Invasive Plants and Animals Policy Framework

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Foreword

The Invasive Plants and Animals Policy framework represents the Victorian Government's approach to managing existing and potential invasive species across the whole of Victoria.

This framework expands our vision for what invasive species management can achieve for the Victorian community as a whole.

This framework has been updated from the *Victorian Pest Management – A Framework for Action*, 2002 policy to incorporate new approaches for managing threats from invasive species and to further recognise the cost-effectiveness of prevention and early intervention. It also aligns with the recently completed Biosecurity Strategy for Victoria.

Flower bud of the State Prohibited weed, orange hawkweed

Invasive plants and animals (IPA) cause significant problems to our natural environment, agricultural industries and amenities in Victoria. As such, a strategic biosecurity approach will be used to deliver a whole-ofgovernment response to invasive species management.

This policy outlines the vision that we hold for the future:

Victoria's wealth, well-being and biodiversity will be protected and enhanced by reducing the impact of invasive species.

The Victorian Government's approach will be to prevent the entry of new high risk IPA, eradicate those that are at an early stage of establishment and contain where possible species that are beyond eradication and take an asset-based approach to managing widespread invasive species. By working in partnership with relevant industry and communities, we can achieve this goal.

An important principle of this approach is that we will invest public money where it produces the most public benefit.

The scope of this framework covers a wide range of IPA. There will be four modules to the framework that will outline specific actions for each IPA group - Weeds and Vertebrate Pests, Marine Pests, Invasive Freshwater Fish and Invertebrates, and Invertebrate Pests.

Sharing knowledge and working together can help us all tackle invasive species and help achieve Victoria's goals of a thriving economy and a healthy environment.

Summary

The Invasive Plants and Animals Policy Framework (IPAPF) presents the overarching Victorian Government approach to the management of existing and potential invasive species within the context of the Whole of Government Biosecurity Strategy for Victoria.

The IPAPF incorporates a biosecurity approach and ensures that Victoria maintains a comprehensive planning framework to guide future policy, planning and community activity specific to invasive species.

This document sets out a vision for what invasive species management can achieve for Victoria and a framework for working towards that vision. More specific actions for particular groups of invasive species are then provided in a number of modules attached.

The vision can be simply stated as:

- Victoria's wealth, wellbeing and biodiversity will be
- protected and enhanced by reducing the impact of invasive species.
- The previous policy framework for invasive species,

- Victorian Pest Management – A Framework for Action

(VPMF), completed in 2002, was successful in providing structure for pest management from policy down to project and on-the-ground, incorporating community and stakeholders into pest management. An asset-and risk-based approach to pest management was introduced, leading to greater attention given to new and emerging invasive species. However, many developments have led to the need for a substantially different policy framework. Most importantly, the policy direction for invasive species needs to be revised to align with the high-level approach specified in the recently completed Biosecurity Strategy for Victoria.

Biosecurity arrangements are currently being modified at national and state levels as governments seek to meet the challenges of a rapidly changing operating environment. Implementation of the Victorian Biosecurity Strategy will involve scoping biosecurity threats and consideration of alternatives to current management arrangements. While the IPAPF accurately reflects current priorities, modification to accommodate new directions is likely to be required within the next few years.

The general principle of government involvement in invasive species management will be that government invests to maximise public benefit. This investment may be necessary due to market failure or to the role of government as manager of public land and waters. Intervention will only occur where the benefits outweigh the costs.

A range of actions can be taken to manage an invasive species risk. Identifying when and how to intervene is a complex problem that requires a detailed understanding of where threats originate, how they are spread, what policies or services can be effective and the relative benefits and costs of all options.

Since European settlement in Australia, selected weeds and pest animals have been the subject of government action and legislation. While considerable success has been achieved in the past, we should be wary of over-reliance on and over-confidence in what can be achieved through government regulation and funding.

It is not feasible or cost-effective for government to enforce or fund the control of all currently declared noxious invasive plant and animal species in the state, nor is it reasonable to apply regulation to a greatly increased number of species and expect effective action against them all.

A strategic biosecurity approach will be used to deliver a whole-of-government response to invasive species management. A biosecurity approach uses risk management to identify threats and then assess their relative risk to determine the most appropriate intervention to maximise public benefit. Under Themes 5 and 6 of the Victorian Biosecurity Strategy, efforts

will increasingly be directed to preventing the establishment of new species of concern and providing capacity to deal with new incursions as soon as they occur. The proposed direction is consistent with national approaches.

Operationally, the approach by Government will be based on four key elements or intermediate outcomes: prevention, eradication, containment and asset-based protection.

Analyses of biosecurity programs generally show that prevention provides a higher return on investment than eradication, eradication is better than containment and containment is better than managing impacts of widespread invasive species. This general trend will inform government on where to invest, whether the returns derive from protecting primary production, protecting the environment or a combination of the two.

Prevention and preparedness

Preventing high-risk invasive species from establishing is the most cost-effective approach to managing the threat they pose. Yet considerable resources and planning are required to maintain prevention of a large number of species. Victoria is recognised nationally and internationally for leadership in prevention and preparedness for invasive species, yet there is scope for further improvement and for the proportion of government investment in invasive species to increase in future.

'Preparedness' encompasses all the activities and resources necessary to successfully manage new incursions.

Eradication

Eradication is generally only possible in the early stages of establishment when distribution and abundance of the invasive species are low. This approach can be almost as cost-effective as prevention. It is expected to increase in relative importance within the overall investment of government. Future identification of invasive species as targets for eradication will be based on a rigorous analysis of feasibility and risk.

Containment

Where a high-risk species cannot be eradicated, there can be substantial net benefit gained from preventing its further spread. Containment involves measures to eradicate outlying (satellite) infestations and prevent spread beyond the boundaries of core infestations (those that are too large and well established to eradicate).

Given the large number of potential target species for containment, it is vital that a rigorous risk assessment and feasibility and cost–benefit analyses are applied to select species for containment.

Obtaining a high degree of community support is a prerequisite for any long-term containment program.

Asset-based protection

An asset-based approach to managing an invasive species is appropriate once it has become so widespread that it would be inefficient to control the species everywhere it occurs and containment would provide a low return on investment. The asset-based approach is to manage the species only where reducing its adverse effects provides the greatest benefits by achieving protection and restoration outcomes for specific highly valued assets.

Monitoring, evaluation and reporting

For science-based programs, such as invasive species management, monitoring, evaluation and reporting (MER) is one element of adaptive management, whereby programs are continually reviewed and analysed to ensure that their approach is consistent with and supportive of any changes in environmental response, community expectation or scientific knowledge.

Research and development

The knowledge that comes from research and development is critical to implement evidence-based management approaches. In many cases, substantial advances in invasive species management will require development of new techniques and acquisition of greater knowledge. The Victorian Government's investment in research needs to be sufficient to ensure future management is not seriously constrained by insufficient R&D support.

* * *

The overarching policy direction and goals for invasive species are translated into more specific actions in the attached modules, which also provide further supporting information for the specific groups of organisms that they address.

Vehicle hygiene is important for preventing weed spread

Policy Direction

Cornsnakes are frequently found being kept illegally in Victoria

Aim

Invasive species threaten Victorian parks, forests, waterways, biodiversity and rural land asset values and are a major concern for government and private land managers. They have serious impacts on agricultural production and hinder the long-term sustainability of rural communities.

The Invasive Plants and Animals Policy Framework (IPAPF) presents the overarching Victorian Government approach to the management of existing and potential invasive species within the context of the Whole of Government Biosecurity Strategy for Victoria. The IPAPF incorporates a biosecurity approach and ensures that Victoria maintains a comprehensive planning framework to guide future policy, planning and community activity specific to invasive species.

This document sets out a vision for what invasive species management can achieve for Victoria and a framework for working towards that vision.

This vision needs to build on common understanding of the roles and responsibilities of key stakeholders. It also depends on recognition that community-led action and support and the engagement of key stakeholders are essential to complement the roles of land and natural resource managers.

Vision

Invasive species management will help achieve Victoria's goals of a thriving economy and a healthy environment. This will be achieved by contributing to the following policy objectives:

- an increase in Victoria's competitiveness and productivity; and
- the enhanced condition of our land and water environments, including biodiversity.

The vision should ensure that Victoria is protected from the increasing environmental, productivity and social costs of invasive species through coordinated and appropriate actions by land and water managers, industry, the community and government.

The vision can be simply stated as:

Victoria's wealth, wellbeing and biodiversity will be protected and enhanced by reducing the impact of invasive species.

Need for a new policy framework

The previous policy framework for invasive species, *Victorian Pest Management – A Framework for Action* (VPMF), completed in 2002, was successful in providing structure for pest management from policy down to project and on-the-ground, incorporating community and stakeholders into pest management.

Coordination, collaboration and partnerships were all improved under the VPMF. An asset- and risk-based approach to pest management was introduced, leading to greater attention given to new and emerging invasive species. This approach focused primarily on invasive plants and terrestrial vertebrate animals, although its principles were expected to apply to all invasive species. However, many developments have led to the present need for a substantially different policy framework to set out, in a coherent way, the future direction for invasive species management in Victoria and to present a new rationale for it.

New approaches for managing the threats from invasive species have been developed and evidence has supported the cost-effectiveness of prevention and early intervention.

Most of the specific actions listed in the VPMF have been completed. The VPMF did not identify specific actions for invasive species other than plants and animals.

Significant changes have been recognised in the natural environment, society and the economy, which will affect both the nature of future threats from invasive species and the suitability of various responses to them. Climate change, for example, was not considered in the VPMF.

Most importantly, the policy direction and associated actions for invasive species need to be revised to align with the high-level approach specified in the Biosecurity Strategy for Victoria.

The northern Pacific seastar (Asterias amurensis) is invading Victorian coastal areas

Scope

The IPAPF will:

- be aligned with relevant government policies and strategies, including the Biosecurity Strategy for Victoria and the White Paper on Land and Biodiversity;
- set out a comprehensive risk management approach to address, as appropriate, species at all stages of invasion, ranging from those that can be excluded from Victoria to those that are already widespread in Victoria;
- be relevant to management of both public and private land, freshwater and marine systems;

- provide a clear rationale for the allocation of government investment in management of invasive species;
- identify high-level priorities and directions to be translated into specific management actions in government planning documentation (e.g. business plans, Regional Invasive Plants and Animals Strategies and other documents relevant to invasive species management);
- set out the roles and responsibilities of major stakeholders and of the community in general; and
- align with national policies and arrangements for coordination of invasive species management.

Codium fragile is an invasive seaweed found along Victoria's coast

Undaria pinnatifida is an invasive seaweed that has established in Port Phillip

In line with Theme 2 of the Victorian Biosecurity Strategy, modules will be developed to set out how this policy framework applies to particular invasive species and what actions will be taken. Module 1 will cover terrestrial vertebrates (mammals, birds, reptiles and amphibians) and all terrestrial and freshwater plants. Other modules will cover freshwater fish, terrestrial invertebrates, freshwater invertebrates and marine species. All modules will exclude consideration of species that are native to Victoria or any micro-organisms.

While the approach outlined in the IPAPF is expected to be applicable to all invasive species, some modification may be required for particular species or situations.

Biosecurity arrangements are currently being modified at national and state levels as governments seek to meet the challenges of a rapidly changing operating environment. Implementation of the Biosecurity Strategy for Victoria will involve 'a review of significant threats and the possible responses to those risks, to inform the development of biosecurity plans for each of the key areas of current biosecurity exposure' (Theme 2). While the IPAPF accurately reflects current priorities, modification to accommodate new directions is likely to be required within the next few years.

Principles of this framework

Theme 3 of the Victorian Biosecurity Strategy states that the Victorian Government will make sound decisions and investments in relation to biosecurity. This principle will be expanded, in relation to how invasive species are dealt with under this policy framework.

The general principle of government involvement in invasive species management will be that government invests to maximise public benefit. This investment may be necessary due to market failure or to the role of government as manager of public land and waters. Intervention will only occur where the benefits outweigh the costs. There is a range of actions that can be taken to manage invasive species risks.

Identifying when and how to intervene is a complex problem that requires a detailed understanding of where threats originate, how they are spread, what policies, programs or services can be effective, as well as an understanding of the relative benefits and costs of all options. Note that:

- Determining relative benefits and costs requires risk assessment and the application of a risk management approach to biosecurity.
- Government needs to apply the precautionary principle – proposed introductions of new species will not be allowed until the risks have been assessed and determined to be acceptable.
- Management will be directed by sufficient evidence to make informed decisions and, where necessary evidence is not available, further research and development will be conducted to provide it.
- Invasive species management is an integral part of Victoria's approach to biosecurity and to integrated natural resource management.
- Early intervention to prevent introductions of new high-risk species, or to ensure eradication as soon as possible, will generally be much more cost effective than trying to manage invasive species once they have become widely established. This focus on risk management, prevention and early intervention is consistent with national priorities outlined in documents such as the Australian Weeds and Australian Pest Animal Strategies.
- It is not possible or desirable for government to provide for control of all invasive species. Nor is it appropriate for all invasive species to be declared as pests using legislation. Criteria for government intervention need to be established and widely accepted.

- Government intervention is only warranted to protect high-value assets (whether at the stage of early intervention or once an invasive species has become well-established). For established pests, government investment for invasive species management needs to be part of an integrated approach to protect high-value assets. (Assets are defined under 'Asset-based protection' later in this document).
- Government partnerships with community, industry and key stakeholder groups are essential to maximise the benefits of government intervention. Invasive species management operations will be carried out in ways that are consistent with the aims of other policies, such as those concerned with animal welfare, protection of native species and communities, river health and Aboriginal cultural heritage.

Overall approach

Since European settlement in Australia, selected weeds and pest animals (such as rabbits) have been the subject of government action and legislation. While considerable success has been achieved in the past, we should be wary of over-reliance on and over-confidence in what can be achieved through government regulation and funding. It is not feasible or cost-effective for government to enforce or fund the control of all currently declared noxious invasive plant and animal species in the state, nor is it reasonable to apply regulation to a greatly increased number of species and expect effective action against them all.

In line with its roles and responsibilities outlined later in this document the Victorian Government will direct its efforts to:

- where its role is justified by market failure and other criteria outlined in 'The case for government investment' below; and
- where it can achieve the most cost-effective contribution to achieving its vision for pest management.

Criteria for government investment and involvement need to be accepted by all stakeholders.

A strategic biosecurity approach will, in future, be used to deliver a whole-of-government response to invasive species management. A biosecurity approach uses risk management to identify threats and then assess their relative risk to determine the most appropriate intervention to maximise public benefit. Adopting this approach will increase the rate of return on investment by minimising the spread of new species and providing the required levels of protection needed to safeguard our highest-value assets from established invasive species.

Under Themes 5 and 6 of the Victorian Biosecurity Strategy, efforts will increasingly be directed to preventing the establishment of new species of concern and providing capacity to deal with new incursions as soon as they occur. The proposed direction is consistent with

national approaches.

As outlined in Theme 3 of the Victorian Biosecurity Strategy, risk management, sound policy objectives and achievement of government outcomes will form the basis of the government's involvement with invasive species. The suite of tools needed to achieve these objectives – including appropriate legislation – will be determined by these objectives themselves rather than having tools, such as legislation, driving the government's approach. The relative public and private net benefits from action or lack of action in invasive species management will help to determine which policy tools are most appropriate.

Legislative reform will be considered to support the directions of this policy framework, recognising that current legislation is not ideal in some respects. One reason for this is that it does not sufficiently support a risk-management approach.
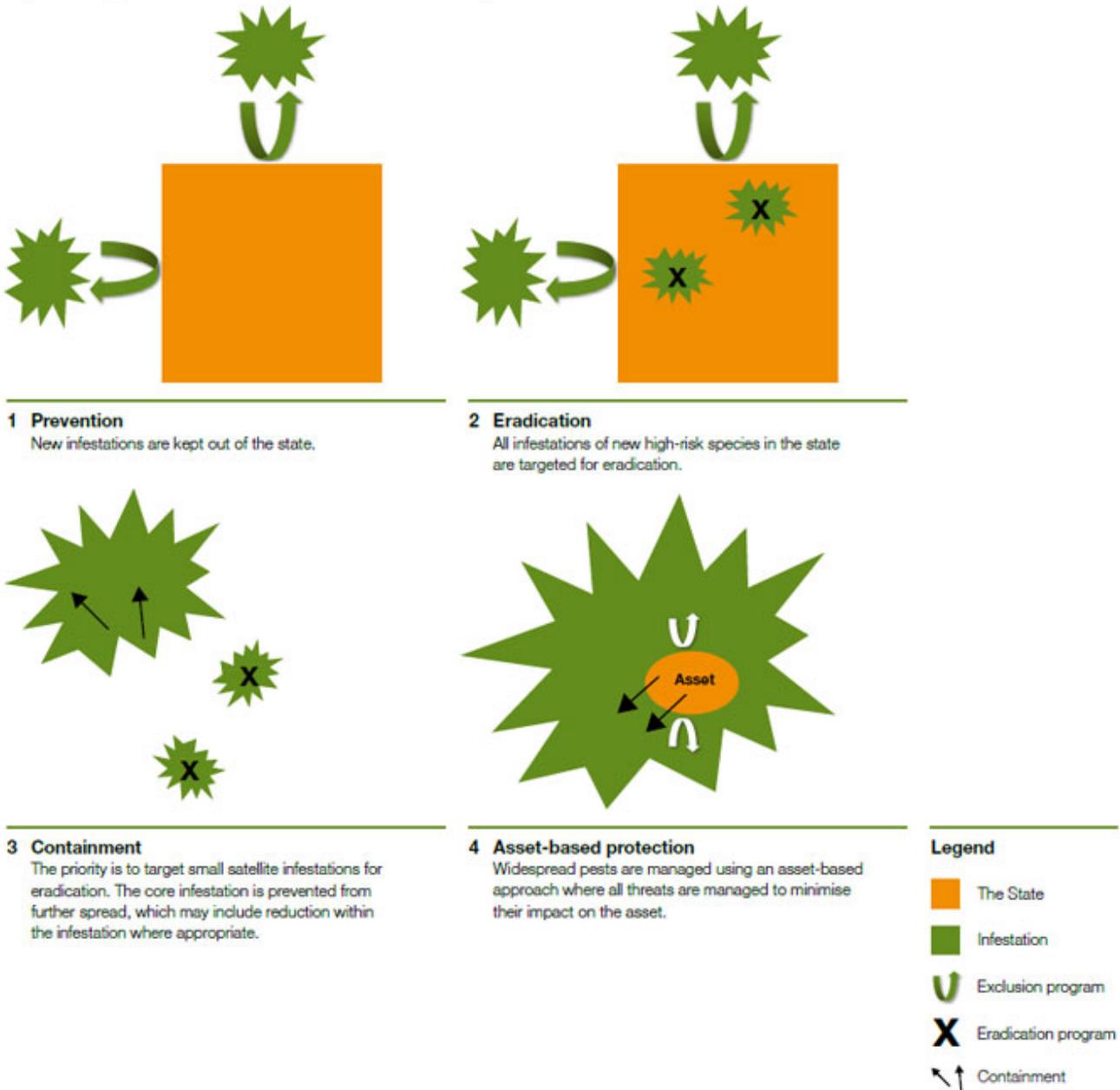
Operationally, the approach will be based on four key elements (referred to as 'intermediate outcomes' in the program logic in Appendix 3): prevention, eradication, containment and asset-based protection (see Figure 1). This program logic was developed specifically for the invasive plant and animal species that can be managed under the CALP Act. However, it is applicable to other invasive species with little modification.

The logic can, in principle, be applied at any level – from national through state and regional to sub-catchment, river reaches or even individual properties. However, in order to achieve maximum public benefit, the Victorian Government investment in prevention, eradication and containment will be based on a statewide perspective. For example, a proposal to eliminate infestations of a weed in a region where it is Regionally Prohibited would be assessed according to whether this would contribute to an effective state-scale containment program that met the criteria for government investment. The statewide perspective for investment does not apply to government in its role as a land and water manager where investments may appropriately be based on regional or local priorities.

Aquatic weeds, such as parrot's feather, can congest waterways, making access difficult

Figure 1: Approaches to management at different stages of invasion

1 Prevention
New infestations are kept out of the state.

2 Eradication
All infestations of new high-risk species in the state are targeted for eradication.

3 Containment
The priority is to target small satellite infestations for eradication. The core infestation is prevented from further spread, which may include reduction within the infestation where appropriate.

4 Asset-based protection
Widespread pests are managed using an asset-based approach where all threats are managed to minimise their impact on the asset.

Asset

Legend

The State	
Infestation	
U	Exclusion program
X	Eradication program
↖↑	Containment

The case for government investment

Individuals and businesses will tend to react to invasive species to minimise their costs and maximise their benefits.

Benefits are often financial but they can also include intangibles, such as maintenance of good relationships with neighbours who wish to see invasive species managed. In many situations, the end result is action that is sufficient to provide a good outcome for the community as a whole. However, in some instances government may need to intervene where there is market failure and where the benefits of that intervention outweigh its costs.

Government will also invest to meet its responsibilities as a manager of public land and waters, including protecting assets and managing adverse effects on adjoining landowners.

Market failure

Where the lack of a desirable private sector response results from misalignment between the incentives of private parties and the interests of the public, economists conclude there is market failure. It is necessary to identify carefully the type of market failure that appears to exist, as this influences the design of any government involvement.

Sometimes a private sector response is not forthcoming because an industry is claiming inability to act in order to obtain a government response and thereby avoid costs. In such a case, it is assumed that the private sector does have incentives to act and thus there is no market failure. Market failure in invasive plants and animals predominantly occurs because of the failure to address spillovers, but also because of the provision of public goods. These terms are explained further below.

Spillovers

Spillovers exist when anyone's action or lack of action influences the outcomes for anyone else, either positively or negatively. The types of spillovers from invasive species are explained below.

The actual degree of spillover may be uncertain where it is difficult or costly to link decisions by one party to the consequences for others. For example, a producer may be responsible for the spread of an invasive species that affects other producers, but it is difficult to prove who has created this problem or determine the resulting costs.

Productivity spillovers

The risk management strategy of one individual or firm may influence the costs faced by others. For example, effective rabbit management by one landholder inhibits their spread to neighbouring properties. Failure to control rabbits by one landholder may have a negative effect (yield loss or additional control costs) on neighbouring landholders.

Market access spillovers

The presence of an invasive species, such as the weed branched broomrape, may prevent sale of produce into some markets. Thus failure by some landholders to prevent introduction or to eradicate an invasive species such as this, can have large negative effects on others.

Human health spillovers

The failure to adequately control some invasive species can create a risk to human health. For example, the red imported fire ant inflicts painful stings that can cause severe allergic reactions. Costs are incurred in diagnosis and treatment.

Environmental spillovers

Invasive species frequently have effects that damage the natural environment. For example, carp and red eared slider turtles threaten the environment through their impact on aquatic biodiversity and plants escaping from gardens can invade native vegetation and damage biodiversity.

Spillovers and market failure

Spillovers do not necessarily imply that there is market failure. Before concluding that market failure exists, there needs to be consideration of whether private firms and industries can correct or deal with the spillovers. There will only be market failure when, in the absence of government intervention, sufficient public benefit does not emerge from private actions or private actions create negative effects.

There are several reasons why the market may not be able to manage spillovers in a way that is in the best interests of society. In such cases government may need to take responsibility for managing the response to invasive species. Reasons why this may be so include the following:

Risk of public harm

When there is a risk that an invasive species issue will spillover and affect outcomes such as public health, biodiversity and the value of public land, there may not be sufficient incentives for private risk management strategies to address the issue. Government will need to be involved to ensure these outcomes are delivered.

Access to policy instruments

Government will sometimes be in a position to act more effectively to address spillovers because it has access to a wider range of policy mechanisms to manage invasive species. For example, regulation may be a cost-effective way of slowing the spread of an invasive species and thus limiting its impact, but only government can implement this action.

High coordination costs

When the risk arising from an invasive species is largely confined to a single industry, private industry may be capable of managing the response with minimal, if any, government involvement. On the other hand, when the invasive species will affect multiple industries

and/or multiple jurisdictions, it becomes more difficult and costly for the private sector to provide effective management. Government may need to play a role in coordinating the actions of affected parties. An example of how this may be provided includes implementation of the Australian Weeds Strategy.[1]

Public goods and invasive species

Public goods are goods and services that are both non-rival and non-excludable. Non-rivalry is when one person's use does not reduce the total amount of the good or service and multiple persons can use the good or service at any one time. An example of this is knowledge. Any number of land or water managers could be using the same knowledge to manage an invasive species. If more of them do so, this does not mean that others are less able to use the knowledge.

Non-excludable goods

Where it is difficult to exclude any individual or organisation from the benefits provided by a good or service, it is said to be 'non-excludable'. Biological control agents for invasive species are an example of this; it is usually impossible to exclude anyone from benefiting because these agents typically spread unassisted across the whole landscape.

When a good or service possesses these characteristics it is difficult for a private producer to make a profit from them and thus governments will be the only possible provider.

Selective public goods

Many invasive plants and animals services can also provide what are known as selective public goods. A selective public good is one that is beneficial to a subsection in society, rather than to the entire public, such as development of control techniques that are useful only within certain industries.

When it is difficult to exclude any industry member from the benefit, a 'free-rider' problem may arise. Each industry member has an incentive to refrain from funding the research; the research may be funded by someone else and they may benefit anyway. Because the benefits to one member may not be a large enough incentive, a group response is required. Industry associations can be helpful in designing these responses and government may have a role in helping the industries try to overcome the 'free-rider' problem by establishing mechanisms, such as levies, that enforce participation by beneficiaries.

Eastern Gambusia is an invasive fish species
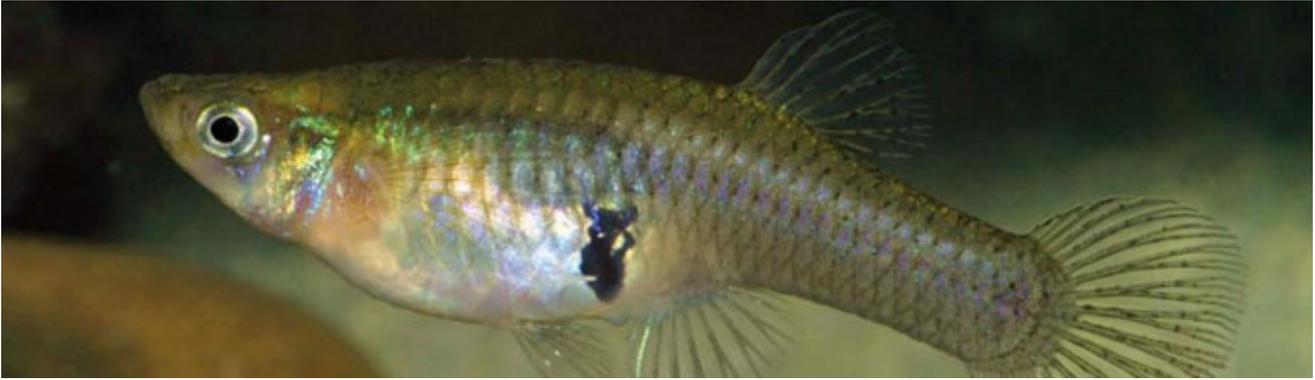
Efficient delivery of services

Often the optimal government response to an invasive species issue will include an investment in the provision of services. In carrying out this role, an important decision needs to be made about which parties can provide these services most efficiently. In some situations, purchase of the services by government from a private sector firm or community organisation may be the most efficient.

Return on investment

Government investment in management of invasive species occurs at all stages of invasion – from preventing entry to managing widespread species. Analyses of biosecurity programs generally show that preventive actions are the most cost-effective; the benefit–cost ratio decreases as an invasion progresses (see Figure 2).

The former Cooperative Research Centre for Australian Weed Management commissioned an economic model to help determine the optimum level of investment in weed management in the grains industry.[2] This model demonstrates that the greatest benefits accrue for highly invasive weeds that are targeted when their populations are at low levels. There is also benefit in slowing the spread of a weed when eradication is not feasible, because this increases the time that some producers will be able to operate without bearing the control cost or yield loss caused by the weed.

An exception to the generally low return on investment in managing more widespread species is biological control, which, however, is only an appropriate or feasible response for a subset of invasive species. For example, an economic assessment for the Australian weed biological control effort since 1903 has indicated an overall return of approximately $23 for every dollar of investment.[3]

A fundamental consideration is that the potential for new species to invade and cause significant negative impacts must be clearly defined if the net benefits of prevention, eradication or containment are to be determined. Risk assessment systems are one method used to prioritise species for these activities. However, the accuracy of the risk assessment

will influence the economic value of this method of prioritisation.[4] Uncertainty is inevitably associated with risk assessment of species at an early stage of invasion because their actual invasiveness and impacts are not yet apparent. Another consideration is that some new species may have both significant detrimental impacts and large potential commercial value. The current Victorian Weed Risk Assessment, for example, calculates a score without using potential commercial value to offset likely negative impacts.

In summary, prevention provides a higher return on investment than eradication, eradication is better than containment and containment is better than managing impacts of widespread invasive species (with the exception of biological control). This general trend will inform government on where to invest. It is valid whether the returns derive from protecting primary production, protecting the environment or some combination of the two. Quantifying the benefits from protection of the natural environment has proved to be challenging and there is no single widely accepted approach. This issue is not unique to management of invasive species and is the subject of much research and debate. Although quantifying the benefits in financial terms will not always be possible, there may still be sufficient qualitative evidence to justify investment.

Figure 2: Generalised invasion curve showing actions appropriate to each stage
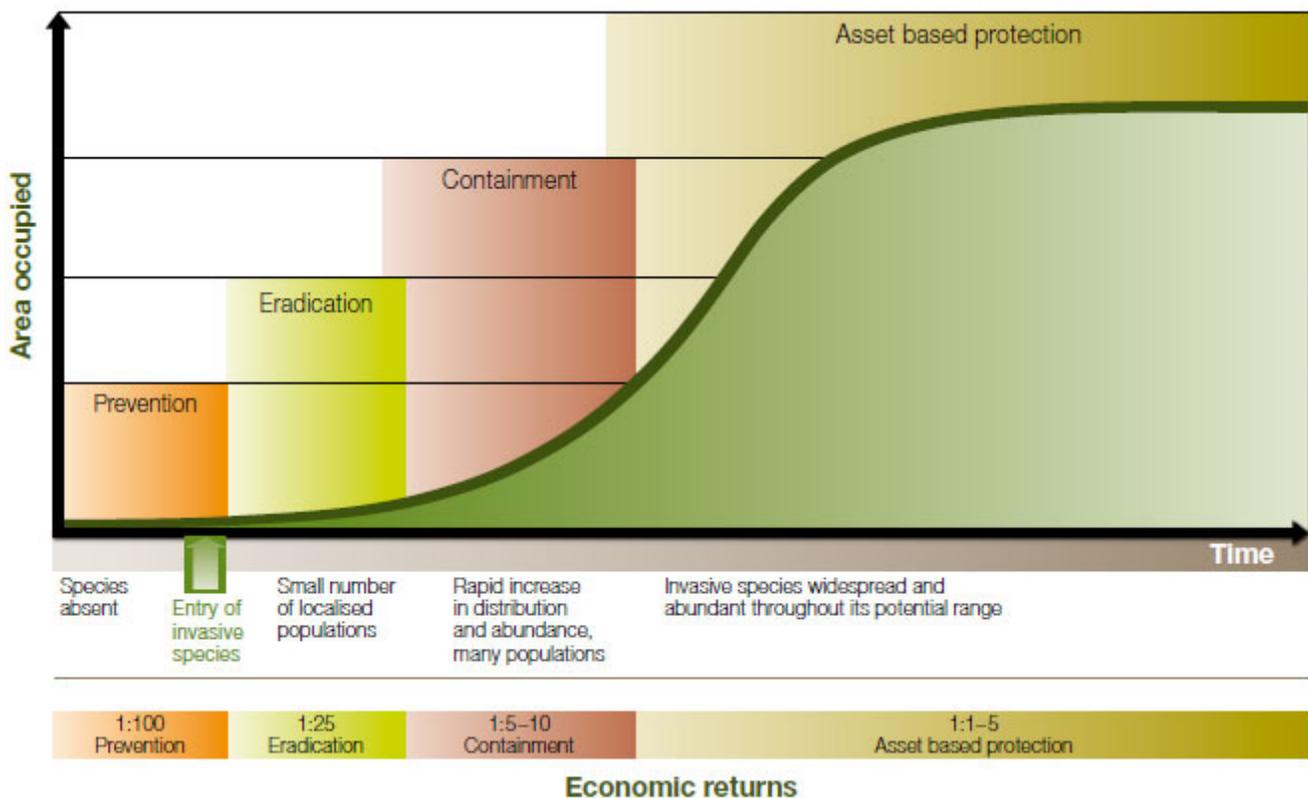
Cost-sharing approaches

Where there is a role for government in providing invasive species services, cost-sharing may be appropriate where there are both public and private benefits. There are generally three different ways of approaching cost-sharing arrangements as shown below.

User pays

A user-pays principle occurs when the direct users of a given good or service fund all or part of the cost of providing it.

Where practical, it can be appropriate to charge individual users who consume goods or services relating to invasive species management. Many activities, such as certification, accreditation, audit, inspection and diagnosis, are currently charged on a fee-for-service basis in Victoria. The advantage of this is that it leads to the service being used only where it provides net benefit to the user and thus provides a signal to providers about the level of demand. This will help in designing an efficient supply of services.

However, for many invasive species management services, a user-pays mechanism will be impractical, as it will be impossible for users to determine what tangible benefits they gain from many types of service.

Beneficiary pays

The beneficiary pays principle allocates costs according to the 'beneficiaries' of a good or service. For example, the public will be expected to pay where there are public goods or community-wide spillovers, such as environment and health impacts. Where the invasive plants and animals issue is expected to impact on an industry, the industry would be expected to pay.

Often a particular project will have a mix of public and private beneficiaries and, in principle, co-funding is appropriate. In some cases it may not be possible or desirable to share costs, for reasons including that the cost of developing and implementing arrangements may be excessive relative to the costs recovered by government.

Risk creator pays

Risk creator pays occurs when the person who is responsible for creating a risk bears the costs of managing that risk. Penalising the risk creator may be a suitable policy option in some circumstances. For example, by placing fines on the importation and transportation of a banned plant species, there is an incentive not to undertake this activity. If this incentive were efficient, the chance of the plant establishing and spreading would be reduced, which would reduce the likelihood of services being needed later to deal with this particular risk.

Policies to deal with risk creation will have the greatest chance of success where the risk creator can be easily identified. Sometimes the ultimate cause of recently-emerged risks was deliberate or inadvertent importation of a species at a previous time when this action was legal and the responsible business may be unidentifiable or no longer exist. Where this occurs, risk creator pays is not a viable policy mechanism.

The European fan worm (Sabella spallanzanii) is an invasive marine species

Fire ants are the subject of a national eradication program

Goals

The goals outlined in this section are generally applicable to all modules of the policy framework, though modifications may be required for different types of invasive species.

Case studies demonstrating the application of each of the goals in relation to terrestrial and freshwater invasive plants and terrestrial vertebrate animals, together with specific actions for these groups of organisms, are presented in Module 1 of this framework. Further species will be covered in additional modules.

Prevention and preparedness

Preventing high-risk invasive species from establishing is the most cost-effective approach to managing the threat that they pose, yet considerable resources and planning are required to maintain prevention of a large number of species. Victoria is recognised

nationally and internationally for leadership in prevention and preparedness for invasive species, yet there is scope for further improvement and for the proportion of government investment in invasive species directed to this area to increase in future.

'Prevention' in this framework applies to species that are not present in Australia, species present in Australia but not in Victoria or species present in Victoria which have not escaped into the environment. Once a species is able to reproduce and spread unassisted an attempt to remove it is deemed more suitable for eradication.

Prevention requires the coordination of a number of activities:

- risk assessment to determine which species need to be addressed;
- analysis of pathways by which these species may be introduced;
- engagement with relevant industries and other groups;
- surveillance to ensure timely detection;
- prompt identification of suspected high-risk species;
- trace back and trace forward after detection;
- humane removal and destruction; and
- follow-up to prevent recurrence.

Legislation will be used as necessary to authorise measures for investigation and destruction of high-risk species and to prohibit actions that lead to their introduction and spread. Enforcement action, including prosecution, may be used where it is the most effective tool to encourage future compliance with such legislation.

Where feasible, the costs for preventing introduction and for eradicating new introductions should be borne by those generating the risks (i.e. 'polluter pays').

'Preparedness' encompasses all the activities and resources necessary to ensure that new incursions can be managed successfully.

Eradication

Eradication is generally only possible in the early stages of establishment when distribution and abundance of the invasive species are low. This approach can be almost as cost-effective as prevention. It is expected to increase in relative importance within the overall investment of government.

Eradication is the optimal outcome of any management program for a high-risk invasive species that is already present in an area. The fact that there are relatively few examples of eradication of invasive species being achieved at a state or regional scale reflects the high degree of sustained commitment required in successful eradication programs. Analysis of a number of different weed eradication programs has led to the observation that when the size of the infestation exceeds 1000 hectares, eradication is almost never possible.[5]

Experience has shown that eradication often fails even at much smaller infestation sizes. The approach to eradication outlined in this policy framework is consistent with the guidelines for eradication published by the International Plant Protection Convention.[6]

Actions to achieve eradication are expected to be of limited duration and only affecting a very small area. This, combined with the very large benefits resulting from eradication of high-threat invasive species justifies the use of expensive techniques that may cause significant short-term damage to assets or disruption of human activities.

Eradication has, in the past, often been identified as an aspirational goal where it is highly unlikely to be achieved or there is insufficient information to make a valid assessment of feasibility. Future identification of species as targets for eradication will be based on a rigorous analysis of feasibility and risk.

Containment

Parks Victoria ranger checks a sand pad for animal tracks

Where it has been determined that a high-risk species cannot be eradicated, there can sometimes be substantial net benefit gained from preventing its further spread. Until recently the term 'containment' was often applied to routine control of established invasive species that have some potential for further spread. The more rigorous definition of containment used here describes an intensive and usually costly approach that is expected to be justifiable only for a small number of high-risk species.

Containment involves measures to eradicate outlying (satellite) infestations and prevent spread beyond the boundaries of core infestations (those that are too large and well established to eradicate). Containment on a state scale may therefore involve regional-scale eradication (where the species is present in the region, but eradicable) or regional prevention (where the species is not present in the region).

In some regions both core and satellite infestations may be present. Within core infestations the approach may be management to protect high-value assets or, when necessary, to reduce the abundance and extent of the invasive species as a way to minimise the chance of spread beyond the core infestation boundary.

The purpose of containment is to prevent an invasive species from spreading into further areas that are suitable for its establishment. Unlike eradication, it is accepted that the costs of containment may continue indefinitely. Enhanced control by landowners at the boundary of a core infestation may be required and this ultimately benefits all landowners who remain free of the invasive species. In these circumstances there may be a case for the boundary land owners to be relieved of part or all of these costs.

Containment programs require an accurate knowledge of the boundaries of current infestations. Decisions on whether to continue a containment program will be based on how successful the containment efforts have been in preventing the initial infestation from spreading, including whether any reduction in the area of core infestation has been achieved and how effective efforts to eradicate satellite infestations have been. Obtaining initial data on the extent of infestations is a challenging and costly undertaking. Certain environmental conditions (such as drought) may make it impossible in the short term to acquire definitive baseline data on which a containment program can be reliably based.

Containment can sometimes be beneficial even if it eventually breaks down because the delay in spread may provide large economic benefits or allow cost-effective management techniques to be developed to reduce its impacts.

Given the large number of potential target species for containment, it is vital that a rigorous risk assessment and feasibility and cost–benefit analyses are applied to each species being considered by the Victorian Government for substantial investment to support state-wide containment. Containment will not be an automatic choice for all non-eradicable invasive species with potential for further spread.

Actions for containment of high-threat invasive species will take place across larger areas than for eradication and they are expected to be applied repeatedly for an indefinite period. The degree of off-target damage and disruption to normal land management that is tolerable from containment activities will therefore be lower than for eradication. Obtaining a high degree of community support is a prerequisite for any long-term containment program.

Asset-based protection

An asset-based approach to managing an invasive species is appropriate once it has become so widespread that it would be inefficient to control the species everywhere it occurs and containment would provide a low return on investment.

The asset-based protection approach is to manage the species only where reducing its adverse effects provides the greatest benefits by achieving protection and restoration outcomes for specific highly valued assets. While statewide prevention, eradication or

containment of selected species that are not yet an immediate threat to a particular asset ultimately contribute to protecting it, these actions are not defined as part of an asset-based approach.

Under the developing asset-based approach, all threats are considered, including those invasive species that are within or in the vicinity of the asset. Thus the threats from invasive species are assessed along with other threats such as salinity, soil erosion, nutrient loads, asset overuse, inappropriate fire or grazing regimes or insufficient water availability. Benefits of this approach include the ability to deliver multiple outcomes through an integrated approach that addresses the cause rather than a symptom of the problem and a strong focus on investing for well-defined outcomes.

Assets may be defined as 'the biophysical or physical elements of the environment we are trying to protect'.[7] The need to protect these assets is due to the social, economic and environmental values attached to them and to the services which they provide. Services may include provisioning, such as production of food, fibre and water; regulating, such as regulation of flood, drought, land degradation and disease; supporting through processes such as soil formation and nitrogen cycling and cultural, such as recreation and other nonmaterial benefits.[7] Aboriginal cultural heritage sites are considered to be an asset under this approach.

Assets of each type (environmental, economic and social) are first identified and prioritised at the appropriate scale (state, regional or sub-regional). This assessment is based on the values, services or benefits they provide to the community. There is a range of decision support tools available for identifying and prioritising assets and assessing potential investment and there is a need for consistent approaches and techniques to be developed and agreed.

For each asset, all threats are identified and assessed for their relative risk regardless of their legislative status. Possible changes to the nature of the invasive species threat due to climate change should be included in the assessment, to the extent to which they can be confidently predicted. Those invasive species posing a significant risk to the asset are considered for control.

Once priority assets and high-risk threats to those assets have been identified, a feasibility analysis will determine:

- the availability of effective management techniques;
- the cost of applying the techniques at the asset scale; and
- the cost–benefit ratio of controlling the invasive species, taking into account any adverse impacts of control measures.

Assets are sometimes also threatened by processes that are not due to invasive species. Where these threats are considered to be severe and not amenable to management, then invasive species management may not be attempted.

Appropriate ways to manage invasive species' threats to assets may include local or regional prevention, eradication or containment, or treatment to directly reduce impacts by reducing the population of the invasive species.

Management effort is then allocated where it will provide the greatest net benefit. Impacts on assets will be reduced through site treatment and management of pathways of spread as part of an integrated asset-management approach. In many cases the asset-based approach will require involvement of multiple stakeholders to deal with a range of threats and to provide follow-up works.

Actions to manage invasive species for asset protection will often become an ongoing part of site management and are more likely to succeed if they have a low level of off-target effects. The potential for asset degradation caused by repeated application of some control techniques over the long term must be taken into account.

Supporting elements

Partnerships

Effective management of invasive species in Victoria requires a partnership approach that includes state and local governments, CMAs, industry and the community. Each group plays one or more roles including educator, priority-setter, coordinator, advocate and manager of land or water. However, by developing and applying partnerships with other organisations, each will be better able to mitigate the impacts of invasive species through the successful implementation of the Invasive Plants and Animals Policy Framework.

The challenge in achieving this is to ensure that partners are clear on their management responsibilities for invasive species. The expectations should be realistic. Awareness about the impacts of invasive species among land and waterway managers is increasing steadily, particularly as networks and partnerships are established and grow. Sharing knowledge and seeking to work collaboratively is collectively building the capacity of land and waterway managers to include invasive species management into their core business activities without impacting on their business imperatives. The value of these partnerships often extends beyond invasive species management.

There has been a growing realisation that the protection of biodiversity assets cannot be sustainably achieved without community involvement. For this reason, community groups are being encouraged to participate in controlling invasive species through focused grants

programs, collaboration across private and public land through vehicles such as Conservation Management Networks and engagement of special-interest groups in pest animal control.

In recent years the Victorian Government has successfully developed partnerships and invasive species management networks through programs to build the capacity and confidence of land and waterway managers. This approach has facilitated strategic invasive species management outcomes. As part of Victoria's biosecurity approach it has the potential to form powerful statewide alliances to tackle invasive species and protect Victoria's assets.

The management of invasive species in a biosecurity context requires a coordinated and strategic approach.

Partnership development will support all the goals and actions of the IPAPF including preparedness and prevention, eradication, containment and asset protection. An important part of partnership development in recent years has been the operation of community weed groups. The current groups provide important benefits by:

- bringing together stakeholders to share views and plan cooperatively;
- connecting government to community concerns; and
- as a route for exchange of knowledge and information.

A review of the community weed groups was completed in late 2009. This review will help identify the future role of these groups in implementing the approach set out in this framework and assist in determining whether establishment of other community groups concerned with matters such as rabbit management should be supported.

Policy and legislation

A range of policy mechanisms is available to progressively implement the biosecurity approach and achieve public benefits from managing invasive species. Pannell[8] introduced a model that considers the suitability of different mechanisms – including education, awareness raising, technology transfer, research and development, regulation, subsidies and other economic instruments – when they are applied at different combinations of public and private benefit. This model or similar approaches will be used as a basis to develop principles for consistently selecting the most appropriate policy tools for different situations. These principles will provide a more objective basis to assess the merits of particular options, such as enforcement, bounties or market-based instruments. Some of the apparent problems with existing arrangements and options for resolving them are listed below, though further analysis is likely to identify others.

Reform of legislation may be required to create a greater focus on prevention and early intervention. Some other jurisdictions in Australia have already implemented a 'permitted list' system for the management of invasive plants and animals. Under this system all new nonnative species and their hybrids are by default prohibited from trade and possession until they have been subject to risk assessment and confirmed as sufficiently low risk. A significant advantage of the permitted list approach is that it prevents new species from being widely distributed before the risk they represent is recognised.

Currently in Victoria there are no legislative restrictions on trade or cultivation of most non-native plants, unless they are proclaimed as noxious weeds, in which case they cannot be planted, sold or traded. Situations are likely to arise in future where plant species that are promoted as a new crop have potential to provide large economic benefits, but also appear to be a potential weed risk to other industries or the environment. A permitted list would provide the means to prevent cultivation of these species until detailed assessment of risks and potential benefits was conducted. According to the results of these analyses new species could be allowed without restriction, declared as noxious or developed as crops with conditions enforced to manage their potential negative impacts. A permitted list approach to animals would have similar benefits.

Where invasive species are being managed with the aim of containment on a state scale, control at the boundary of core infestations and the eradication of satellite infestations is of very high importance, but may not be recognised consistently in regional planning. Region-byregion prioritising of species, as currently exists for species covered by the CaLP Act, may not be the most effective way to implement statewide containment; the alternative of a centralised approach should be considered.

Unlike invasive species that are targets for statewide eradication or containment, the management of widespread invasive species should be closely integrated with approaches to other land- and water-management issues. The asset-based approach provides such integration, yet it may not be well aligned with the way that relevant Acts are currently implemented. Thus there is a need for a review to identify better approaches, including the possible need for legislative reform.

Legislation to manage invasive species interacts with various Commonwealth and state legislation and policies directed at other matters. These include native flora and fauna (Flora and Fauna Guarantee Act 1988, Environmental Protection and Biodiversity Conservation Act 1999 (Cwlth)), animal welfare (Prevention of Cruelty to Animals Act 1986), cultural heritage (Heritage Act 1995), game management (Wildlife Act 1975), regulation of herbicides and toxins for animal control (Agricultural and Veterinary Chemicals (Control of Use) Act 1992 and Agricultural and Veterinary Chemicals (Victoria) Act 1994) and identification of livestock (National Livestock Identification System).

Often the implications of these Acts for invasive species management can be accommodated at an operational level without undue difficulty, but in some cases refinement or modification of legislation or policy is required. Analysis of the operation of policy and legislation to identify and implement necessary changes will be an ongoing task.

Stakeholder engagement

Effective engagement with stakeholders is crucial to improving statewide invasive species management outcomes.

This policy framework recognises the diversity of stakeholders in invasive species management, and their distinct and differing priorities and expectations. Such stakeholders include national, state and local government agencies and authorities, industries, community interest groups and the broader community. A variety of engagement tools and approaches will be implemented to ensure stakeholders' differing invasive species interests and needs are understood and responded to appropriately.

The approach to engagement of this policy framework will specifically promote;

- Enhanced information and knowledge exchange with stakeholders;
- A stronger shared understanding of the roles and responsibilities of government, industry and community in invasive species management and obligations of land and water managers; and
- Increased collaboration between stakeholders for improved invasive species program outcomes.

Monitoring, evaluation and reporting

For science-based programs such as invasive species management, monitoring, evaluation and reporting (MER) is one element of adaptive management, whereby programs are continually reviewed and analysed to ensure that their approach is consistent with and supportive of any changes in environmental response, community expectation or scientific knowledge.

MER must be coordinated across Victoria to understand what is happening at statewide as well as catchment level. This needs to encompass natural resources management as a whole, since programs such as invasive species management contribute alongside many other programs to facilitate landscape change. MER for invasive species will be linked to other programs through related activity in catchment-condition and state-ofenvironment reporting and with the Australian Government through the national MERI framework.

Delivery of MER for invasive species needs to be supported by effective information management systems that meet ongoing requirements for agency-specific and whole-of-government purposes.

A statewide program logic has been developed to guide policy and program development for invasive plants and terrestrial vertebrates at all levels across Victoria (see Appendix 3). This program logic will be extended to the whole range of invasive species and form the basis for development of an evaluation framework.

MER enables government to be accountable to the community for the value of its investment and provides information necessary for programs to demonstrate effective and efficient progress towards the achievement of their stated outcomes.

A properly constructed MER program will provide objective measurement through clearly understood and accepted methodologies, of progress being made towards stated program goals. This may include answering some fundamental questions:

- To what extent is the program making progress on the outcomes it stated it would achieve?
- Are the program interventions that are being used appropriate to achieve these desired outcomes?
- Does any aspect of the program need to be modified as a result of evidence of progress to date?
- What other evidence that is required for demonstrating program effectiveness is not currently being collected?
- What changes in the environment, community values or expectations have occurred that we need to respond to?
- How should we direct future investment to maximise public benefit?

Incorporating consistent and effective MER into all aspects of the invasive species program is a priority for implementation of this policy framework.

Research and development

The knowledge that comes from research and development is critical for the implementation of evidence-based management approaches and, in many cases, substantial advances in invasive species management will require development of new techniques and acquisition of greater knowledge. The resources directed to R&D need to be proportional to the size and scope of the program that it underpins; at present there are clear unmet needs.

Supply of sufficient information for land managers to make appropriate risk management decisions in invasive species management is a common area of market failure and it may therefore be appropriate for government investment to meet this need where that provides public benefit. Research and development is an area where cost-sharing with private beneficiaries and other jurisdictions offers an opportunity to add to the value achieved from government investment.

Invasive plant research is predominantly delivered through the Biosciences Research division of DPI and invasive animal research through the Arthur Rylah Institute for Environmental Research. Consideration should be given to the capacity of these organisations to deliver R&D for an expanded range of invasive species.

Victorian Government investment in research and development for invasive species has remained constant for a number of years, resulting in a decline in the relative investment in R&D as support for other parts of the program has increased. The Victorian Government's investment in research needs to be further analysed to ensure future management is not seriously constrained by insufficient R&D support.

Research priorities in Victoria are now aligned to themes of preparedness, prevention and eradication, containment and asset-based protection. Risk assessment, surveillance and diagnostics, impact assessment and biological control are areas of current work that support these themes. With regard to invasive animal management, there will continue to be a particular focus on improving the relative humaneness of control techniques.

Biological control programs, on average, provide very high rates of return on investment, with the added advantages of freedom from off-target impacts and ability to be effective in remote and difficult to access places. Biological control is usually applied to species that are already widespread and are managed through asset-based protection. However, biological control can also be applicable to invasive species being managed for statewide containment.

Spartina is a significant threat to coastal ecosystems. Control measures include aerial spraying

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A large infestation of serrated tussock

Appendix 1

Abbreviations

APAS	Australian Pest Animal Strategy
AusBIOSEC	Australian Biosecurity System for Primary Production and the Environment
AWS	Australian Weeds Strategy
AWC	Australian Weeds Committee
CaLP Act	Catchment and Land Protection Act 1994
CCEPI	Consultative Committee on Exotic Plant Incursions
CMA	Catchment Management Authority
CRC	cooperative research centre
DPI	Department of Primary Industries
DSE	Department of Sustainability and the Environment
IPA	invasive plants and animals
IPAPF	Invasive Plants and Animals Policy Framework
MER	monitoring, evaluation and reporting
MERI	monitoring, evaluation and reporting, improvement
NRMMC	Natural Resource Management Ministerial Council
NWIP	National Weed Incursion Plan
POCTA	Prevention of Cruelty to Animals Act 1986
PV	Parks Victoria
R&D	research and development
VPMF	Victorian Pest Management – A Framework for Action
WONS	weeds of national significance

Appendix 2

Glossary of terms

asset	A natural resource that provides services (ecosystem services, production services or social services).
asset-based approach	Involves prioritising control actions for a number of threats based on the relative value of identified assets that will be protected by the actions. Prioritisation should be based on maintaining the viability of important environmental assets and optimising outcomes for asset protection and management.
biodiversity	The variety of life forms: the different plants, animals and microorganisms, the genes they contain and the ecosystems they form.
biological control	The process of using one living species – the agent – to control (usually suppress) an unwanted species – the target. The control of one species by the release of live organisms of another species.
biosecurity	A process designed to mitigate the risks and impacts to the economy, the environment, social amenity or human health associated with pests and diseases.
Catchment Management Authority (CMA)	Under the Catchment and Land Protection Act 1994 (CaLP Act), Victoria is divided into ten catchment regions and a catchment management authority is established for each region. CMAs have specific roles and responsibilities under the CaLP Act in relation to pest management prioritisation.
containment	The application of measures in and around an infested area to prevent the spread of an invasive plant or animal species. This may include reduction of the density or area of the infestation where appropriate. A containment program may include eradication of satellite infestations.
control	In relation to organisms, this includes: – reducing the number of those organisms – preventing an increase in the number of those organisms – reducing the activity or appetite of some or all of those organisms – modifying the behaviour or characteristics of some or all of those organisms.
core infestation	An established population of a pest animal or weed from which satellite infestations may arise.

delimitation survey	A survey that aims to determine the extent of a weed infestation, including the location of the core infestation and satellite infestations.
eradication	When a species (including, for a plant, its propagules) has been removed or killed and no longer occurs at that site. In practice, this means that it can no longer be detected by recommended methods of survey for a defined period of time.
established	A species that, for the foreseeable future, will perpetuate within an area after entry.
incursion	An isolated population of a pest recently detected in an area, not known to be established, but expected to survive for the immediate future.
introduced species	A species that is present in, but not native to a particular place.
invasive species	An invasive species is a species occurring, as a result of human activities, beyond its accepted normal distribution and which threatens valued environmental, agricultural or other social resources by the damage it causes.
native species	Species that is believed to have occurred in a specified part of Australia prior to European settlement.
naturalised species	Originating elsewhere but established and reproducing itself without deliberate human assistance. May have high to low impacts.
new and emerging weed	A recognised weed that has recently been detected, or a plant species that has been known in the area for some time, but has only recently been recognised as having invasive properties.
noxious weed	A species declared as 'noxious' in schedules under the CaLP Act. The Act defines four categories: State Prohibited, Regionally Prohibited, Regionally Controlled and Restricted. NOTE: A noxious weed may be an agricultural and/or an environmental weed.

pest animal	An animal species declared by the Minister under the CaLP Act in one of four pest animal classes: Prohibited Pest Animal, Controlled Pest Animal, Regulated Pest Animal and Established Pest Animal.
potential distribution	The estimated area into which a particular species may spread in the absence of control or containment measures. This area is estimated based on the known environmental, climatic and physical preferences of the species.
risk	Risk is the chance of something happening that will have an impact on objectives. NOTE: The level of risk (e.g. high, medium or low) is defined by the particular method being used. Estimating the level of risk requires an objective, evidence-based consideration of the likelihood and consequences of a particular set of circumstances.
satellite infestation	An eradicable population of a pest animal or weed arising as a result of spread from an established population (see also core infestation).
species-led approach	Prioritising actions that will be most effective in preventing, eradicating, containing or reducing a target pest species, rather than those that will best protect or enhance a specific asset (see also asset-based approach).
weed	A weed is a plant that requires some form of action to reduce its effects on the economy, the environment, human health and amenity.
Weed of National Significance (WONS)	One of 20 weeds that have been identified as 'Australia's worst weeds' for which a nationally coordinated management strategy has been developed and implemented. (See http://www.weeds.org.au/natsig.htm for more details.)
weed risk assessment (WRA)	An evidence-based process estimating the relative weed risk of plant species based on their biological characteristics, impacts on agriculture, the environment and human health and the ratio of the species' present and potential distribution.

widespread species	A species that has spread to many of the places that are suitable for its growth within a specified area. It may occur at high or low density in these places. Containment may still be possible on a small scale, but exclusion from remaining uninvaded areas or reduction are more likely to be appropriate responses.

Appendix 3

Statewide Overarching Program Logic – Applying the Biosecurity Approach to Invasive Plant and Animal Management

Appendix 3: Intermediate outcomes

	Intermediate outcomes
	New high-risk invasive plants and animals are prevented from establishing in Victoria (PREPAREDNESS, PREVENTION)
	Measures, including risk assessment, surveillance and incursion planning will be in place to stop introduction of new high-risk invasive plants and animals or detect them at an early stage.
	High risk invasive pla nts and animals in the early stage of establishment are eradicated from Victoria (ERADICATION)

Action will be taken through engagement, communication and education to support communities and industries in acting on their responsibility to manage invasive plant and animal issues	Timely incursion response will allow detected high-risk species to be eradicated.
	High risk invasive plants and animals of limited distribution are contained (CONTAINMENT)
	Action will be taken to prevent high-risk species from spreading outside current core infestation boundaries, to reduce abundance and extent within boundaries where appropriate and to eradicate satellite populations.
	Key biodiversity and other natural resource assets are protected by reducing the impact of invasive plants and animals (ASSET-BASED PROTECTION)
	Action will be taken, on both public and private land, to reduce impact through treatment in and around affected sites as part of an integrated asset-management approach.

Intelligence: social research, applied research, forecasting, risk assessment, modelling, partnerships

Foundation elements

- Communications Intelligence: social research, applied research,
- Policy forecasting, risk assessment, modelling, partnerships
- Capacity and capability

- Investment
- Economic evaluation
- Strategy
- Education
- Program design and development
- Information management: data, systems, processes
- Legislation
- Monitoring, evaluation and reporting
- Stakeholder engagement

Appendix 1: Table 2

Long-term outcome	Departmental objectives	GVT2 outcomes
	DPI Enable transformation in Victoria's primary and energy industries to sustainably increase wealth and wellbeing while protecting and enhancing safety, community, animal welfare and environment	**More quality jobs and thriving, innovative industries across Victoria**
		Protecting the environment for future generations
Victoria's wealth, wellbeing and biodiversity are protected and enhanced by reducing the impact of invasive plants and animals.		**Efficient use of natural resources**

DSE

- Investing in improved land and catchment management
- Protecting biodiversity and the associated ecosystem services
- Enhancing the values of Victoria's parks and forests

Building friendly, confident and safe communities

Greater public participation and more accountable government

Sound financial management

EXTERNAL DRIVERS

- Political pressures
- Climate change
- Globalisation
- Demographic change
- Changing community expectations