that are not within the current range for the species but that are expected to provide critical habitat to that species in the future.

It is critical that the policy framework for implementing CHDs addresses the likely consequences of developing management plans and interim conservation orders, and possibly consider, the need for limited compensation to private landholders where their land use would be restricted for the purposes of protecting biodiversity.<sup>40</sup>

Finally, the legislation needs to be amended to allow parties other than DEPI to bring legal action for breach of the terms of the FFG Act<sup>41</sup> in a similar form to third party enforcement of the federal *Environment Protection and Biodiversity Conservation Act 1999* (s. 475), which gives standing to ‘an interested person’ to apply for injunctions. Under an amended FFG Act, these third parties could then apply to VCAT for an enforcement order, which would compel DEPI to take action. In particular, third parties would be able to apply for enforcement orders to stop any activity that relates to a listed threatening process.

Similarly, there is currently no Victorian Biodiversity Strategy (a legislative requirement of the FFG Act). The previous state strategy has now lapsed, and initial efforts to produce a new one in 2010 were not completed. Without a guiding document for our biodiversity goals and targets, it is difficult to adequately direct limited resources in an efficient way.

### **1.1.4.3 Improved data and monitoring regimes to inform decision making, adaptive management strategies, and target setting**

For a more detailed discussion of how data and monitoring regimes in the environmental disciplines require improvement see Part B: 5.1 Monitoring and Data Collection.

Environmental programs, like all other aspects of government activity, need to be effective, both in terms of costs and outcomes.

The absence of adequate data and monitoring regimes makes it difficult to produce clear evidence and evaluation that demonstrates a direct causality between NRM programs and their benefits to the environment.

Throughout the consultation in the development of this report, it was clear that – despite the efforts of a world-renowned scientific community, and very capable and active citizen science contributions - there are significant gaps in resourcing and our understanding of Victoria’s natural environment (see Part A).

In addition to developing and implementing policies and programs, the government has a responsibility for the evidence base on which these interventions are built.

These responsibilities include more baseline monitoring, harmonised data frameworks and compliance with various legislated requirements. Another recent report by VAGO<sup>43</sup> found that DEPI ‘cannot be sure that their compliance activities contribute to protecting natural resources, primary industries and the environment as the legislation intended’. In response, DEPI has established a compliance reform team and a whole-of-DEPI regulation and compliance transformation project, to improve its approach to compliance activities.

It is a three-part process to address this disconnect in the policy cycle – both between the evidence base and decision making, and evaluating that the interventions undertaken can be shown to have tangible and demonstrable benefits on Victoria’s natural capital.

It is envisaged that this three-part process is formalised through the development of an EPM Plan.

### Establish community priorities

Firstly, it is necessary to establish community priorities regarding the method of valuing ecosystem services through broad consultation with both scientific experts and local community representatives. From this engagement, the underlying ecological processes can be identified and prioritised, and then determination of intervention activities for specific natural assets and attendant environmental programs can be decided.

### Map statewide data

Secondly, the development of these programs would be aligned with rigorous information requirements. All statewide environmental data would be aggregated and mapped.

Given that the budget available for environmental management programs is always limited, the government – and program managers – need to be able to demonstrate that the programs that do receive funding are actually delivering the outcomes they were designed to achieve.

Data collation and information retention are critical in this process.

To this end, a more systematic use of tools is required. One such tool is the Investment Framework for Environmental Resources (INFFER) – a framework developed in collaboration between DEPI and academia with extensive ground truthing in Victoria.

INFFER could help both the State Government and CMAs develop more effective and efficient programs. INFFER provides a step-by-step process for assessing the likely success of a project, its value for money, the strength of the scientific basis for the work, and other variables that inform, but are not always considered, when making decisions about environmental investments.<sup>44</sup>

### Establish statewide targets

Thirdly, a key gap in Victoria's natural resource management is the absence of targets.

Victoria's catchment management authorities (CMAs) produce regular regional catchment strategies (RCSs) – initially in 1997, then in 2003–04, and most recently in 2013. One analysis found that only a minority of targets in the first two rounds of regional catchment strategies met the criteria of 'SMART' targets: specific, measurable, achievable, relevant and time-bound.<sup>45</sup>

The guidelines for preparation of the latest round of RCSs did direct CMAs to develop SMART targets 'where possible' for significant assets,<sup>46</sup> but the legal requirements of the *Catchment and Land Protection Act 1994* (CaLP Act) (s. 24) do not explicitly require this.

One approach to developing SMART program targets would be to frame targets using a Strategic Adaptive Management approach. A key component of this is planning in advance for how to respond to changing conditions of natural assets, their threats and drivers for change, or a change in the provision of ecosystem services.

Steps to be followed include:<sup>47</sup>

- Establish quantitative and/or qualitative baseline thresholds for ecosystem services (linked to scientific understanding of ecosystem processes and asset condition).
- Identify checkpoint levels on path towards baseline thresholds.
- Establish a series of high-level working groups, with representatives from government, academia and the community, to determine management actions that will be taken in the future if a given checkpoint level is reached (as the checkpoints become closer to the baseline thresholds, planned management actions will need to become more drastic to ensure the thresholds are not crossed).
- Implement those actions if the checkpoints are reached.
- Evaluate, learn from, and reassess management actions.

This would allow aspirational targets to be set, including intermediate checkpoints with agreed management responses to ensure that the immediacy of need for Victoria's natural assets is not eclipsed by long-term goals.<sup>45</sup>

The targets to be included within an EPM Plan need to be aligned with an ecosystem services framework to provide an easily understood, anthropocentric rationale for the protection of natural assets and the ecological processes that support them.<sup>8, 9, 48</sup>



*Red tailed cockatoos*  
Courtesy of Bob McPherson and [www.redtail.com.au](http://www.redtail.com.au)

## RECOMMENDATION 2

It is recommended that the Victorian Government establish targets for statewide ecological processes and ecosystem function and adopt Strategic Adaptive Management.

### ATTRIBUTES

The Strategic Adaptive Management approach will deliver targets, threshold baseline levels and checkpoints by agreement between government, scientists, land-users and community stakeholders. These targets will:

- be set at state, regional and local scales
- include predetermined management responses if intermediate checkpoints are crossed
- be assessed and reported against, regularly and publically.



*Plovers, Phillip Island*

## 1.2 Improved Protection, Extent and Connectivity of Native Vegetation

### Proposition

#### Importance of native vegetation

One of the most important aspects of land management is retention and restoration of native vegetation. It helps maintain ecosystem processes and leads to many ecosystem services – ecological as well as social, cultural and economic.<sup>49</sup>

To preserve these services, a number of issues need to be addressed:

- **Protecting what remains:** keeping national and state parks as large banks of high-quality native vegetation, and boosting protection of remnant vegetation on private land.
- **Increasing the extent:** ensuring an appropriate suite of regulations and incentives to rehabilitate land that has been cleared or degraded.
- **Improving connectivity:** targeting revegetation work to achieve landscape-scale strategic objectives of ecosystem services and resilience to climate change.

Foundation Paper Two, *Land and Biodiversity Victoria: The Science, Our Private Land Holders, Incentives and Connectivity* provides a detailed discussion on many of the issues presented in 1.2.

### Context

Victoria is the most cleared state in Australia.<sup>19</sup> Since European settlement of Victoria, over half of the state's native vegetation has been removed, chiefly for the purposes of agriculture and urban development. Much of this clearing occurred before 1989, after which broad-scale clearing of land was banned. Indeed, up until the 1980s, farmers were even encouraged by the government to actively clear their land.<sup>50</sup>

#### 1.2.1 Protection of areas of high natural capital

Preservation of protected areas is a fundamental component of biodiversity conservation,<sup>51</sup> and therefore of supporting ecosystem resilience. In Victoria, our National Parks and State Parks have typically been less exposed to the stressors that threaten ecosystems, which increases the likelihood that those areas are more resilient to other impending stressors like climate change.<sup>52</sup>

In that context, the National Reserve System is a good example of a 'climate-resilient' strategy for ecosystems. Climate change will, however, 'challenge the ability of the current reserve system to provide protection when the climate shifts so much that plants and animals no longer thrive where their current reserves are located'.<sup>52</sup>

Globally, even as protected areas are expanding, biodiversity continues to decline.<sup>53</sup> This is because protected areas generally prevent only direct impacts such as land clearing; not indirect impacts like pollution and climate change, which can originate from outside the park boundaries.<sup>54</sup> While setting aside areas for ecological purposes is important, it is not enough by itself. It is also important to ensure the quality of these ecosystems is maintained.

See 1.1, 1.3 and 1.4 for further discussion of these issues on public land. The remainder of 1.2 will focus on these issues pertaining to private land.



*Wildflowers, central Victoria*

## 1.2.2 Protection on private land: permitted clearing and landholder obligations

Almost two-thirds of land in Victoria is privately owned, and just 20% of this private land retains its native vegetation. Revegetation of farm land in southern Australia has been shown to yield great benefits for biodiversity and ecosystems.

For example, by increasing the amount of native vegetation on a property from 4% to just 8%, populations of woodland birds increased by about 25% over a period of eight years.<sup>55</sup>

Primary producers can benefit from improvements to their local ecosystems, such as those shown in Figure B.1.1.

Change <sup>56</sup>	Effect	Benefit
<b>Encouraging more native fauna</b>	Reduction in insect pests	Less need for chemical sprays
<b>Establishing wind breaks</b>	More sheltered crops and livestock	Greater yields
<b>Establishing more shade</b>	Cooler body temperature for stock	Greater yields of milk, wool, meat
<b>Maintaining remnant vegetation</b>	Improved property landscape and aesthetics	Potential for recreational opportunities and increased property values

**Figure B.1.1: Benefits to primary producers from local ecosystem improvement**

### 1.2.3 Permitted clearing: recent reforms to regulations

DEPI has recently reformed permitted clearing regulations.

In September 2012, DEPI undertook a public consultation process that received 182 submissions<sup>149</sup> from a variety of sources, including academic institutions, catchment management authorities, local government, community groups, peak industry bodies and individuals.

Significant changes to policy governing clearing of native vegetation were announced in May 2013. The reforms were scheduled to commence in September 2013 – when the Victorian Planning Provisions (VPP) and all planning schemes are amended – as this report was going to print.

The previous policy (Native Vegetation Management: A Framework for Action) had been reasonably effective at reducing the removal of native vegetation, although the ultimate goal of a net gain each year was not being met. DEPI reported an overall net loss of 4,090 ( $\pm$  20%) habitat hectares per year (which accounts for both area and quality).<sup>57</sup>

The Second Approximation Report is due to be released late in 2013 and will provide a quantified measure of the effectiveness of native vegetation management since 2008.



*Road to Nhill*

#### 1.2.3.1 Objectives of the reforms

The recent reforms have removed 'net gain in the extent and quality of native vegetation' as an overall objective of native vegetation management (State Planning Policy Framework (SPPF), clause 12.01-2). The new objective is 'to ensure that permitted clearing of native vegetation results in no net loss in the contribution made by native vegetation to Victoria's biodiversity' and that the reform 'creates the framework for permitted clearing to have a neutral impact on biodiversity'.<sup>58</sup>

There are serious objections raised in relation to this shift.<sup>59, 60</sup> Concerns from both academic institutions and CMAs are that the reforms focus too heavily on reducing cost, both to government and landowners, rather than focusing on maintaining and improving Victoria's biodiversity. Furthermore, the aims and actions of the review conflict with the underlying intent of Victoria's permitted clearing regulations to achieve 'no net loss'.

### 1.2.3.2 Contributions of native vegetation to broader environmental outcomes

The Victorian Government suggests that the changes help clarify the objective of the permitted clearing regulations and introduce ‘a more stable, equitable, predictable and transparent system and has measurable benefits for both the environment and industry’.<sup>61</sup>

However, in doing so, it also overlooks the contributions of native vegetation to other environmental benefits – such as water quality, land protection and social and cultural values.

According to DEPI, the Biodiversity clause in the permitted clearing regulations is deliberately limited to the state’s expectations regarding biodiversity to avoid confusion and duplication with objectives that are appropriately dealt with elsewhere within planning schemes. Other benefits from native vegetation (or disbenefits from its removal) remain in the VPP, including in the SPPF. This includes:

- elements of the SPPF relating to environmental risks (13-03-1 Soil degradation; 13-03-2 Erosion and landslips); natural resource management (14-02-2 Water quality); and Environmental and landscape values (12-04-3 Landscapes)
- other objectives within clauses 52.16 and 52.17, including land and water protection, identified landscape values and Indigenous cultural heritage.

While some of these other values of native vegetation are included in the Purpose of Clause 52.17 as DEPI asserts, these are not explicitly linked to the objectives of the permitted clearing regulations.

Government reference to ‘relative biodiversity values’<sup>58</sup> affirms these concerns. The methods that will be used to assign ‘biodiversity value’ under the proposed changes are unclear.<sup>60</sup>

NaturePrint (see Foundation Paper Two, *Land and Biodiversity Victoria: The Science, Our Private Land Holders, Incentives and Connectivity*) is promoted as a key tool of the reforms. Although it is an innovative mapping and modelling tool with many benefits and of scientific merit, NaturePrint is purely biodiversity-based and does not include aspects such as the loss of visual amenity, cultural heritage, land protection and water quality objectives.<sup>62</sup>

### 1.2.3.3 Assessing sites before the removal of native vegetation

Changes to how sites are to be assessed are also potentially problematic. The reforms endeavoured to reduce the burden of the permitted clearing regulations by removing the need for on-site assessments in the case of low-risk removals of native vegetation. These assessments will now be done exclusively using mapped data (employing tools such as NaturePrint).

This presents two key issues:

- the criteria for determining ‘low-risk’ removals of native vegetation
- the danger of relying on mapped data alone without the verification of on-site inspections.

#### The criteria for determining low-risk

Firstly, areas that already have depleted biodiversity values may be determined to be low risk. However, the biodiversity values that remain may be very important for the local community and may in fact warrant a greater level of protection rather than a reduced level of protection. Studies have highlighted the importance of also conserving and improving the quality of smaller vegetation patches<sup>63, 64</sup> or individual trees.<sup>65</sup> Furthermore, individual acts of low-impact clearing can be collectively significant.<sup>66</sup> The reforms could result in incremental clearing of these ‘low-risk’ situations based on the development of a simplistic system.

Biodiversity is fundamental to ecosystem resilience. The Australian Institute of Landscape Architects present the considered view that ‘Rather than allowing incremental clearing in all “low-risk” situations such as urban settings and putting all of our efforts into high risk/strategic areas such as conservation reserves, we should endeavour to protect and enhance a mosaic of quality and extent across the Victorian landscape which is far more likely to be developed through the rigour and imperfection of the current native vegetation permitted clearing regulations than the proposed reforms.’<sup>67</sup>

Glenelg Hopkins CMA also raised the concern that ‘Much of the Victorian Volcanic Plain (VVP) has not been surveyed and many of the EVCs are inaccurate. There is a risk in classing this area as low-quality vegetation as more of the VVP grasslands will be lost despite the presence of significant species such as the Striped Legless Lizard.’<sup>62</sup>

There is a further complication in that key decision criteria are focused largely on threatened species and not biodiversity as a whole, and the importance of ensuring that ‘common’ species persist. Vegetation classified as ‘low-quality’ could be important habitat for local fauna.<sup>60</sup>

According to the Interdisciplinary Conservation Science Research Group (RMIT University): ‘Small patches and corridors of vegetation not only provide habitat for a number of species persisting in highly fragmented landscapes, but have been found to compliment [sic] conservation objectives for large reserves.’<sup>59</sup> This can be achieved through a combination of providing connectivity<sup>68</sup> and keystone resources<sup>69</sup> for a number of species and ecological communities. Studies have also highlighted the importance of placing a high value on native vegetation irrespective of its size and of not biasing conservation objectives towards patches that are large in extent.<sup>70, 71</sup>



*Grasses, western Victoria*

### Relying on mapped data without the verification of on-site inspections

Secondly, there is a risk that relying on mapped data alone will fail to account for small but important variations – for example, that one particular cluster of trees might provide habitat to a community of a threatened species when a similar nearby cluster does not. The metadata contained within these digital datasets is too coarse to be applied at the scale of individual properties. NaturePrint has a resolution of 75 m × 75 m, whereas much of the clearing and biodiversity values considered under the permitted clearing regulations operate at a finer scale than this.<sup>60</sup> Even the 'Introduction to NaturePrint: A blueprint for nature conservation' published by DEPI cautions that: 'care should be taken when using the maps at fine scales such as parcels, properties and paddocks'.<sup>72</sup>

In addition to the level of accuracy of the proposed mapping and modelling tools, the Australian Institute of Landscape Architects raised a number of additional questions and concerns regarding a shift to relying on mapped data:

**Will the tools be available for use by the proposed date for assessment changes? Ecological systems are temporal, not static, and can change within a few years; therefore, how regularly will information be updated and how will the tools adapt to changes in environmental conditions and land uses? How will the data be populated and kept up to date? Furthermore, how are assessors (mainly Councils) meant to use these tools? It may be difficult for Councils to incorporate the local spatial data on indigenous vegetation into NaturePrint, due to the lack of standardised approaches to data collection. What funding will be available to facilitate this action?**<sup>67</sup>

At a minimum, a discretion available to decision makers inserted into the regulatory framework as to what kind of assessment process is sufficient and required would be advisable. That may include the use of digital data or on-ground ecological assessments or, further, some form of social or cultural assessment.

#### 1.2.3.4 The importance of retaining the avoidance hierarchy

Administrative efficiency has been introduced through the new policy, which is likely to make it more user-friendly for those clearing land and those providing offsets. The regulations also remove the previously existing hierarchy of first avoiding the clearing of native vegetation, then minimising the clearing, and finally offsetting that which cannot be avoided.

The purpose of the avoidance hierarchy was to ensure a precautionary approach to proposals to clear native vegetation.

That was not always the case in practice. An analysis of applications under the previous system shows that only 3% of initial applications to remove vegetation were refused, and 70% of these refusals were then overturned at VCAT.<sup>73</sup>

A greater reliance on offsetting approach assumes that biodiversity restoration projects are adequate substitutes for avoiding the loss in the first place. There is no scientific evidence to support this, and indeed offset projects typically result in a loss of overall biodiversity.<sup>74</sup> At best, new plantings will only provide adequate habitat decades into the future when the ecosystem has matured, but even this overlooks the importance of population dynamics across shorter time scales.<sup>75</sup>

A perceived shift away from the principles of 'avoid' or 'minimise' provoked a great deal of concern among submissions in the public consultation process from both the community sector and scientists:

**The North Central CMA region is significantly cleared and it is considered reasonable that efforts are made to avoid clearances, minimise impacts and/or contribute to a 'net gain'. Allowing the removal of native vegetation, in circumstances where it is deemed to have no significant impact on Victoria's biodiversity, does not reflect due consideration of the smaller isolated remnants that occur and are significant at a regional scale. These pockets of native vegetation may be important for connectivity, visual amenity or land protection.<sup>76</sup>**



*North central Victoria*

The majority of clearances under the permitted clearing regulations opt not for replanting, but for protection of existing native vegetation. This means that rather than establishing new vegetated areas, the offset instead creates long-term protection for another piece of native vegetation, often several times larger than that being cleared. The consequence is that permitted clearing regulations inevitably lead to an overall loss of native vegetation.

It is critical that the risk factors used to calculate the area of offset required be reconsidered. A recent study<sup>77</sup> found that to ensure no net loss in the population of a single frog species that lived in an area being developed, a habitat offset 19 times larger than the original habitat was needed. While each clearing and each species will be different, the proposed risk factors of 1.5 and 2 (i.e. somewhat less than 19) may well be far too low to achieve effective biodiversity protection.

### 1.2.3.5 A purpose-built information system

It is important to acknowledge that DEPI has committed to improving the information system to support the reforms to the permitted clearing regulations: 'Proposed action 2.1: Develop a purpose built information system that measures biodiversity value and prioritises locations across the state for conservation. This system can inform application assessment pathways, decision making guidelines and offset requirements.'<sup>58</sup>

DEPI currently collects information on permits that are referred to DEPI (as a referral authority) and on all offsets that are recognised as credits by the native vegetation credit register. The new online Native Vegetation Information Management (NVIM) system, which will be rolled out to support the reforms will expand the collection of information to include the permits granted by local government that are not referred to DEPI. The supporting reforms, which form part of the reforms to Victoria's native vegetation permitted clearing regulations, include clear commitments regarding the collection and reporting of information regarding the reforms to Victoria's native vegetation permitted clearing regulations.

However, if this information system is based primarily on modelling, it is erroneous to state that it 'measures biodiversity value' – rather it estimates or models biodiversity value.<sup>60</sup> Furthermore, it is critical that complementary databases are aligned with the NVIM to maximise information sharing and analysis. For instance the Victorian Biodiversity Atlas (VBA) needs to be adequately resourced for all essential database management tasks such as data capture, quality control and assurance, maintenance and updating; and the extent of native vegetation that is cleared for the purpose of bushfire protection also needs to be analysed comparatively with the NVIM.

## RECOMMENDATION 3

**It is recommended that the Victorian Government protect native vegetation on public and private land by amending permitted clearing regulations.**

### ATTRIBUTES

**The amendments will include:**

- **recognising the contribution of native vegetation to all ecosystem services**
- **expanding the tools for clearing application assessments to include ground-truthing at all scales**
- **a requirement that all applications outline the steps that have been taken to avoid and minimise the extent of native vegetation that is proposed for clearing.**

### 1.2.4 Permitted clearing: an alternative to the current offsetting framework

Conventional offset schemes such as that prescribed by the State Planning Policy Framework are effectively a 'lending bank' where the loans are never fully repaid by developers, and the unaccounted for costs are borne by society as a whole through reduced ecosystem services.

An alternative to this conventional model is a type of scheme that has been described as a 'biodiversity savings bank'.<sup>75</sup>

The administrative efficiencies of the recent reforms could be maintained, but trades will only be allowed once the 'evidence for the expected environmental benefits is beyond reasonable doubt'.<sup>75</sup> Trades that adversely affect critical habitat for listed threatened species, or that add to an already high risk of extinction, will not be allowed.

The biodiversity savings bank could be linked to carbon bio-sequestration programs like the Federal Carbon Farming Initiative, with the added advantage that this would ensure bio-sequestration plantings are undertaken to maximise biodiversity as well as carbon capture – ensuring greater diversification rather than the current reliance on monoculture plantations.

There are international examples of viable biodiversity savings bank models. In the US, there are a broad range of systems implemented from conventional offsetting models to successful biodiversity or conservation savings banks.<sup>78</sup>

A key phase of establishing a biodiversity bank in Victoria will be to transition the existing BushBroker program to become a key platform for the new savings bank. BushBroker is the flagship mechanism of government for facilitating offset deals among buyers and sellers of native vegetation offsets. BushBroker is an innovative program that warrants its good reputation but could still be improved by consolidating the proliferation of separate schemes (within some individual councils and also individually brokered deals) that duplicate effort and defy tracking and coordination.

A new savings bank would require government leadership and the consolidation of schemes into an improved BushBroker program could then be expanded to become a one-stop shop for accreditation and monitoring of offset deals for native vegetation clearance.

BushBroker could be linked with the new online NVIM, enabling the tracking of all legal clearing of native vegetation where:

- planning authorities register all applications for clearing
- approved applications are listed
- clearings are detailed (locality, area to be cleared, vegetation type to be cleared, etc.) and the offsets that are required
- permitted clearings' accredited offset deals can be verified
- reporting at various geographic scales (council area, catchment management region, statewide) can occur to enhance future planning and policy development.<sup>66</sup>



*Wattle Newstead*

### 1.2.5 Additional requirements for native vegetation protection

Victorian landowners have duty-of-care requirements established by the *Catchment and Land Protection Act 1994*. Section 20(1) requires landowners to take all reasonable steps to:

- avoid causing or contributing to land degradation which causes or may cause damage to land of another landowner
- conserve soil
- protect water resources
- eradicate regionally prohibited weeds
- prevent the growth and spread of regionally controlled weeds
- prevent the spread of, and as far as possible eradicate, established pest animals.

What remains unclear is where action by land managers crosses the threshold from being something that meets these basic legal requirements and something that ought to be supported by government incentives.<sup>13</sup>

The vast majority of Victorian landowners are very conscious of their duty-of-care obligations and the impact that their actions have on local ecosystems. However, while many individual actions by landowners (and developers) may appear to have relatively minor impacts, collectively 'traditional' activities undertaken can have significant impact on our ecosystems. Some of these activities include:

1. Cattle grazing in national parks
2. Licences for crown river frontage grazing
3. Greenfields mineral and gas exploration
4. Uncontrolled prospecting in National Parks
5. Inappropriate tourism and development in National Parks.

There is much discussion among experts and the community about the impacts of these activities, and they need to be reconsidered, their management modified.

The final point (5) was recently the subject of an impassioned plea by some of Victoria's most esteemed scientists and academics, including Sir Gus Nossal AC, CBE, Professor Barry Jones AO and former chairman of the Victorian Environmental Assessment Council Duncan Malcolm AM, JP.<sup>79</sup> They express deep concerns about the National Parks Amendment (Leasing Powers and Other Matters) Bill before State Parliament: 'The most insidious of these intrusive uses are the proposals of the Victorian Government to lease areas within our national parks for up to 99 years to encourage commercial development by private corporations.'

The Office of the Victorian Government Architect (OVGA) argues strongly that any built intervention must complement environmental, Aboriginal and historic cultural heritage and other values, and must be subject to design review by the OVGA's Victorian Design Review Panel during the project process to provide qualitative review.

## 1.2.6 Increasing native vegetation on private land

Beyond the duty-of-care obligations, DEPI has a number of programs that are designed to provide incentives to private landowners to increase the extent to which they manage their land for ecological outcomes.

The two key programs provide payments for taking measures that improve the quantity (extent) and quality of biodiversity, as well as its security:

- BushTender aims to improve high-priority native vegetation and biodiversity by providing a new source of income to landowners.
- EcoTender provides a broader framework and covers aspects of land and water management that result in environmental improvements, and is not limited to native vegetation. Outcomes can include, for example, improved hydrology or reduced levels of salinity.

These programs use an auction-based approach, wherein landowners offer to undertake specific activities for a specific price. They are established with the help of a site assessment by DEPI field officers. The government then selects the tenders that represent best ecological value for money.

The lack of funding for long-term monitoring of projects such as those funded under these schemes means that it is hard to assess the effectiveness of this investment (see 1.1 for further discussion).

Indeed, the lack of funding more generally is the primary limiting factor with programs like BushTender and EcoTender. There is currently no ongoing State Government funding, and the programs only operate cyclically as money becomes available. Generally, the schemes do not cover labour costs or opportunity costs associated with the conservation work undertaken. This means that, while cost-effective for the government, the schemes do not provide full compensation for the conservation value being provided in return by landowners. In the longer term, this failure to provide full compensation may result in diminished interest in the programs.

Although an economically efficient way of achieving incremental improvements in local biodiversity, as part of a new funding model it is critical that the government further explore ways in which the private sector can be encouraged to provide financial support to these schemes – in particular as they link to strategic landscape-scale projects such as wildlife corridors (see below).

While DEPI does make an effort to inform landowners of the incentives, and previous tenders have been fully subscribed, there is scope for more effective dissemination of information that is more readily understood.

Of course, promoting greater uptake is only of use if there is sufficient funding to enable that uptake. And while revegetation may not be as ideal as retaining vegetation in the first place, there are other activities that landowners can commit to under EcoTender that can make major contributions to ecosystem health. In addition to dealing with pest plants and animals, fencing off livestock from waterways (and allowing regrowth of native riparian vegetation) yields significant benefits to ecosystem services – especially to water quality (see 1.1).

Finally, these market-based mechanisms, which foster competition between landholders, often create tension with the community cooperative (e.g. Landcare) model of conservation, which relies on volunteerism, reciprocity and trust. Both approaches have merits, but the possible tension between the two needs to be managed to avoid ‘crowding out’ by the government:<sup>80</sup>

‘... environmental policy design should proceed with caution in the presence of intrinsic motivations. Weak regulations and small, competitive financial incentives have the greatest potential for negative effects. Recognising and supporting existing efforts can crowd in, rather than crowd out, voluntary contributions.’<sup>81</sup>

## 1.2.7 Improving connectivity

### 1.2.7.1 Strategic design of biolinks

Victoria has a highly modified and cleared landscape, and beyond protecting existing areas of high natural capital, we need to ensure these areas are well connected.

Biolinks, or wildlife corridors, can play an important role in allowing the migration of species and the mixing of genes, which in turn contributes to the resilience of the species<sup>82</sup> – in particular, resilience to the impacts of climate change.

Specifically, as temperatures rise, many species are expected to migrate south or to higher elevations. Obviously this is a major problem for many of our species – those that already live in our alpine areas cannot go much higher,<sup>83</sup> and those in southern coastal areas cannot move any further south.<sup>84, 85, 86</sup>

Excellent work is being done to establish wildlife corridors throughout Victoria, at both small and large scales. Much of this is on private land by volunteer groups,<sup>87</sup> with funding from both public and private sectors.

While individuals and community groups can and do play an important role in performing this work, the government's role of strategic leadership is critical in determining how and where biolinks are to be established.

While there are several schools of thought regarding the best structure of biolinks,<sup>52</sup> it is critical that projects that receive public funding comply with a broader strategic direction for connectivity throughout the state, and beyond state borders. To that end, the National Wildlife Corridor Plan sets out a number of guidelines for biolinks.<sup>88</sup>

- Building wildlife corridors across Australian landscapes is a cooperative endeavour.
- Corridors are to be designed and implemented in ways that benefit local communities.
- Healthy, functioning landscapes require connectivity at a variety of scales.
- Effective corridors connect the landscape across a mosaic of land tenures and land uses without affecting property rights.
- The design and location of corridors are to be based on the best available information derived from scientific research, traditional Indigenous knowledge and practitioner experience.
- Corridors are to be designed to assist native species' adaptation to the impacts of climate change.
- Corridor design recognises and manages for potential risks such as those posed by invasive species and fire.

### Case Study: Gondwana Link<sup>89</sup>

Gondwana Link is a landscape-scale conservation project in the ecologically significant south-west corner of Western Australia. It extends for 1,000 km from the western edge of the Nullarbor Plain to the wet forests of the Margaret River region, consisting of 12 smaller area programs fitting together to produce a large landscape change.



**Figure B.1.2: Gondwana Link<sup>90</sup>**

The aim of the Gondwana Link project is to reconnect fragmented ecosystems, and to protect, restore and maintain the fundamental ecological processes that underpin these ecosystems.

The project commenced in 2002 as a collaboration of key groups before the small coordination unit became a not-for-profit company, Gondwana Link Ltd, in 2009. Lead groups in the project are Bush Heritage Australia, Greening Australia, the Wilderness Society, the Nature Conservancy, Fitzgerald Biosphere Group, Friends of the Fitzgerald River National Park and Green Skills.

The project is being achieved through a range of activities, including:

- developing the case for stronger protection of the public land estate
- providing incentives for better land management, such as fencing and restoring bush land
- purchasing bush land to protect and manage
- purchasing and revegetating large areas of cleared land
- developing ecologically supportive industries, such as commercial plantings of local species
- working to achieve social, cultural, and economic change where this strengthens support for ecological values.

## Lessons learnt and challenges for Victoria

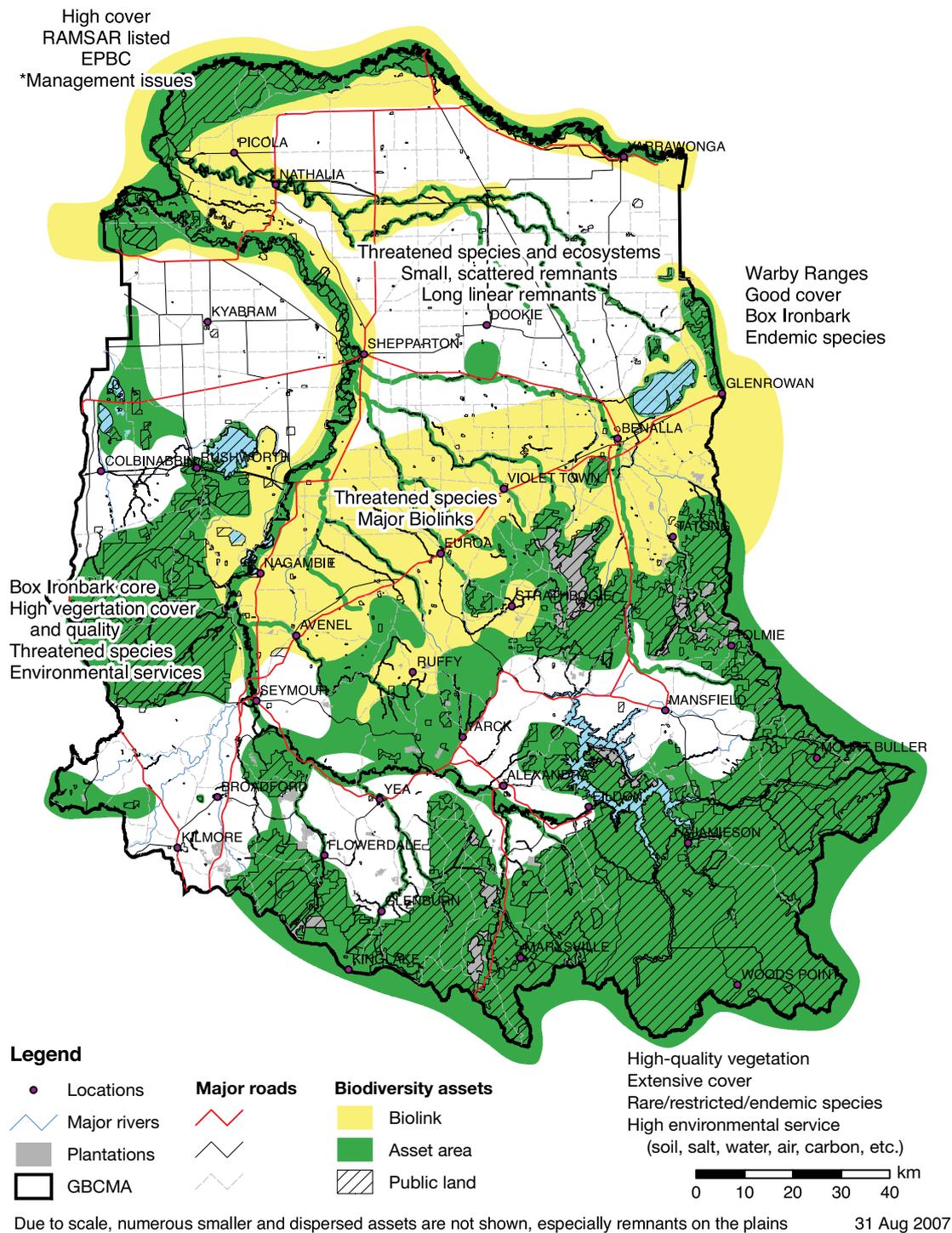
The following challenges were identified and addressed by the scientific and strategic planning undertaken in developing Gondwana Link:

- Fine-scale spatially explicit planning across complex landscapes
- Factoring in specific impacts of climate change and the potential synergistic effects of climate change and other land cover changes
- Accommodating unforeseen emerging opportunities.<sup>91</sup>

Foundation Paper Two, *Land and Biodiversity Victoria: The Science, Our Private Land Holders, Incentives and Connectivity* includes a chapter on biolinks (Chapter 6) and a case study on the Werribee River biolink with reference to other Victorian projects.

Gondwana Link is showcased here as an example of a landscape-scale initiative. A critical obstacle for Victoria in establishing a similar project is the significant fragmentation across the state in comparison to Western Australia. However, Habitat 141, which crosses the South Australian border with Victoria, is a good example of a successful, local north–south corridor initiative.

Establishing biolinks can also potentially result in adverse socioeconomic impacts – chiefly concerning land-use opportunities (such as loss of future opportunities for agricultural use or peri-urban development).<sup>92</sup> These impacts need to be addressed in the planning of large-scale connectivity projects, but the initial step is to identify the scientifically optimum biolinks and prioritise them before allowances are made for socioeconomic factors. Furthermore, these allowances need to be clearly stated and justified.



**Figure B.1.3: Biodiversity assets for Goulburn Broken Catchment, Victoria, 2010–2015**

Source: [www.gbcma.vic.gov.au](http://www.gbcma.vic.gov.au).

There has been a trend across Australia of governments increasingly relying on private individuals and groups to perform conservation work (explored further below). With that reliance in mind, maps that establish connectivity priorities can be seen as setting the broader framework within which community groups can operate – rather than perceived as government controlling, or centralising, conservation efforts.

It is also important that the community understands the overall objectives – including the need to collect data from these projects to assess the effectiveness of the efforts.

## RECOMMENDATION 4

It is recommended that the Victorian Government integrate and sponsor efforts to develop biolinks at different scales.

### ATTRIBUTES

To achieve this, the Government will need to ensure scientific oversight and community engagement to:

- evaluate effectiveness of current private land funding models and programs to deliver ecosystem services
- publish all evaluations publically
- establish funding mechanisms (including market-based initiatives) based on this evaluation
- assist Victorians to access Federal funding opportunities
- provide logistical support to landowners and community (including ongoing monitoring).

#### 1.2.7.2 Delivery of biolinks and community involvement

Community consultation is a key element in the design, development and implementation of biolinks. Volunteer efforts are the bedrock of biodiversity conservation in the private sphere. It is critical that community groups are drawn into a meaningful collaborative ethic and that they retain a sense of 'ownership' of their work.

Community groups such as Landcare play a key role in supporting individual landowners, so it is important for projects to be locally owned and driven. Revegetation projects may be geographically isolated (such as a farmer planting a row of trees as a wind break), or they may be part of a large, strategic wildlife corridor.<sup>93</sup>

The government needs to facilitate and support this community involvement, and does so through state-funded Landcare facilitators.<sup>94</sup> There are also federally funded Landcare coordinators focusing on the Carbon Farming Initiative.

While these geographically based coordinators are critical, there is also a need for coordinators focusing on key themes, such as Indigenous participation, urban and coastal Landcare and youth involvement. Funding for these roles was a 2010 state election promise, but they are yet to be created.

In addition to Landcare groups, Victoria also has 13 Conservation Management Networks. These are intended to bring together private landowners, public authorities (such as CMAs) and the wider community. Typically, these networks focus on a local ecological community, and so far they have had success in achieving good biodiversity outcomes.<sup>95</sup>

In Victoria there are over 300 'Friends of' organisations and many other small community groups such as field naturalist groups. Larger organisations such as the Victorian National Parks Association and Birdlife Australia also play a major role. This broad diversity of community volunteer efforts needs to be supported.



*Hindmarsh planting day – Landcare from the bush to the city*

The government can also work to consolidate, galvanise and harmonise these groups and promote collaboration where possible. Biolink projects present a great opportunity to bring together diverse community groups and harness their understanding of integrated NRM at a landscape scale.

Nationally, the Australian Biodiversity Conservation Strategy identifies engaging all Australians as a major priority. It aims to achieve this by mainstreaming biodiversity, increasing Indigenous engagement, and enhancing strategic investments and partnerships. The strategy has set a target of a 25% increase in participation in biodiversity conservation activities by 2015 (from 2010).

Government promotion of landscape renewal best practice is also critical. As the incentive programs have now been established and implemented for a decade, there are many examples of Victorian farms that can be showcased to demonstrate the environmental outcomes.

A key feature of this will be to demonstrate the advantages of retaining and/or restoring native vegetation. Partnerships with universities or other research organisations could be established to conduct experiments that look to test guidelines for how much land on a farm could be devoted to conservation.<sup>96</sup>

The techniques implemented by the farm would be selected based on their capacity to demonstrate a maximising of ecosystem function while maintaining productivity, also taking into account associated issues such as soil health and the impacts of conventional food production methods (see Part B: 2.1 Sustainable Food Systems).

## 1.3 Effective Protection and Delivery of Environmental Water

### Proposition

As the global climate changes, environmental baselines will no longer be stationary but change over time with patterns of rainfall and drought in south-east Australia. At the same time, water demands will change as human settlements expand and many river systems will suffer from high levels of consumptive water use.

In creating the Environmental Water Reserve (EWR), Victoria has made great progress in defining and delivering water to ecosystems. However, the greatest portion of the EWR is also the most vulnerable to change. To protect waterways from the pressures of over-extraction we need to provide greater legal protection to the water already in the EWR, expand the EWR where appropriate and use effective water accounting to address problem areas.

### Context

Healthy rivers and wetlands (referred to as waterways) support ecosystems and provide a home for species important to Victoria – such as river red gums and the Murray cod. Appropriate flows of water through waterways are essential to ensure proper ecosystem function. Water thus provides numerous ecosystem services that are essential to our society. It underpins critical elements of the economy: agricultural production, tourism and recreation.

#### 1.3.1 The importance of environmental water in providing ecosystem services for all Victorians



*Boosey Creek, north-east Victoria*

Appropriate flows of environmental water carry out a number of functions:<sup>97, 98</sup>

- stimulate animals like native fish to feed and breed (to do this cod and yellowbelly fish need to be able to move on to floodplains)
- trigger plants to seed or germinate (river red gums need flooding for seeds to germinate)
- move carbon (important for food chains) between rivers, floodplains and estuaries
- allow fish and plants to move about the river system and colonise new areas
- help restore groundwater supplies
- stabilise river banks through better vegetation growth, reducing erosion into the river
- flush out the salt along river banks and floodplains
- prevent toxic blue–green algae blooms
- provide social and recreational uses such as boating and fishing.

The importance of environmental flows has been clearly demonstrated in the past decade. The Murray Hardyhead (a freshwater fish endemic to the lower Murray–Darling river system in South Australia, Victoria and New South Wales) is one of the most highly threatened fish in Australia. In 2008 the remaining populations were under threat from lack of water, driven by a decade of drought and greatly exacerbated by river regulation on the Murray, which was impairing breeding by severely disrupting connectivity between populations.<sup>99</sup>

In this case, a suite of actions were taken to enable breeding and protect the species, including provision of environmental water and significant earthworks. These responses were, however, beset by tensions between government and the irrigator community. Rather than environmental water being delivered to habitat areas as a matter of procedure, it required the intervention of the Victorian premier.<sup>100</sup>

### 1.3.2 Threats to environmental water

The threats to future water resources in Victoria are:

- reduced rainfall and inflow under a changing climate
- land-use changes (for example, forest plantations on previously unforrested land can reduce the amount of rainwater reaching waterways)
- declining groundwater and water-quality impacts, including pollution, bushfires and salination.

A changing climate in south-eastern Australia will increase the uncertainty of supply (see Foundation Paper One, *Climate Change Victoria: The Science, Our People and Our State Of Play*, Chapter 4) and compound the problems caused by over-extraction.

Recent projections of climate change impacts in the region estimate that for 1°C of warming, average annual rainfall is expected to decline by 0–9% – this reduction is expected to double with 2°C of warming.<sup>101</sup>

In many cases most of the Environmental Water Reserve is water left in rivers after other uses have been met. As a result, reduced flows caused by climate change disproportionately affect this water. For example, in the dry years of the Millennium Drought up to 95% of water was extracted from the Campaspe River system for towns and irrigation, greatly intensifying the pressures of drought on the environment.<sup>97</sup>

Modelling of the environmental flow components of the Campaspe led to the conclusion that, even under baseline conditions, there are many occasions when the minimum flows needed to sustain populations of Murray cod are not achieved.

If conditions of either moderate climate change or the low inflows of the drought years are assumed, then environmental flows become even lower. Without some form of intervention, it is unlikely that the river will be able to support natural populations of native fish.<sup>102</sup>

### 1.3.3 National Water Initiative

Action on environmental water has been led at the federal level by the National Water Initiative (NWI), guided by the National Water Commission (NWC), which oversees framework development and reports on implementation. The NWI seeks to improve productivity and efficiency while ‘establishing clear pathways to return all systems to environmentally sustainable levels of extraction’.<sup>103</sup>

All states and territories were required to develop an implementation plan to meet commitments under the National Water Initiative (2004). Victoria’s plan was accredited by the National Water Commission (NWC) in 2006.

In it, the government committed to:

- protect and where necessary repair stressed rivers and groundwater systems – the natural source of all our fresh water – by giving them legal water rights and conducting restoration works
- price water to encourage people to use it more wisely
- permanently save water in our towns and cities, through commonsense water-saving and recycling measures
- secure water for farms through pioneering water allocation and trading systems
- improve monitoring and reporting on the quantity and quality of the state’s water resources.

### 1.3.4 Water rights

The agencies in Victoria responsible for allocating and delivering environmental water are:

- the minister for water, who has broader water allocation responsibilities under the Water Act
- the minister for environment and climate change, who is responsible for the environmental watering policy framework
- DEPI, which manages the water allocation and entitlements framework, develops state policy on the management of water resources, waterways and environmental water, and has oversight of the Victorian Environmental Water Holder (VEWH)
- VEWH, which decides on the most effective delivery of water and communicates those decisions; is responsible for public engagement; and commissions projects to demonstrate ecological outcomes; and drafts annual watering plans developed in consultation with, and delivered by, waterway managers
- waterway managers (Melbourne Water and catchment management authorities), which identify regional priorities; undertake local flow studies, monitoring and reporting; and propose annual environmental watering actions to VEWH
- water corporations, which provide infrastructure (dams and irrigation) to hold and deliver environmental water; and ensure all passing flow commitments are delivered.

There are four different types of ‘rights’ to take water in Victoria, these are issued as entitlements:

- bulk entitlements
- environmental entitlements
- water shares
- water licences.

In addition to issued entitlements, sections 8.1 and 8.4c of the *Water Act 1989* allow individuals to take water for domestic and stock purposes.<sup>104</sup>

In regulated rivers (where water is held in storage), rights to use water exist as bulk entitlements and are held by water corporations in perpetuity.

Within these bulk entitlements, water shares are allocated, urban customers are supplied and licences for irrigator usage are issued. Water-use licences do not specify a volume for use, only the conditions under which water can be used.

At present there are around 38,000 water shares in the state with a market value of over \$4 billion.<sup>105</sup> In groundwater and unregulated rivers, consumption of water is limited by permissible consumptive volumes (PCV) and sustainable diversion limits (SDL) respectively. These aim to prevent extraction of water that will damage the environment. However, limits on use often reflect historical allocation rather than a sustainable level of use for that river.

In areas of the state that fall within the Murray–Darling Basin, water use is also limited by the Murray–Darling Cap – a limit that was set at the volume that was extracted in 1993–94. Any new water shares or water licences cannot exceed these limits. In 2019, this cap will be replaced by an SDL.



*Barmah redgum flooding 2011*

### 1.3.5 Sustainable water strategies

Management of water in Victoria is guided by the regional sustainable water strategies (SWSs). These documents, produced between 2006 and 2011, describe the water supplies and requirements of four regional areas (Central, Northern, Western and Gippsland), as well as outlining current policy and challenges for issues such as changing land use, future threats to water supply or balancing consumptive needs.

Where necessary, the SWSs identify unregulated systems that are designated Water Supply Protection Areas (WSPAs). These are areas that are highly flow-stressed and require a statutory management plan to address problems of over-use.

The Victorian Government has introduced measures to prevent future over-allocation of water systems (incorporated into the regional SWSs), and has made significant investment in recovering water for environmental use. There are, however, still problems with pressures from existing over-allocation.<sup>106</sup>

While Victoria does not issue new water licences that exceed the various allocation caps, it is a key feature of the state water allocation framework that the rights of existing water users be protected.<sup>15</sup> When addressing the sustainable use of water, government plans specifically state that interventions should not affect existing water users (e.g. Northern Region SWS).

This policy applies even in river systems that are potentially over-allocated, such as the Campaspe.<sup>97, 102</sup>

The present State Government position is that it does not explicitly identify systems as over-allocated. Instead, it manages the needs of the environment through the WSPA designation.

To date, the government has not provided data to the NWC on over-allocated systems in the state. However, the NWC identified 18 water systems in Victoria that are listed as WSPAs and, by implication, were over-allocated and/or overused in 2011 – rising from a total of nine in 2009.<sup>107</sup> This increase is a result of greater recognition of system stress as SWSs are implemented.

### 1.3.6 Defining environmental water

The *Australian Environmental Water Management Report 2010* (NWC 2010) uses a commonly agreed definition of environmental water: 'Environmental water is the water regime provided to achieve environmental objectives.'

The pressures on environmental water were brought acutely to the fore during the prolonged dry conditions that Victoria experienced between 1997 and 2009. The Millennium Drought served to exacerbate the stress that many water systems were under due to high levels of extraction for consumptive use.

In response, reforms to the *Victorian Water Act 1989* in 2005 established the existence of the Environmental Water Reserve.

The Environmental Water Reserve (EWR) is made up of three parts:

- **Environmental entitlements (or held water):** This water has the same legal status as other bulk entitlements (e.g. water rights held by water corporations). It is the only part of the EWR that can be stored and actively managed,
- **Obligations on bulk entitlements (or planned water):** Water that can be destined for consumptive use (some passing flows are primarily for environmental outcomes) but must provide minimum flows at determined points to meet environmental needs, and
- **Above-cap water:** Water that remains in excess of all other entitlements and cannot be kept in storage. Above-cap water comprises the largest portion of the EWR and is the most susceptible to natural variation and climate change.

Environmental entitlements have identical legal status to bulk entitlements for consumption and represent water that is effectively 'owned' by the environment. In 2009, this portion represented 6% of the total EWR<sup>13</sup> and is likely to have increased since then.

Some bulk entitlements specify that passing flows are reduced or stopped when inflows fall below a certain level.<sup>102</sup> These conditions are likely to become more common in a changing climate.

There is more protected water available for environmental flows than in the past. However, because of the relatively high vulnerability of most of the EWR and the possibility that, in future droughts, environmental water could be used to bolster consumptive requirements at the expense of waterway health, there have been calls for a greater protection of environmental water outside of environmental entitlements.<sup>108</sup>

In addition, a changing climate means that we can no longer rely on past trends of rainfall and drought to predict future conditions, and this is to be recognised when setting and reviewing targets for environmental flows.



*Irrigation channel water wheel north-east Victoria*

### 1.3.7 The Victorian water law review 2014

A review of the Victorian water law, due in 2014, intends to investigate the effectiveness of current water allocation and management arrangements. The review seeks to simplify the current framework 'without adversely impacting on current entitlements', suggesting that it is unlikely to recommend the reduction of existing consumptive entitlements.<sup>109</sup>

However, the potential exists to reclaim water from consumptive use through mechanisms such as the sustainable water strategies purchase. These can set targets for water to be recovered via purchase on the water market.

It is critical that the review explicitly assess the potential outcomes of reducing consumptive entitlements through purchase.

Non-entitlement water in the EWR does not have equal legal status to water managed by the VEWH. This water (planned and above-cap water) is the most vulnerable to decreased flows in a changing climate.

It is important that any planned water listed as part of an environmental entitlement remains a part of that entitlement.

Where planned water cannot be converted to environmental entitlements, legal protection could still be ensured so that, when they are reduced in dry years, the impact on the previous beneficiaries (including the environment, and downstream domestic and stock users) is offset by the water corporation that receives the extra water.

This approach was applied by the government during the drought and makes sure that any consumptive reduction to passing flows during drought is not cost-free to users of the extra water.

The State Water Accounts provide a good tool for monitoring how water has been delivered and compliance with passing flow requirements. The government could push for the rapid release of these accounts to identify any problem areas in a timely manner, and be prepared to take enforcement action for any breaches.

## RECOMMENDATION 5

It is recommended that the Victorian Government improve the protection of the existing Environmental Water Reserve.

### ATTRIBUTES

Protection would be improved by:

- defining types of water outside environmental entitlements (e.g. planned water, conveyancing water, evaporation, flood) that cannot be managed
- identifying physical and policy barriers to efficient delivery of water options for managing non-entitlement water for environmental outcomes
- providing clear requirements to comply with terms and conditions of both bulk entitlements and environmental entitlements and include penalties for non-compliance
- including the conversion of non-entitlement water to environmental entitlements, with oversight of delivery passed to the VEWH where the conversion benefits the environment, water can be managed effectively and there is no impact on the reliability of water availability
- retaining any planned water listed as part of an environmental entitlement as part of that entitlement.



*Yarra River Parks Vic cleaning activities*

### 1.3.8 Formation of the VEWH

Once environmental entitlement to water had been established, the need for an independent decision maker to guide the use of water drove the formation of the VEWH through an amendment to the Water Act. The VEWH began operation in 2011.

The VEWH was established to hold and manage environmental water entitlements and is not involved in defining water entitlements and allocations<sup>110</sup> (see 1.3.4 Water rights).

The purpose of the VEWH is to manage the environmental water holdings to:

- maintain the Environmental Water Reserve in accordance with the Environmental Water Reserve objective
- improve the environmental values and health of water ecosystems, including their biodiversity, ecological functioning and water quality, and other uses that depend on environmental conditions.<sup>110</sup>

The Victorian model has key differences to other existing water holding entities (such as the Commonwealth Environmental Water Holder):<sup>100</sup>

1. **Management focus:** The VEWH owns a large water portfolio and is responsible for efficient, accountable and effective management rather than further water recovery, making the VEWH unique among environmental water management organisations.
2. **Increased independence:** There is a limit on the power of the environment minister to direct the actions of the VEWH; and its corporate form provides the VEWH with legal standing and the ability to enter into contracts in its own right.
3. **Increased flexibility:** Under its legislation, the VEWH may be able to trade water more freely than other government-funded agencies.

#### 1.3.8.1 Delivery of environmental water

The VEWH works closely with waterway managers (Melbourne Water and the catchment management authorities) to produce seasonal plans for water delivery, and is a unique statutory environmental water management body in that the environment minister cannot direct its actions in respect to delivery or trade in water.

In 2011–12 (the first full year of operation), 92% of planned priority watering actions were fully or partially achieved by the VEWH and waterway managers.<sup>111</sup> However, it should be noted that this was a year of particularly high rainfall.

Total delivery across the state was 516,000 ML of water to 35 river reaches and 10 wetlands. Some key outcomes from these deliveries include:

- The first environmental water release into the Yarra, which maintained water quality and improved habitat for fish. Sightings of Australia grayling suggests successful upstream migration (see Case Study: Yarra River Environmental Flow Management).
- Inundation of Lake Carpul (a northern wetland) – an event that has not occurred since 1993. The lake is dominated by a black box community that generally requires inundation every one in eight years. Without the 2,062 ML of environmental water the lake would have continued to decline. This water made sure the environmental values were maintained while the CMA investigated a works program to make future watering more efficient. Over 20 species of waterbirds were recorded.
- Provision of environmental water to the Wimmera–Mallee wetlands through the Wimmera–Mallee Pipeline. This action supported a local population of Australian painted snipe (a nationally vulnerable and state-listed threatened species) and a variety of locally significant animals.

## Case Study: Yarra River Environmental Flow Management

The water holdings in the Yarra River consist of:

- 17,000 ML per year
- minimum passing flows at various points along the river
- 55 ML per year in the Yarra River downstream of the confluence with Olinda Creek.

### Objectives

The water holdings are used to provide a range of specific flow events in the Yarra River. These flow events have been identified by the Yarra River Environmental Flow Study,<sup>112</sup> a scientific study that considers the stream-flow-dependent environmental values of the Yarra River and the water required to support them.

The environmental flow objectives identified for the Yarra River include:

- Maintain channel geometry throughout all reaches.
- Improve access to suitable habitats for fish and macroinvertebrates by providing flows that scour sediment from pool and benthic surfaces in riffles.
- Maintain longitudinal connectivity for fish passage.
- Increase the zone of flood-tolerant vegetation on banks by drowning terrestrial vegetation encroaching on banks.
- Ensure minimum flows do not cause flow related declines in water quality.
- Preserve inundation of wetlands and floodplains.

### Actions

Each year Melbourne Water submits a Seasonal Watering Proposal for the Yarra River that outlines the priority watering actions for the upcoming year. Following inclusion in the Seasonal Water Plan by the VEWH, Melbourne Water is issued with a Seasonal Watering Statement that enables them to deliver the Yarra water holdings in accordance with the Seasonal Watering Plan.

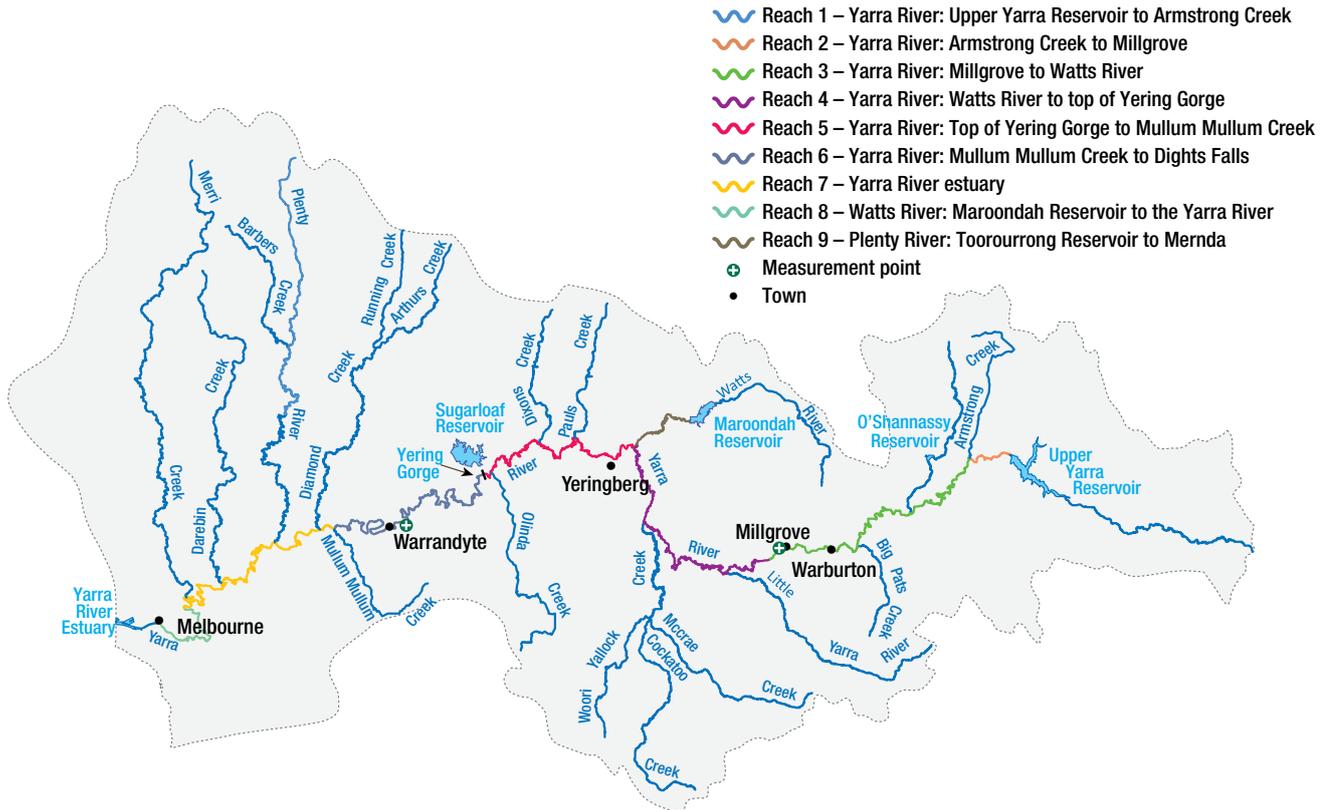
Management of the water holdings includes actions such as:

- Releasing specific flow events into the Yarra River for environmental benefit.
- Placing a temporary 'cease to harvest' order on the Yering Gorge pumps to allow stream flow to pass through the system.
- Working with storage operators to maximise the environmental benefit of operational releases of water into the Yarra River.

In 2012–13 Melbourne Water released 12,693 ML of water into the river for various environmental flow events into the river including:

- A winter flow event targeted at scouring sediment from the bed of the stream to improve habitat for fish and macroinvertebrates.
- Two summer flow events aimed at improving water quality and providing connectivity between habitats for fish and macroinvertebrates.
- An autumn flow event targeted at the spawning of Australian grayling, a native threatened fish species.

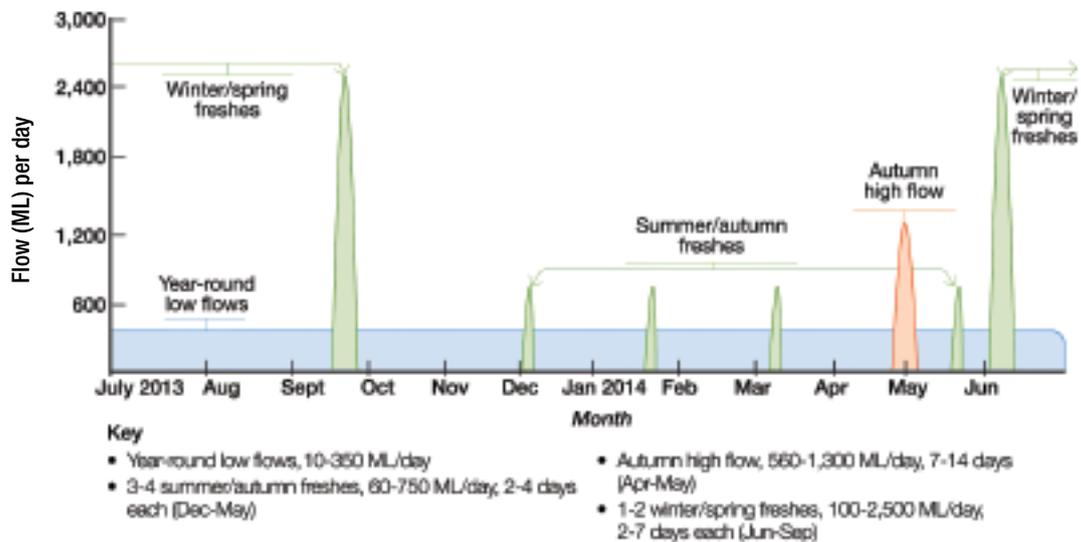
Water Holdings throughout the state are managed adaptively, allowing the delivery of the entitlement to be tailored to the prevailing climatic conditions and new knowledge gained from the monitoring and evaluation of previous flow events.



**Figure B.1.4: The Yarra system showing the different ‘reaches’ of the river**

The reaches are essentially the management units of the system, with each reach having specific flow recommendations.

<b>Low flows</b>	Low flows generally provide a continuous flow through the channel. This may either maintain the flow above a ‘cease to flow’, or provide habitat as a change from ‘high flows’.	Connects in-stream habitats and can have benefits for other system users, such as providing water for livestock.
<b>Freshes</b>	Small or short-duration peak flow events. These are flows that exceed the base flow and last for at least several days. Freshes are a key contributor to the variability of flow regimes, providing short pulses in flow.	Helps to maintain or improve water quality and prevents algal blooms from occurring.
<b>High flows</b>	Persistent increases in the seasonal base flows that remain within the channel. High flows do not fill the channel to ‘bankfull’.	Allows for fish migration and enhances recreational fishing opportunities.



**Figure B.1.5: Priority watering actions in the Yarra system 2012–13**

This illustrates the range of watering events Melbourne Water could have supplied under the Seasonal Watering Plan.

### 1.3.8.2 VEWH activity in the water market

In managing its water holdings, the VEWH has access to the market in water shares and water allocations. It is able to engage in temporary trade of water holdings in order to meet its objectives.

In 2011–12, the VEWH sold 12,000 ML of allocation across several systems.<sup>111</sup> Proceeds from the sale of water are used for future watering priorities for waterways and direct environmental outcomes in rivers and wetlands. This may include funding the delivery of environmental watering actions, purchasing water allocation at a different time – or in a different system, or funding works and measures to improve water-use efficiency.

In this way, the VEWH can use trade to actively improve its overall objectives of improving environmental conditions. For example, the VEWH used sale funds to make a joint purchase – with Melbourne Water – of an additional water entitlement in the Werribee Basin, increasing the water available for priority watering actions in the winter of 2012.<sup>113</sup>

The need to achieve value for money in its management decisions creates an incentive for the VEWH to consider the marginal benefits of either using its water or using the funds generated by sale of the water. When the marginal benefit of selling the water and investing in an alternative activity is greater than using the water directly, it is reasonable to expect that the VEWH would sell. This capacity to sell water to achieve alternative benefits (such as infrastructure investment to improve efficiency of environmental watering, or investment in some of the many other elements of environmental health in aquatic ecosystems) extends the role of the VEWH beyond merely the provision of environmental water.

In time, this may lead to competition between the waterway managers for access to available water resulting in a de facto extension of the role of the VEWH into broader aquatic ecosystem management, by rewarding those waterway managers who best achieve efficient environmental watering through integrated catchment management.<sup>100</sup>

The most recent research in the Southern Murray–Darling Basin by the NWC<sup>114</sup> concluded that: ‘Water markets are making a major contribution to the achievement of the [National Water Initiative]’s overall objective of optimising the economic, social and environmental values of scarce water resources.’

The VEWH is able to act in the state and interstate water markets to manage the EWR and there is scope for investigation on how water holdings can be best managed through those markets, particularly in dry years.

Research focusing on the Murray–Darling Basin has been undertaken by the Commonwealth Scientific and Industrial Research Organisation (CSIRO) – investigating how sophisticated market transactions can be used to improve environmental outcomes.<sup>115</sup> CSIRO models the environmental flow outcomes of using time-limited products, such as entitlement leasing and options contracts.

Products of this type allow private entitlement holders a greater sense of security while still allowing water to be used for environmental purposes at optimal times. Indeed, trading by the VEWH is in allocations, which is temporary trade.

Further research will provide useful insights into the optimal balance between the various forms of water products and irrigator attitudes to using the water market in this way. This can inform the government’s ability to develop sophisticated trading products, such as time-specific leasing, to manage environmental water.

### 1.3.9 Future challenges – monitoring and demonstration of outcomes

It can be difficult to determine the extent to which planned environmental water is being made available, as most reporting methodologies are established to monitor water managed through entitlement provisions.

In the long term, it is critical that the VEWH demonstrate the benefits of environmental watering, in terms of both the maintenance of healthy waterways and the benefits and services that we accrue from them.

#### Research

Outcomes for environmental water delivery are based on environmental objectives used to set delivery of volumes of water. Therefore operational plans for releases of water would best be guided by an extensive research program to maximise those outcomes. Targets would also incorporate input from community engagement to identify benefits taken from waterways and community-identified values that would be improved by investment.

Long-term research, guided by the VEWH, could be conducted into strategies for the most efficient delivery of water for the provision of ecosystem services.

It would also be advisable to assess strategies such as the creation of dedicated infrastructure and the use of sophisticated water market products.



*Water landscape Murchison north-east Victoria*

## Monitoring

Maximising the efficiency of water delivery in providing outcomes will depend on demonstrating the effects of those deliveries. DEPI has a monitoring system for assessing the response of rivers to environmental watering and is developing a similar system for wetlands.<sup>17</sup> This can form the basis of long-term monitoring of the outcomes of environmental water delivery – the benefits generated, and the identification of problem areas.

Effective delivery, accounting, research and monitoring will ultimately identify systems where ecological outcomes are not being met. The VEWH and water managers can drive the process of improving outcomes either through investment in restoration or infrastructure, or securing additional water for these systems.

## Target setting

Each site that is provided with environmental water has specified environmental objectives that are set annually. Examples of these outcomes that the VEWH are seeking from 2012–13 to 2015–16 include:

- increased fish, bird and bird breeding pairs
- improved water quality
- increased diversity of aquatic species
- regeneration of riparian vegetation.

Providing environmental flows will require considerable investment and it is crucial, therefore, that the benefits can be observed. This requires an effective ecological monitoring program that can demonstrate effective use of the water holdings and is supported by timely and transparent reporting.

To this end, the Victorian Government has developed and is undertaking the Victorian Environmental Flow Monitoring and Assessment Program (VEFMAP),<sup>116</sup> and is developing a similar program to monitor wetland responses to watering.<sup>15</sup> These programs will provide a sound scientific basis for the link between particular flow components and the ecological response.

To further improve knowledge of ecosystem responses, waterway managers carry out targeted ecological monitoring following environmental water deliveries and provide the information to the VEWH (see Case Study: Yarra River Environmental Flow Management).<sup>117</sup>

Effective delivery, accounting, research and monitoring will ultimately identify systems where ecological outcomes are not being met and could be the focus of future investment.



*Wimmera River*

## **RECOMMENDATION 6**

It is recommended that the Victorian Government use research and monitoring to protect environmental water and set targets.

### **ATTRIBUTES**

Statewide water targets are best established through a consideration of ecosystem services benefits. Targets would be reviewed and updated regularly using a transparent framework.

Indicators to measure progress towards targets are:

- environmental flows necessary to maintain services
- waterway health
- standard indices of water health
- social and recreational benefits.

## 1.4 Review of Impacts on Ecosystems Due to Planned Burning

### Proposition

**Large bushfires in Victoria can have severe impacts on life, property, communities and ecosystems, and it is necessary that the government act to mitigate risks. Climate change is likely to increase the risk of fires.<sup>118</sup>**

The fuel reduction target of a minimum annual rolling average of 5% of public land recommended by the Victorian Bushfire Royal Commission (VBRC) was largely intended to improve protection of life and property in the event of a very large fire. It is possible that this target will not provide the level of protection assumed by the public and it is ecologically inappropriate for many ecosystems, leading to substantial damage to biodiversity and ecosystem functions.

The rezoning of planned burning zones to elevate the priority of asset protection may act to compound environmental damage.

Ultimately, there would be a risk-based management approach to fire prevention. The use of planned burning for fuel reduction would be one tool among a wider set of options.

### Context

The Victorian Bushfires Royal Commission (VBRC) was convened in the tragic aftermath of the 2009 Black Saturday bushfires. The Victorian community sought to learn from those experiences to minimise bushfire losses in the future.

#### 1.4.1 A future bushfire regime that protects life, property and ecosystem services

Alongside a focus on preparedness, response and recovery, the VBRC considered how the state would use land and fuel management to reduce the risk of very large fires.

A range of recommendations in the VBRC final report suggested the State Government:

- burn an average of 5% of public land annually to reduce fuel loads (Recommendation 56)
- report on the outcomes of that burning (Recommendation 57)
- upgrade current monitoring programs to assess the outcomes of planned burning on biodiversity (Recommendation 58)
- amend the Code of Practice to include a risk analysis model for planned burns with a clear set of risk-reduction objectives, expressed as measurable outcomes (Recommendation 59).

While the findings of the VBRC were welcomed and DEPI is making progress in the development of risk frameworks and reporting outcomes, criticism of Recommendation 56 has continued.

A 5% target is an unfortunate compromise that may not provide a significant increase in asset protection. At the same time it will result in a high rate of burning that will be detrimental to many Victorian ecosystems.

This problem is compounded by the revised management zones in the Code of Practice. Previously, the Code of Practice differentiated between zones where burning was carried out for asset protection and where it was justified primarily on ecological grounds. The management outcomes for these zones have now been reclassified to effectively give primacy to asset protection in order to meet the 5% target.

The target of yearly burning on 5% of all public land statewide is too blunt an instrument. A preferable option, echoed by the VBRC implementation monitor, is that government develops clearly articulated planned burning objectives for asset protection and ecological management. Furthermore, annual targets for these need to be based on sound evidence and clearly separated at the local scale. Any statewide target would be the sum of these regional targets and not vice-versa.

#### **1.4.1.1 Impacts and losses from severe bushfires**

Bushfires are a fact of life in Victoria and have played a central role in the evolution of the landscape over millions of years. However, while fires are crucial for the functioning of indigenous ecosystems – such as dry eucalypt forest – severe fires can lead to very large losses. These are losses in terms of life and property – with all their attendant secondary impacts – and also to the ecosystem services on which our society depends.

Some of the major fires of the last 20 years have inflicted significant initial impact\* on ecosystems. The largest of these have been defined by the Bushfire CRC as ‘severe’ due to the magnitude of their impacts.

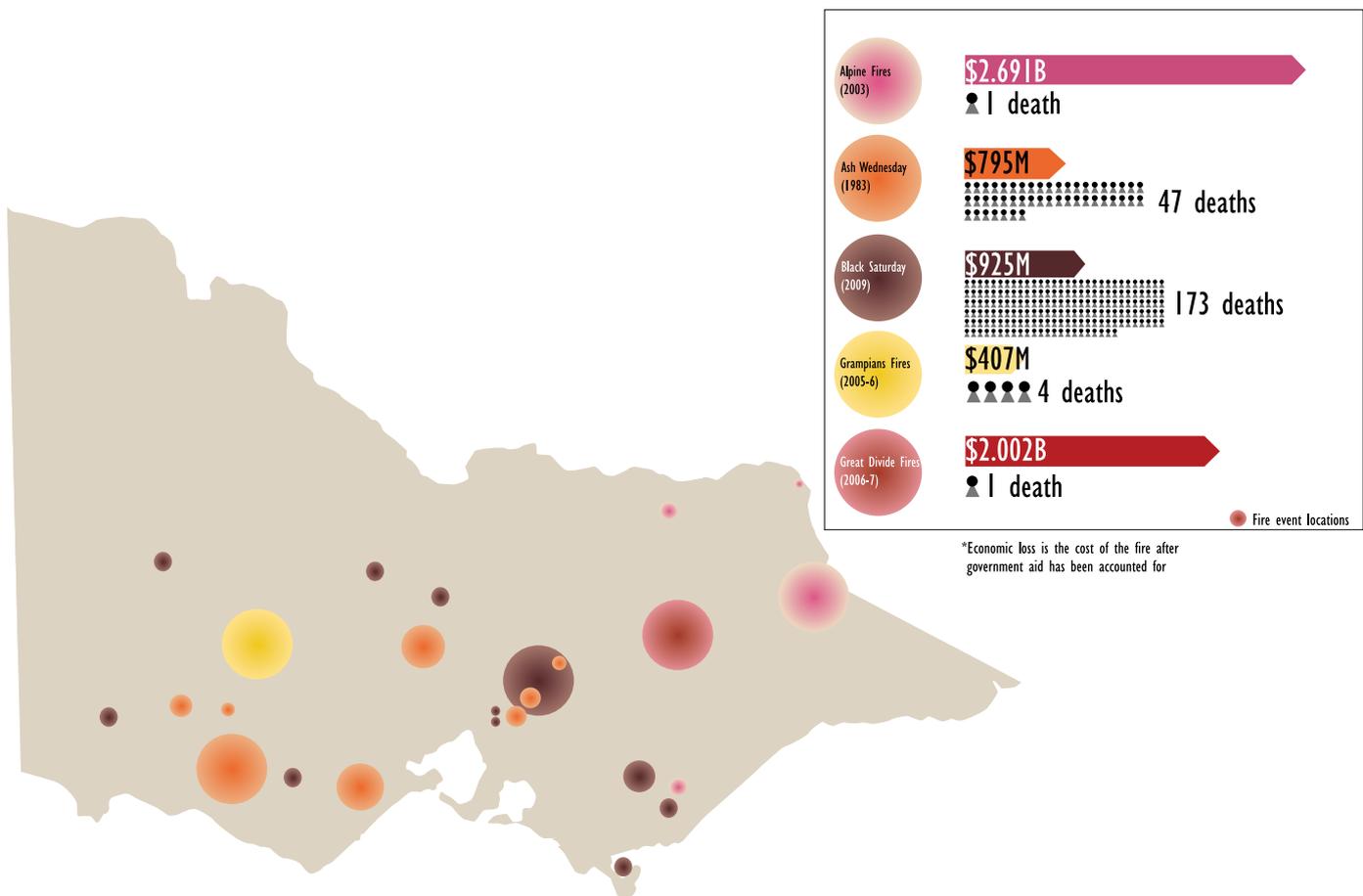
The most severe fires experienced in Victoria in recent years were the Black Saturday fires of 2009. These fires caused some of the most considerable loss of life and property in recent history. Other fires, including the Ash Wednesday fires of 1983, also caused major losses.

Victoria has also experienced severe fires that, while not causing major damage to life or property, have severely impacted on ecosystem services.

The Great Dividing Range fires (1996–97) and alpine fires (2003) each caused losses valued in excess of \$2 billion.<sup>120</sup> The large majority of these losses were from primary production in the form of forestry losses but other ecosystem services were affected, such as the availability and quality of water in catchments.

---

\* It is important to distinguish between the considerable initial impact of a major fire, and the well-documented capacity for long-term recovery if there is no subsequent fire. Generally the natural environment has been able to accommodate occasional ‘catastrophic’ fire (though that capacity may diminish considerably in isolated, fragmented or already degraded ecosystems). On the other hand, while a single low-severity burn may have little initial impact, high frequency low-severity fire has the potential to radically alter many EVCs. In this respect, note the FFG Threatening Process listing of ‘High frequency fire resulting in disruption of life cycle processes in plants and animals and loss of vegetation structure and composition’.



**Figure B.1.6: Bushfire-related deaths and economic losses**

Source Bushfires CRC.

The effect of the 2003 alpine fires on hydrology was observed in subsequent years. There has been an initial increase in streamflow in burnt areas but it is expected that there will be a subsequent reduction as the forest re-establishes – leading to long-term reduction in water available for consumptive use.<sup>121</sup> EPA monitoring also noted that water quality was negatively affected in burnt areas over the same period.<sup>122</sup>

As the Australian climate changes, fires are expected to become more frequent and, if there is no intervention, increase in severity.<sup>123</sup> Since populations in fire-prone areas are growing, managing the impacts of fires has never been more important.

### 1.4.1.2 Risk-based fire planning

Fire cannot be eradicated from the landscape, and it serves as an ecological process, so it is essential to develop effective management strategies that allow fire to carry out its ecological function while reducing the impacts of severe fires.

This can be best achieved through risk-based planning. This approach identifies assets in need of protection. This could include:

- property
- agricultural land
- ecosystems that provide services such as clean water
- fire-vulnerable areas of high conservation value (such as rainforest)
- areas of high tourism value.

Risk-based planning assesses the likely risks to these assets from uncontrolled bushfires, often using sophisticated modelling that incorporates landscape elements and fire behaviour. Management treatments, including planned burning for fuel reduction, are then deployed to reduce risks to acceptable levels.

This approach promotes a desired outcome. Complexity arises when outcomes require conflicting treatments. Often ecosystem assets can be under-represented in risk frameworks due to a lack of high-quality information on risks from fire.

DEPI's Future Fire Project<sup>124</sup> is working to provide recommendations on a methodology for defining and evaluating theoretical landscape-scale fire management options that deliver desirable outcomes for sustaining biodiversity and ecosystem services, as well as meeting community needs for protecting human life and property.

### 1.4.1.3 VBRC and the 5% burning target

The state has always taken measures to reduce bushfire risks through a range of strategies, including planned burning to reduce flammable material (and thus the likelihood of a severe fire).

This management technique received significant attention in the aftermath of the Black Saturday fires.

In the 20 years before 2009, the area of planned burning on public land was between 50,000 and 150,000 ha annually (between 0.6 and 2% of all public land).<sup>125</sup>

After consultation with an expert panel and representatives of the forestry industry, the Victorian Bushfires Royal Commission (VBRC) concluded that this burning level was insufficient to significantly reduce risk to life and property from major fires.

Ultimately the VBRC recommended an annual rolling target of burning of 5% (390,000 ha) of public land (Recommendation 56).<sup>\*</sup> The aim of this recommendation was to reduce fuel loads across the entire state and so decrease the incidence and intensity of bushfires.

This recommendation was accepted in principle by the then Labor Government and it continues to be adhered to under the Coalition Government. Both governments have increased resource allocation annually to increase planned burning activities towards the long-term goal of 5% public land.

To this end, in 2011–12 DEPI completed planned burning of over 197,149 ha, representing the most extensive burning on public land since 1991<sup>127</sup> despite the unusually wet weather.

### 1.4.1.4 Impacts of planned burning

Meeting a rolling annual target of burning on public land will expose some areas of the state to a higher frequency of fires than have historically been achieved through planned burning.

This may be suitable for some open forest and shrubland systems that have relatively high frequencies of recurring fires (e.g. 10–30 years)<sup>128</sup> – indeed the VBRC expert panel recommended 5% annual burning of stringybark foothill forests.<sup>129</sup>

However, this target cannot be extended to other natural ecosystems in the state, which are less well understood and have different fire dynamics. For example, the average fire interval for mountain ash forests is 35–75 years.<sup>130</sup>

<sup>\*</sup> VBRC Recommendation 56 is 'The State fund and commit to implementing a long-term program of prescribed burning based on an annual rolling target of 5 per cent of public land.'

Land managers use the tolerable fire interval (TFI) to assess suitable burning frequencies for natural systems. This is based on the assumption that the ideal interval between fires for any given vegetation community is in the range between the maximum interval – a frequency that allows constituent species to reach maturity and set seed – and maximum interval – the longest time possible before there are species extinctions in the absence of fire.

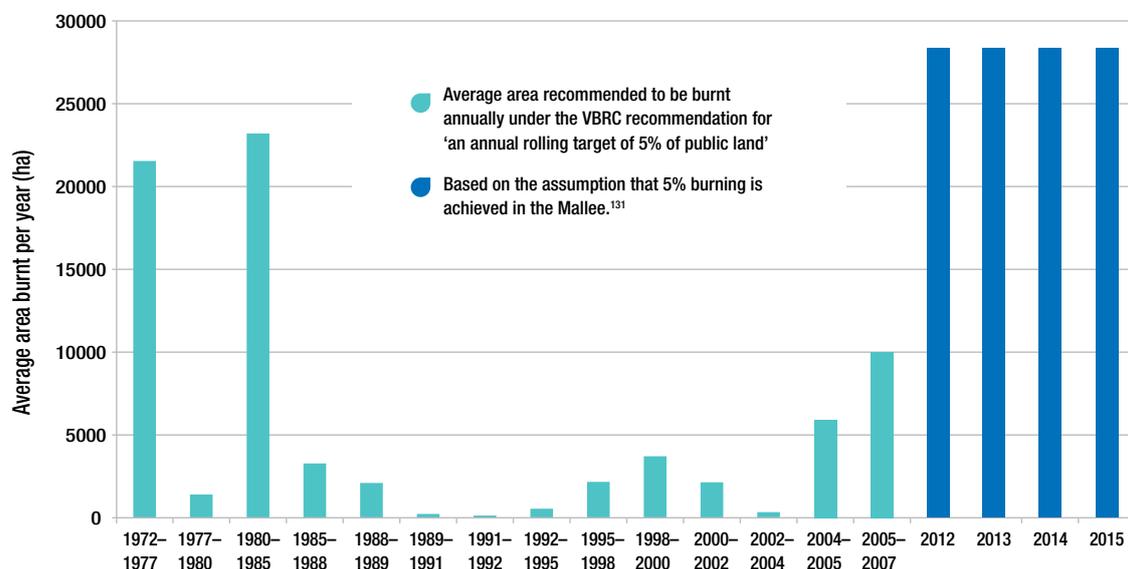
There are a range of habitat types in Victoria that have minimum TFI for low-intensity fires of less than 20 years (e.g. foothills forest, grassy forest, box/ironbark, grasslands). Conversely there are also several habitats with minimum TFIs of 30–80 years (Mallee Saltbush, closed forest, mist forest, high-altitude shrubland and woodland).

Planned burning of 5% of public land would likely be achieved with varying fire regimes across the state, meaning that some ecosystems would be exposed to a longer interval between fires.

However, if large areas of public land are burnt at a rate that far exceeds natural regimes, there are likely to be numerous impacts on biodiversity and ecosystem function (see Case Study: Fire Regimes and the Birds of the Mallee).

Research conducted in the Mallee has examined the outcomes from hypothetically achieving the 5% target in that region. This work found that, if implemented, burning would be nearly treble the historic rate of burning from bushfires and planned burning combined (Figure B.1.7).<sup>131</sup>

Furthermore, attainment of the target excludes anticipation or incorporation of burning from unplanned bushfires. This means that to experience any natural fires would result in a total burnt area that is potentially even greater than projected figures.



**Figure B.1.7: Average area burnt per year by bushfires and planned burning in the Mallee region between 1972 and 2007 (lighter bars) shown with the average area recommended to be burnt annually under the VBRC recommendation for “an annual rolling target of 5% of public land” (darker bars)**

Ultimately, adopting the recommended burning regime may lead to the burning of habitat that is predominantly in the early stages of generation (less than 20 years) since the last fire. This will disadvantage some species such as the Mallee fowl, which requires habitat that has remained unburnt for periods of greater than 60 years.<sup>132</sup>

It is also important to recognise that inappropriate fire regimes are a listed threatening process under the Victorian *Flora and Fauna Guarantee Act 1988*, potentially placing government burning programs at odds with conservation objectives.

### Case Study: Fire Regimes and the Birds of the Mallee<sup>133</sup>

In semi-arid Mallee ecosystems, management that results in large proportions of recently burnt vegetation (e.g. by burning 5% of the landscape annually or permitting reserve-scale bushfires), or a high local diversity of age classes, will negatively affect more bird species than they would aid.

Management strategies that promote particular age classes (i.e. mid-age and older vegetation) are likely to benefit bird species.

Incorporation of species-specific knowledge from a landscape perspective can refine management strategies and assist in defining the characteristics of 'desirable' fire mosaics for maintaining biodiversity.

An inflexible burning target fails to recognise the importance of this sort of information.



*Birds at Nhill Mallee*

### 1.4.1.5 Changing the nature of fire management

The state Bushfire Plan includes the DEPI Fire Protection Plan, which covers fire prevention by DEPI. DEPI's primary objectives for bushfire management are outlined in the Code of Practice for Bushfire Management on Public Land.<sup>134</sup>

Objectives of the code are:

- To minimise the impact of major bushfires on human life, communities, essential and community infrastructure, industries, the economy and the environment. Human life will be afforded priority over all other considerations.
- To maintain or improve the resilience of natural ecosystems and their ability to deliver services such as biodiversity, water, carbon storage and forest products.

Under the Code of Practice used between 2006 and 2012, planned burning on public land was managed according to the designations:

1. Asset Protection Zone
2. Strategic Fire Management Zone
3. Ecological Management Zone
4. Burning Exclusion Zone.

Zones 1 and 2 were managed primarily for fire protection outcomes. The justification for burning was based on reducing fire risks to life and property.

Zones 3 and 4 were managed for ecological outcomes. While management was expected to contribute to regional risk reduction, burning had to be justified as meeting the requirements for ecosystems within the zone.<sup>135</sup>

Zones were intended to be managed in such a way that multiple objectives for asset protection and ecological management could be achieved in areas with an appropriate weighting according to the type of zone.

In 2012, the Code of Practice was revised and the Ecological Management Zone designation became the Landscape Management Zone. This expanded the purpose of planned burning in the Ecological Management Zone to give bushfire protection outcomes equal weight with ecological requirements.<sup>136</sup>

While the 2012 code still advocates multiple outcomes, the dominant need for public safety after the 2009 fires has allowed for biodiversity outcomes to be downplayed.

As a result of these changes, planned burning that is potentially ecologically inappropriate could be carried out if it contributes to overall targets for asset protection.

### 1.4.1.6 An alternative risk-based fire management strategy for Victoria

Specific criteria for assessing risk have not been specified by the VBRC, but DEPI has made significant steps in establishing risk management processes – recognised in the 2013 annual report from the VBRC implementation monitor<sup>137</sup> – and, at present, risks to life and property are well quantified.

In contrast, risks from large, uncontrolled bushfires to biodiversity and ecosystem function are relatively undefined and there needs to be extensive further work on incorporating this into fire management regimes.

Victoria requires a clear distinction between reasons for establishing burning regimes in asset protection zones (reduction of risk to life and property) and ecological management zones (what ecological asset or process will be put at risk if burns are not carried out; and how the regime is ecologically appropriate).

The Victorian Government needs to set targets for planned burning using clear distinctions between burning intended to protect asset values and that intended for ecological purposes. Appropriate zones for these outcomes would be set and risks assessed using relevant criteria and metrics, and based on appropriate criteria and zoning (striving, wherever possible, to achieve both objectives),

When assessing risk, there is an acceptance that some areas will always have a relatively high incidence of fire and, as such, be high-risk areas for habitation. When members of the public choose to live in these areas there needs to be clear communication of the attendant risks and tools available for assisting residents to understand and accept personal responsibility for fire preparedness.

A fully realised risk-based fire management strategy may require planned burning for fuel reduction near settlements, including risk reduction on farmland. This is often unpopular and expensive. Fire suppression strategies, including burning, are considerably more expensive when carried out in populated areas and it is important that appropriate resourcing is addressed.

Overcoming resistance to this will require a substantial public information campaign illustrating the damaging effects of some burning programs and realistic assessments of risk reduction under the current system.



*Fighting fire*

## RECOMMENDATION 7

It is recommended that the Victorian Government implement a risk-based fire management strategy defining planned burning targets on public and private land, incorporating protection of financial, environmental and cultural assets.

### ATTRIBUTES

This strategy would include:

- a withdrawal of support for planned burning on an annual average of 5% of public land
- targets for planned burning that: have clear distinctions between burning intended to protect asset values and ecological burning, supported by an amendment to the Code of Practice, and; include areas burnt by bushfires
- implementation on both public and private land
- a range of fire risk-reduction methods including, but not limited to, planned burning, land management, fire preparedness, strategic town planning and zoning decisions.

### 1.4.2 Identifying risks from fire

The final report of the Bushfires Royal Commission Implementation Monitor (BRCIM) noted the criticisms of Recommendation 56 and the logistical problems with such a substantial increase in planned burning, and concluded that the intention of the VBRC was to effectively reduce public risk from bushfires.

The BRCIM recommended that government ‘reconsider the planned burning rolling target of 5% as the primary outcome and considers that the most important objective of the planned burning program must be to address public safety risks’.<sup>138</sup>

This considered view reinforces expert opinion that statewide targets are most effective when they are the sum of evidence-based regional targets, aligned with local objectives of risk reduction that are clearly defined in terms of asset protection or ecological function.<sup>139</sup>

There are potential tensions between managing fire risks and other land management objectives – such as improving native vegetation (which may be fire-prone) or establishing biolinks (which may act to spread fire). These questions will require rigorous scientific research to identify the issues with clarity and to assist policy makers to find the best resolution.



*Fire in Victorian landscape*

The challenge therefore lies in fully identifying assets of value (life, property, primary production, water, ecosystem health) and incorporating these into an appropriate risk framework for guiding management.

DEPI has begun this crucial work with HawkEye,<sup>140</sup> a targeted monitoring program that aims to assess the biodiversity effects of planned burning. The data produced could act as the basis for including ecological and biodiversity values in future statewide risk assessments.

A risk-based, rather than hectare-based, target for planned burning would align with the remainder of VBRC recommendations on land and fuel management.

### 1.4.2.1 Reporting the outcomes and impacts of planned burning

The VBRC recognised the importance of fire management to ecosystem functioning and proposed several recommendations to encourage the definition and reporting of outcomes.

- Recommendation 57 required annual reporting of planned burning outcomes – including reporting on risk reduction and biodiversity impacts.
- Recommendation 58 required DEPI upgrade its long-term data monitoring of the effects of planned burning and bushfires on biodiversity.
- Recommendation 59 required clarity in the Code of Practice, defining objectives as measurable outcomes and including an explicit risk analysis model.

Progress in implementing these recommendations has satisfied the BRCIM. However, many of the quantitative elements – such as measurable targets – are still being developed by DEPI.

At the time of publication of this report, there has been no annual reporting of the biodiversity impacts of the burning program. Improving monitoring regimes to comply with Recommendation 57 and inform decision making is a critical gap. A new fire management system that allows managers to map planned burns against biodiversity and heritage information<sup>141</sup> will allow DEPI to start addressing this issue.

## RECOMMENDATION 8

**It is recommended that the Victorian Government undertake statewide accounting and reporting of the outcomes of planned burning to demonstrate risk reduction to human and ecological communities.**

### ATTRIBUTES

**Accounting and reporting would include:**

- **the effects on ecological assets and services from planned burning and bushfires**
- **the risk reduction to life, property, biodiversity and ecosystem function attained by planned burning**
- **reporting in the context of projected losses from actual severe fires (the changes in risk contingent on planned burning or any other intervention needs to be clearly stated)**
- **a regular review of impacts on biodiversity need to be reviewed by an independent body, such as the VBRCIM, to establish appropriate targets for burning in landscape management zones.**

### 1.4.3 Fire preparedness and management in an appropriate planned burning regime

Information from reviewing and monitoring could be used to create a robust evidence base for a risk-focused fire management scheme that assumes that protection of life and property take primacy.

The Bushfire CRC is an alliance of all the fire and land management agencies in Australia and New Zealand, CSIRO, the Bureau of Meteorology, the federal Attorney-General's Department and several other fire-related organisations.<sup>142</sup> The CRC has produced work that describes how an integrated model for year-to-year fire management – sensitive to local variations in landscape – could include cost-benefit decisions for a range of fuel reduction strategies.

Management that integrates fuel treatment tools and landscape types will:

- include both fuel treatment and suppression deployment decision variables
- incorporate inputs from geospatial databases and fire-behaviour models
- view the landscape based on realistic fuel treatment units.<sup>143</sup>

Planned burning, when guided by appropriate risk management, is an important tool to reduce fuel loads and the intensity of naturally occurring bushfires but it is not be used in isolation.<sup>144, 145, 146</sup>

A risk-based approach to fire management needs to be fully integrated with all existing government interventions intended to reduce exposure in the highest risk areas, for example:

- overlays to restrict building in fire-prone areas,
- the current government buy-back of land where property was burnt in 2009
- public education for preparedness.

Improving and aligning a whole-of-government response to fire management that links fuel reduction and ecological needs will limit the likelihood of inappropriate burning regimes.

## RECOMMENDATION 9

**It is recommended that the Victorian Government assess options for private land managers for appropriate fire suppression in high-risk areas based on information generated by the CFA Vegetation Management Program.**

### ATTRIBUTES

**This can be achieved as part of the review of CFA operations and processes.<sup>147</sup>**