The background features a decorative graphic consisting of three overlapping circles in shades of blue, arranged in a descending staircase pattern from top-right to bottom-right. Two thin, light blue lines intersect to form a large 'V' shape that frames the central text.

National framework for the management of established pests and diseases of national significance

National Biosecurity Committee

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Contents

1	Introduction	1
2	Background	2
3	The Framework.....	4
	Policy approach	4
	Policy principles.....	7
	Roles and responsibilities of government and other stakeholders	9
4	Assessment and listing of established pests and diseases as nationally significant....	12
	Criteria for assessment and listing.....	12
	Practical application of the assessment criteria	13
	Prioritisation for listing an established pest or disease as nationally significant	14
	Development and management of the list.....	15
5	Framework review and evaluation.....	16
6	Application to state/regional/local programmes	16
	Definitions and terminology	17
	Case Studies.....	19
	Case study 1: Anthrax	19
	Case study 2: Enzootic bovine leukosis	21
	Case study 3: Potato cyst nematode	24
	Case study 4: Northern Pacific seastar	26
	Case Study 5: European fan worm.....	29
	Case study 6: Chilean needle grass.....	33

1 Introduction

In 2011 the former Primary Industries Standing Committee endorsed a number of priority areas of reform under the Intergovernmental Agreement on Biosecurity (IGAB). These reform areas were to be delivered through the National Biosecurity Committee (NBC). A series of working groups were established by the NBC, linked to specific IGAB schedules to progress the work.

One priority reform area relates to the development of a national policy framework for managing the impacts of established pests and diseases of national significance (hereafter referred to as “EPDNS”) under IGAB Schedule 5.

In July 2014 the NBC endorsed the draft ‘National Framework for the Management of Established Pests and Diseases of National Significance’ (the framework) for broader consultation and agreed that the sectoral committees would implement the framework once finalised.

Building on the strengths of the current system, this framework provides a strategic, consistent, scientific and risk-based approach to managing the impacts of EPDNS. The framework allows for:

- activities to be undertaken by the most appropriate party
- appropriate prioritisation of EPDNS based on risk
- effort to be targeted where the greatest biosecurity outcomes can be achieved in the national interest
- investment return to be optimised
- adoption of national investment principles involving beneficiaries and risk creators
- minimisation of regulatory burdens associated with containment of established pests and diseases.

On 1 June 2015 the Department of Agriculture and Water Resources and the NBC released the discussion paper [Modernising Australia’s approach to managing established pests and diseases of national significance](#) for public consultation. The paper outlined a new approach to managing EPDNS. The NBC finalised this framework after considering all [submissions](#).

The framework was endorsed by the NBC in July 2016. It will be applied and implemented by the NBC sectoral committees, with IGAB Implementation Taskforce support and oversight.

2 Background

Pests and diseases are a significant social, economic and environmental burden for Australia. Their location, habits and invasiveness can impact on productivity, market access, food safety, public health, biodiversity and the natural and built environments. These consequences can reveal themselves in a range of ways including (but not restricted to):

- increased production costs for primary products
- loss of or restrictions on national and international trade
- impacts on tourism.

Traditionally, governments across Australia have committed significant resources to address the consequences of pests and diseases, and have operated across the biosecurity continuum. This has ranged from prevention, eradication and containment related activity through to controlling pests and diseases that have become well established. A high level of resources, however, has tended to be invested in response to the visible and ongoing presence of established pests and diseases where there are widespread political and public expectations on governments to 'act'. Further, the approach has often been driven by an enforcement approach by government with community stakeholders.

Increasingly, however, there is a tension faced by governments at all levels between the funding and effort put into established pests and diseases and a recognition that, given limited resources, there is a need to focus efforts on the 'front end' of the biosecurity continuum, where the potential for return on investment for government is maximised. This tension is exacerbated by the sheer number of species to address, arising from the ever increasing numbers of new pests and diseases becoming established each year. As a consequence, governments are becoming more strategic in their investments (for example, applying national risk management standard principles to the prioritisation of weeds based on the degree of risk and feasibility of control).

Given these circumstances and recognising that governments do not have unlimited financial resources, and that enforcement-driven approaches are not always highly effective, cooperation and collaboration across communities, industries and governments is essential to achieve sustainable approaches to managing established pests and diseases into the future. The roles and responsibilities of those parties must be clear and transparent.

For governments at all levels, a nationally consistent approach to EPDNS management provides an opportunity to:

- demonstrate how the return on investment of public funds can be maximised across the broader biosecurity continuum
- demonstrate why there is a need for government to change its role in the established pest and disease arena such as investing public funds where they can add the most value
- move away from a traditional, heavy reliance on enforcement as a means to manage the impacts of established pests and diseases
- place a greater emphasis on utilising other tools and assisting industry/community to better manage the impacts themselves

- work more collaboratively with those stakeholders directly affected by established pests and diseases.

For industry and community stakeholders it provides an opportunity to:

- identify and implement the most appropriate means by which to manage the impacts of established pests and diseases in the future on their business
- explore more effective models of managing established pests and diseases whilst having clarity in the nature and extent of, and rationale for, any support that government provides
- operate more closely in partnership with government.

3 The Framework

The National Framework for the Management of Established Pests and Diseases of National Significance (the framework) is designed to deliver better and more sustainable outcomes for government and the community.

The framework focuses on the role of government and the decision making necessary to drive more effective national, regional and local cooperation and action. This will be achieved by streamlining cooperative efforts, promoting consistency and transparency in decision making, and ensuring limited government resources are directed in ways that best serve the national interest and provide the best return on investment.

The framework:

- establishes policy principles to guide government decision making and cooperation to better manage the consequences of EPDNS
- clarifies the role of government, industry, community, landholders and risk creators in managing EPDNS
- establishes criteria to help determine which established pests and diseases should be deemed 'nationally significant'.

Policy approach

The management of harmful pests and diseases reduces their impact on Australia's 'assets', which may be Economic (e.g. livestock, crops, agricultural land), Social (e.g. health, social amenity) or Environmental (e.g. ecosystems, landscapes, marine and freshwater environments, fauna and flora).

Some of these assets are predominantly privately owned, in which case actions to protect them have a high private benefit. Protection of other assets, such as public health (e.g. in the case of a zoonotic disease), public amenity or environmentally sensitive ecosystems are associated with a high/er level of public benefit. Governments, as public resource managers, have a role in maintaining parks, reserves, waterways and open land in the public interest, and in this respect have the same general responsibilities as private landholders. The management approach relevant to most established pests or diseases is one of asset protection. Managing a pest or disease to protect assets (public or private) is fundamentally different from eradication.

When attempting to eradicate a pest or disease there is explicit focus on actions required to prevent new infection and spread of the pest or disease. Prioritisation of activities to eradicate is driven by the relative likelihood of further spread and the potential consequences of the pest or disease, not the value of the 'asset(s)' it is occurring in and its current impact.

Government intervention to eradicate can be justified where large benefits are obtained by many from avoided future impacts of the pest or disease were it allowed to spread. Also, mostly, government is best placed to conduct the interventions for eradication to succeed. Cost-recovery from risk creators, or failing that, from beneficiaries of these avoided impacts, is nonetheless

indicated in proportion to the risk created/benefits received. This is the principle on which the Emergency Animal Disease Response Agreement and the Emergency Plant Pest Response Deed are founded.

A different situation exists once a pest or disease has spread so far that it is 'here to stay', and is primarily being managed for asset protection. When the impacts are primarily on private assets, the benefits from managing it are now realised predominantly by the landholder, producer or enterprise it is controlled on, and only to a small extent by surrounding landholders/producers who might be affected by local-scale spread.

Decisions on where and how intensively to manage the pest or disease should in principle be made at the property or enterprise level by considering the business or enterprise objectives, the value of the 'assets' and the impacts of the pest or disease on an asset's 'values', the cost of pest or disease management and whether other investments might provide a higher return.

Similarly, decisions for management can also be made on a spatial scale appropriate to the host range, known distribution, and potential for spread of the pest or disease (e.g. coordinated control of rabbits by adjacent landholders is more effective than individual property/enterprise efforts). In this scenario, some government intervention may still be justified. For example, where the impacts are on both private and public assets, to address market failure, or where there is a greater public benefit and return on government investment in the coordinated management of the particular pest or disease.

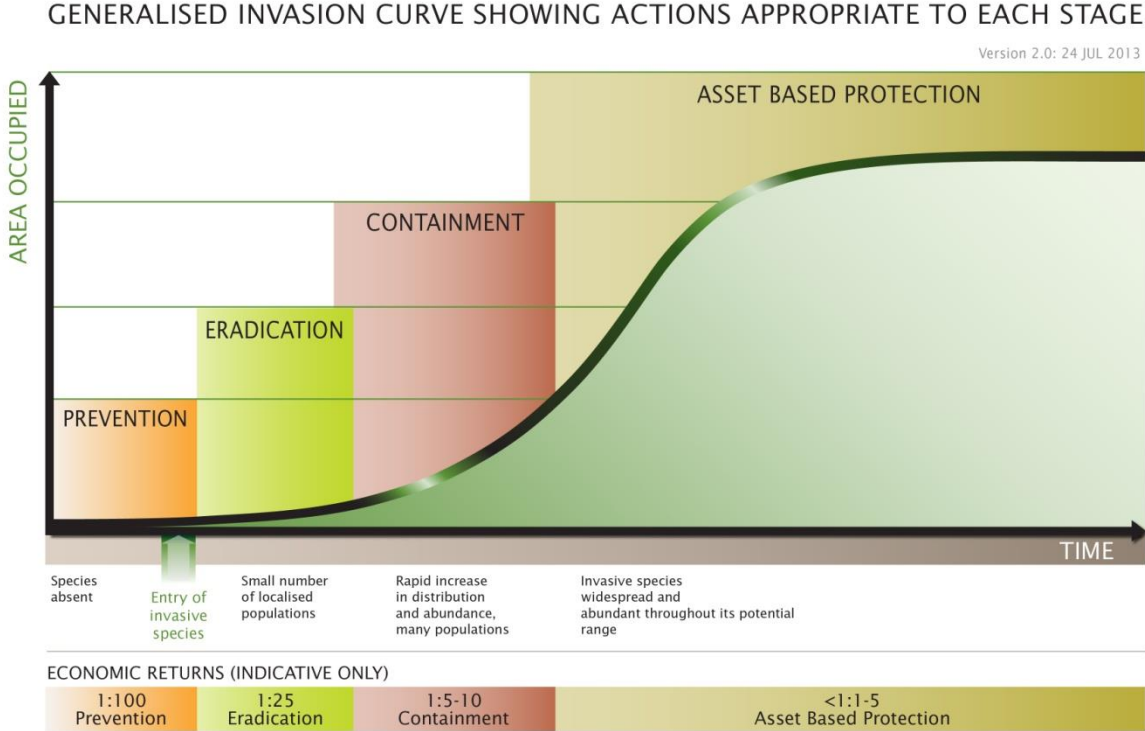
The economic return on investment in on-ground management of established, widespread pests/diseases is generally low relative to prevention, eradication or containment. Sound public funds management dictates governments must maximise return on investment. The argument against government investment in established pest or disease management is therefore not that there is no net public benefit in doing so, but that the return on investment is generally poor by comparison with other areas of biosecurity management.

Targeted government investment, such as research and development for established pest or disease control techniques, e.g. biological or chemical control, or integrated pest management, can have good benefit: cost ratios, but the funding sources for research and development needs to reflect to whom most benefits flow.

The Generalised Invasion Curve (Figure 1) provides a way to demonstrate the invasion continuum and the associated gradient in return on investment along the continuum, based on the stage of invasion of a high risk species.

The role of government, the responsibilities of industries/communities and the scale of industry/community benefits that accrue from government investment also vary depending on the stage of 'invasion'.

Figure 1 Generalised Invasion Curve



Source: Biosecurity Victoria

The figures above are indicative only and are used to illustrate the scale of return on government investment. As indicated in Figure 1, the highest returns on any investment are achieved by focussing resources on prevention and eradication measures—the ‘left hand side of the curve’. In the case of containment, government investment tends to be justified on the basis that governments are best positioned to ‘contain’ the spread, but with contributions from stakeholders obtaining the benefits from avoided future impacts.

Lower returns on investment are generally associated with asset based protection measures—‘the right hand side of the curve’. The benefits from managing a pest or disease in this situation are realised predominantly by the owner of the land it is controlled on and only to a small extent by surrounding land managers who might be affected by localised spread. There is generally a reduced net public benefit given the level of investment that might be required, particularly when comparing it to other parts of the generalised invasion curve.

Governments have resource management responsibilities for public assets and therefore have a role in pest and disease control programs. However, governments should not necessarily be the sole investors in such programs. The emerging, sustainable model is one of asset-based protection that is based on committed community (industry/landholder leadership) rather than an emphasis on government driven approaches underpinned by enforcement and a focus on finding more flexible and ‘fit for purpose’ ways to support community and industry-led action.

Nevertheless, circumstances may dictate government involvement in the management of established pests and diseases even though the return on investment may be low in comparison to other areas of biosecurity management. These circumstances primarily relate to when

government supports sustained community-/industry- led action, or when high value public assets are at risk.

Policy principles

In order to deliver better and more sustainable outcomes for government, industry and the community in managing EPDNS, the following policy principles underpin a national approach whereby EPDNS are recognised as part of the biosecurity continuum and managed under a shared approach. Responsibilities of government, industry and the community in applying these principles are discussed in the next section.

Principle 1: Established pests and diseases of national significance are a particular part of the biosecurity continuum

EPDNS management must be considered in the context of the whole biosecurity continuum, as represented in the form of the Generalised Invasion Curve.

The approach relevant to most established pests/diseases is one of asset protection – wherein the focus is on mitigating impacts on assets, be they private or public.

In situations where a high risk EPDNS may spread into new areas, putting further assets at risk, a containment approach may be necessary. In this context long term containment is a form of asset protection and is included in this framework. Managing EPDNS to protect assets is fundamentally different from, and with a lower investment return than, prevention or eradication approaches.

Principle 2: The management of EPDNS is a shared responsibility between landholders, community, industry and government

The sustainable management of established pests and diseases is resource intensive and requires shared responsibility and effective cooperation among the key stakeholders.

Government investment in management programs, in the absence of industry/community investment (not necessarily financial), is generally not sustainable or effective.

Government will consider investing in the management of EPDNS to protect private assets only when there are industry or community beneficiaries to invest and where benefits exceed costs.

Governments have a responsibility to prevent and control zoonotic diseases, a responsibility shared with risk creators.

Governments have a responsibility to manage EPDNS as public resource managers (landholders) to protect public assets.

Principle 3: To achieve asset-based protection, government will give priority to supporting industry/community leadership and actions

Sustainable asset-based protection requires committed community/industry leadership and action. Government will prioritise its investment to support community-led/industry-led action because it will deliver higher returns on government investment and better outcomes for communities/industries.

Examples of how community leadership can be demonstrated are through local and state-wide action groups or auditable guidelines for self-regulation, QA Programs etc.

Government should not be a sole investor in such programs, except where government is a public asset manager, or where there is significant public benefit and there are no clear risk creators or, failing that, beneficiaries that are able to co-invest to protect public assets.

Cooperation with government may be enabled in a range of ways such as co-regulation, policies, education, and access to information, research, guidelines and action plans.

Principle 4: Government will work with stakeholders to support research and development for more effective pest and disease management

Innovation is important for the future sustainable management of EPDNS.

Government support for innovation through research and development should be considered as part of its commitment to ongoing improvement. A critical factor in considering the costs, benefits and risks of research and its utilisation, will be that there is a demonstrable clear pathway for the adoption of innovation. This will require community and/or industry commitment and ownership of the research and its outcomes.

Government investment in innovation will be in accordance with government investment principles, requiring that beneficiaries contribute in proportion to benefits received.

Government plays a role in research and development by providing levels of investment where there is a public benefit. For example, rabbit haemorrhagic disease for rabbits or biocontrol for weeds, which can provide good investment return.

Principle 5: Enforcement intervention should be kept to the minimum necessary to achieve the desired outcome

Regulated biosecurity intervention measures should be risk based and strictly limited to the minimum level necessary to mitigate risk to the economy, environment and community. This particularly applies to enforcement measures that impact on business and trade (e.g. movement restrictions on commodities). It is essential that these be risk-based, explicit and transparent, with clear statements on what is occurring and why. Alternatives to regulatory measures should be considered wherever possible.

Australian, state and territory government jurisdictions should all promptly notify relevant stakeholders of changes in regulatory requirements for established pests and diseases where this impacts on business and trade, and ensure that all associated regulations, changes to those regulations or other biosecurity measures that have been adopted are publicised promptly to enable jurisdictions to become acquainted with them, and industries to adjust.

Principle 6: Established pests and diseases assessed as nationally significant will have an associated national management plan or strategy

The reason for listing a nationally significant established pest or disease is to mitigate impacts through a national approach, strategy or plan. The national plan or strategy will generally be coordinated by the relevant sectoral committee, but could also be by an industry group, Animal Health Australia (AHA) or Plant Health Australia (PHA). A national approach could be as simple as implementing a legal requirement that the established pest and disease of national

significance is 'notifiable', or that key knowledge gaps with respect to control or management be filled through nationally coordinated research and development.

Alternatively, a national plan or strategy could be more detailed and set out the basis for nationally coordinated management including funding arrangements and roles and responsibilities of government and other parties. An example would be a national program for the containment of a high-impact pest or disease that cannot be eradicated.

Principle 7: The list of established pests and diseases that are deemed nationally significant must be regularly reviewed against the assessment criteria and principles

This principle recognises that EPDNS or emerging EPDNS may change in terms of the nature or extent of their presence. Consequently, regular review against the framework is important.

Review periods for particular pests/diseases should be dictated by the circumstances, but should be at least every 5 years.

Pests and diseases should be removed from the list when they no longer meet the criteria for EPDNS. For example, land managers may control 'get on top' of the problem, and there may no longer be added value from national coordination.

Factors such as climate change and land use change also need to be considered.

During regular review it will be a requirement to justify why an established pest or disease remains listed as nationally significant. Lists of EPDNS cannot simply grow in perpetuity.

Roles and responsibilities of government and other stakeholders

Successful collaborative action to manage established pests and diseases depends on all stakeholders having an understanding and awareness of their roles and responsibilities. Established pest and disease management roles may differ in relation to asset-based protection and containment and be dependent on the general invasion curve stage of invasion (Figure 1). Further, roles and responsibilities can vary depending upon statutory responsibility, location of the incursion, financial incentives to take action and level of collaborative effort required for management.

Key roles and responsibilities of government and other stakeholders are:

Government

- provide support where there is sustained collective action to manage an established pest or disease by an industry or community
- undertake enforcement actions and regulatory interventions with respect to individual landholders only when necessary to support sustained collective action by an industry or community
- when necessary for containment of an established pest or disease, apply nationally consistent regulatory measures only to the minimum extent necessary to manage unacceptable risks

- promote the development of partnerships between government, industry and community
- facilitate coordinated policy across jurisdictions for the management of EPDNS when in the national interest to do so
- work with risk creators where possible to assist adoption of risk management measures as part of normal business practices
- support research into improved EPDNS control or management when there is a strong public interest to do so
- meet roles and responsibilities as a landholder (public land and waters) to protect assets of high public value.

Industry and community groups

- promote and undertake collective action based on industry or community needs at a local, regional or national level to mitigate impacts of EPDNS on industry or community assets
- build risk mitigation (including where applicable containment) measures into normal industry practices
- support and promote industry-driven or market-driven approaches to established pest and disease management or containment where practical and applicable
- support research into established pest and disease management or control that provides industry benefit.

Landholders

Landholders are individual owners or lessors of assets including public and private land, linear reserves, marine and freshwater areas/holdings and built structures.

- control and manage established pests and diseases to mitigate as necessary the impacts on the landholders assets or as required by regulation
- take reasonable steps to minimise the impacts of established pests and diseases on other landholders and assets (both public and private), particularly when part of a programme of collective industry-led or community-led action.

Risk creators

Risk creators include government, industry and community groups, landholders, land developers, operators of earth-moving equipment, contractors engaging multiple landholdings, linear reserve managers (roads, railways), plant nurseries and vessel operators.

- control and manage established pests and diseases to mitigate as necessary effects on public and private assets or as required by regulation
- participate as necessary in industry-led or community-led actions to manage or contain established pests and diseases
- identify risk-creating activities and build risk mitigation measures into normal business practices

- take reasonable steps to minimise the impacts of established pests and diseases on other parties and industries, particularly when part of a programme of collective industry-led or community-led action.

Service organisations such as Animal Health Australia, Plant Health Australia, or Research and Development Corporations can directly support collective action initiatives by the industries they service.

4 Assessment and listing of established pests and diseases as nationally significant

Criteria for assessment and listing

The criteria for assessing and listing (or de-listing) established pests and diseases of national significance are as follows:

- 1) Impact
- 2) Feasibility of management intervention
- 3) Benefits from national coordination

In essence, the first criteria equates to a 'national significance' test, while criteria two and three combine to form a 'national interest' test.

1. Impact

The pest or disease must have a significant national impact. National impact in the context of an established pest or disease of national significance refers to impacts on one or more of the following:

- a) international market access and/or trade
- b) the economic health of the nation
- c) human health
- d) the natural environment and ecosystems
- e) infrastructure causing disruption to more than one state/territory
- f) substantial damage to, or deterioration of infrastructure used by a significant proportion of people over an extensive area
- g) amenity of resources, such as public lands and waters and that has the potential to affect more than one state/territory
- h) Australian culture, cultural assets, practice or custom or national image.

2. Feasibility of management intervention

The pest or disease should be able to be managed in ways that are feasible. This criterion requires that the following factors be considered in assessing feasibility of managing the established pest or disease

- a) technical feasibility of implementing a management approach
- b) potential role of regulatory mechanisms

- c) cost-effectiveness of the proposed approach
- d) level of socio-political support.

For a high impact established pest or disease of national significance, the absence of feasible management methods may be grounds for coordinated research and development. In that case an established pest or disease of national significance could be recognised as nationally significant for the purposes of research and development and not for coordinated on-ground management.

3. Benefits from national coordination

Management of the established pest or disease will benefit from national coordination, as set out in a national plan or approach.

This criterion requires that there be a clearly demonstrable benefit from a nationally coordinated approach or plan that outlines the action to be undertaken by all responsible parties. An established pest or disease may have (or potentially have), significant impacts in one or more regions, but would not be considered as an established pest or disease of national significance if no particular benefit can be demonstrated by taking a nationally coordinated approach, or having a national plan. Of note is that Australia has international obligations to protect biodiversity and this may be of relevance to the test of 'national interest'. A national Threat Abatement Plan (prepared under the *Environment Protection and Biodiversity Conservation Act 1999*) may, for instance, constitute a national EPDNS plan under this framework, if considered consistent with the national coordinated approach for EPDNS.

An example where national coordination would be of benefit would be where regional containment is desirable and nationally consistent and coordinated 'movement controls' are required for that purpose. Another example may be where there is Commonwealth/national or shared funding available that can be invested in an agreed and coordinated fashion. It should be noted that a national plan or approach does not necessarily mean a plan of government action.

Once an established pest or disease is assessed as nationally significant by meeting all of the three criteria (impact, feasibility of management intervention and benefits from national coordination), it should be placed on a list for the relevant sector, as a requirement under the IGAB.

The purpose of listing an EPDNS is to facilitate a nationally-coordinated series of actions and to clearly signal to other stakeholders how government might respond to the established pest or disease. It also provides the opportunity to signal a role for other parties.

An 'action' would not only refer to the application of direct control techniques and enforcement tools, but may involve alternative tools such as education or research.

Practical application of the assessment criteria

In general, a proposition from within government for assessment of an established pest and disease would come through, or be channelled through, the relevant sectoral committee (subcommittees of the National Biosecurity Committee), or alternatively may come through an industry or community proposal to government. In the latter case it would be the responsibility

of the relevant sectoral committee to assess the established pest or disease and make recommendations to the Agriculture Ministers' Forum.

It is important to recognise that applying the criteria may be hampered by a range of factors including:

- lack of knowledge of the potential scale of national impacts
- establishing which actions are likely to be cost-effective
- establishing which actions will deliver significant national economic, social and environmental benefits, and
- establishing the costs and benefits of nationally-coordinated efforts relative to alternative actions that governments, communities or industries might otherwise take independently.

It will be important that in the future, information resources are provided that outline processes for assessing against these criteria and addressing potential information gaps in relation to the above factors which result in prospective pests and diseases being eliminated from the process by the government. This will contribute to ensuring consistent approaches to assessments and decision making at a sectoral level.

See case studies for how established pests or diseases could be assessed against this framework.

Prioritisation for listing an established pest or disease as nationally significant

Operating on the assumption that listing an established pest and disease as nationally significant implies some form of 'action', a process should be in place for nominating as a priority, an established pest or disease of national significance to be officially placed on the list.

Lists should not grow in perpetuity however, and listing of any new species should not be open-ended. Regular review of lists of EPDNS for each sector is necessary. Review periods for particular pests/diseases will be dictated by the circumstances, but will be at least every 5 years. Relevant stakeholders need to be engaged for both initial assessments and in the review process.

Some of the factors that might trigger a review of a pest or disease to be formally placed on or taken off the list include where:

- a pest or disease moves into a new area (put on list)
- control becomes feasible (put on list)
- coordination by stakeholders (other than government) takes over (take off list)
- tools have been developed and provided to industry/community, such that spread and impacts can be managed to an acceptable level without national coordination or intervention (take off list)
- stakeholder request for delisting (i.e. no longer industry or community support for national approach)(take off list)
- a more significant pest or disease takes priority for use of finite resources (take off list).

In the longer term, it is envisaged that each Sectoral committee will further refine the framework criteria as it is applied to pests and diseases affecting their sectors.

Development and management of the list

Sectoral committees (Invasive Plants and Animals Committee, Animal Health Committee, Plant Health Committee and the Marine Pest Sectoral Committee) in their role of developing, implementing and coordinating national activities to address biosecurity issues, will use the nationally endorsed framework to review their existing lists and undertake an assessment in accordance with the framework.

This process will take some time and will not necessarily replace other existing lists such as existing state and territory pest and disease lists and notifiable diseases etc. Upon review, sectoral committee will report their lists to the NBC, which will be responsible for identifying inconsistencies in application of the framework and seeking final endorsement from the Agriculture Senior Officials Committee.

5 Framework review and evaluation

The framework will be subject to a review process. Sectoral committees will commence trial implementation of the framework and report back to the NBC on progress within 12 months.

The NBC will also develop an evaluation plan within the first 12 months of implementation. The evaluation plan will identify the expected impacts and benefits to be achieved by the framework and form the basis of the formal review of the framework.

A formal review of the framework will occur within five years of the framework's adoption, through the NBC and in consultation with sectoral committees and other affected parties.

6 Application to state/regional/local programmes

This framework, and associated national assessment and listing processes, do not by necessity apply to, or override, individual jurisdictional programs or processes for established pests and disease management within their borders. It is also recognised some jurisdictions may be currently free of pests and diseases that may be widespread in other jurisdictions.

The framework should apply whenever Australian, state and territory programmes or needs intersect in the national interest.

The framework is valid with respect to the management of all established pests and diseases. Over time, it would be useful for the framework to be applied to all state or local programs to ensure consistency of message and approach for stakeholders. It would also serve to minimise criticism of jurisdictions by stakeholders.

Definitions and terminology

Asset-based protection	<p>Prioritising control actions for several threats based on the relative value of identified assets that will be protected by the action. Prioritisation should be based on maintaining the viability of assets and optimising outcomes for asset protection and management.</p> <p>Refers to public and private land, natural resources, biodiversity and private goods.</p>
Asset protection	<p>Refers to actions that mitigate impacts or consequences of pests or diseases on assets (this includes public and private assets) and does not necessarily equate to direct control, reduction or destruction of the pest or disease. An example of an 'indirect' asset protection activity is exclusion fencing for rabbits, wild dogs, foxes</p>
Assets	<p>Refers to those things on which pests or diseases may directly or indirectly impact, whether publicly owned, or privately owned or leased, and can include natural or built structures in both the terrestrial and aquatic environments.</p>
Biosecurity	<p>The management of the risk to the economy, the environment and the community, of pests and diseases entering, emerging, establishing or spreading.</p>
Containment	<p>The application of measures in and around an infested/infected area to prevent the spread of an invasive pest or disease. This may include reduction of the density or area of the infestation/infection where appropriate. A containment program may include eradication of satellite infestations.</p>
Control	<p>In relation to organisms, this includes reducing the number of those organisms, preventing an increase in their number, reducing the activity or appetite of some or all of those organisms and modifying the behaviour or characteristics of some or all of those organisms.</p>
Disease	<p>This definition builds on the Intergovernmental Agreement on Biosecurity definition. The presence of a pathogenic agent in a host and/or the clinical manifestation of infection that has had an impact (i.e. significant negative consequences) or poses a likely threat of an impact. It includes micro-organisms, disease agents, infectious agents and parasites.</p>
Eradication	<p>[National Environmental Biosecurity Response Agreement]: In relation to pests and diseases means eliminating a pest or disease from an area. Eradication is indicated by the pest or disease no longer being detectable.</p>
Established	<p>This definition builds on the Intergovernmental Agreement on Biosecurity definition of 'established'. Means a self-sustaining pest or disease that occurs in Australia and is not regarded as eradicable.</p>

An established pest or disease may be distributed widely across Australia, or be only regionally distributed. A regionally-distributed established pest or disease may be the subject of containment measures to mitigate further spread. Native or indigenous plants and animals, pests and diseases are not characterised as established for the purposes of this framework (even if having negative impacts, for example over-abundant native fauna).

Established pest or disease	A pest or disease that is perpetuated, for the foreseeable future, within any area and where it is not feasible (whether in terms of technical feasibility or a cost: benefit analysis) to eradicate the pest or disease.
Landholder	Individuals, companies, organisations and governments that own, lease or manage private, commercial or government land, or own, lease or are licensed to manage parts of the freshwater and marine environments.
Nationally significant	Means an established pest or disease that meets all the criteria of national significance.
Risk Creator	Those individuals, businesses, organisations, industry groups etc. that create or exacerbate risks that may result in a disease or pest emerging or spreading in Australia and the disease or pest causing economic, social or environmental harm.
Pest	This definition builds on the Intergovernmental Agreement on Biosecurity definition. Any species, strain or biotype of the Kingdoms Animalia (excluding human beings), <i>Plantae</i> , <i>Fungi</i> , <i>Monera</i> or <i>Protist</i> that has had an impact (i.e. significant negative consequence) or poses a likely threat of having an impact.
Prevention	[National Environmental Biosecurity Response Agreement]: Prevention under the framework refers to post-border prevention activities. In relation to pests and diseases, includes regulatory and physical measures to ensure that outbreaks are prevented or their impacts mitigated, and includes pre-border, border and post-border activities.

Case Studies

The case studies demonstrate how an established pest or disease could be assessed against the framework. It is to be noted that species used in the case studies may not be formally endorsed by the NBC to be listed as nationally significant.

Sectoral committees (subcommittees of the NBC) will use the framework to review their existing lists and undertake an assessment in accordance with the framework to formally recognise established pests and diseases of national significance (see section 4).

Case study 1: Anthrax

Criteria A. Impacts

Anthrax is a zoonotic disease with minor human health ramifications in an Australian context – exposed knacker workers or farmers may become infected, but only rarely, and treatment is effective. Public health risks (i.e. risks to the broader public) and risk to food safety are negligible given normal industry practices along the production and consumption chain. The disease is limited in distribution to an endemic ‘belt’ embracing much of NSW and Victoria. There are local minor market disruptions when localised cases occur (minor incidents occur most years). Occasionally, very large outbreaks can occur which have market access ramifications on a national scale; these rare outbreaks need to be managed under emergency arrangements. Wider environmental impacts are usually minor. Perhaps the biggest impact of anthrax is on social amenity – it causes widespread consternation and fear in communities, largely through media driven scare. It is a disease listed by the World Organisation for Animal Health (OIE) and hence requires international notification of any significant changes in occurrence or distribution. It is on Australia’s national list of notifiable diseases.

Criteria B. Feasibility of management intervention

Anthrax can be readily contained by quarantine, movement restrictions, burning infected carcasses, and vaccination on properties where outbreaks have occurred or are known to occur. Sometimes it is necessary to mandate vaccination on a wider scale when conditions are recognised that might support a large outbreak. Trace forward and back of livestock movements from properties experiencing disease is also carried out. These government interventions are necessary both to contain the outbreak and to give national and international markets confidence that Australian livestock and livestock products (i.e. from affected and unaffected geographical areas) remain safe and free from anthrax.

Criteria C. Benefits of national coordination

Because large outbreaks generate considerable media interest and knee-jerk negative trade and market access reactions the response to anthrax benefits from national coordination. Anthrax is one of a small number of endemic diseases listed under the Emergency Animal Disease Response Agreement (EADRA) and there is a national anthrax response procedural manual appended to the EADRA. Although no response has been activated yet under the EADRA, it provides for cost sharing arrangements between industry and governments based on the beneficiary pays principle in the event of a large outbreak.

How the draft assessment criteria might be applied?

Under the criteria (A to C above) anthrax merits present classification as an established disease of national significance.

The circumstances under which government would intervene and the possible nature of intervention?

Governments virtually always need to intervene (as per B) to reassure markets, to reduce fear, to mitigate impacts on farms and production, and to contain potential spread to ensure a localised incident does not become a large scale outbreak.

How might a review be instigated as to its consideration for listing or removal?

It is conceivable that given the recognised limited distribution of anthrax to two states one or more of the other jurisdictions could challenge the inclusion of anthrax in the EADRA. Adverse media impacts and trade impacts could be managed bilaterally by the Commonwealth in conjunction with the affected jurisdiction with limited need for true national coordination. Such a review would be unlikely given present epidemiological knowledge, control methods, and international interest in anthrax (including OIE listing). All jurisdictions need to carry out surveillance and ongoing risk mitigation for anthrax (e.g. restriction of introduction of infected livestock and products) and all benefit from market access realised by a credible national control and management strategy compliant with OIE rules and broadly acceptable to trading partners.

Case study 2: Enzootic bovine leukosis

Criteria A. Impacts

Enzootic bovine leukosis (EBL) is a lymphoproliferative disease of cattle caused by infection with bovine leukosis virus. It has a worldwide distribution with the vast majority of infections being subclinical. It occurs rarely in Australia, now being limited to a very small percentage of beef herds following implementation of a prolonged eradication program in the dairy sector.

Production impacts in EBL infected herds are negligible – rarely, an individual animal develops a lymphoid tumour and needs to be culled.

In actual fact, EBL has no direct impact at all: none on public health, the environment, social amenity, built infrastructure, food safety, movement or industry impacts though cost or production or tourism. Minor indirect impacts can occur on individual herds that have tested positive through regulated or market restrictions on the movement of cattle, semen and ova, or products such as milk.

Despite its insipid impact, EBL is an OIE listed disease and is on Australia's agreed list of national notifiable animal diseases. It qualifies for the latter on the basis of its assessment by Animal Health Committee as "a disease of national and genuine concern to Australia according to the criterion [3(c) (ii)] that the disease (agent or strain of the disease agent) is subject to a recognised national control or eradication program".

Why has there been a successful, prolonged and onerous, official national eradication program from the dairy sector, one that necessitates perpetual ongoing biosecurity requirements at the interface with the beef sector (in which no controls apply or are needed), and ongoing monitoring and controls, for a disease devoid of significant real impact?

Opinions might vary, but the root would appear to be in the similarity of bovine leukaemia virus, a C type retrovirus, to some human retroviruses. Notwithstanding the similarity, there has never been evidence of transmission to people, and the likelihood of that occurring appears vanishingly small, and diminishing, as further evidence has accumulated over time. The similarity led some countries (e.g. in Europe and New Zealand), in the past two decades, to embark on EBL dairy eradication programs to mitigate the imaginary, perceived, potential human health risk of milk. The Australian dairy sector, being strongly export-oriented and mindful of potentially falling behind in the international market place as other exporting countries approached and promulgated free status wanted to pursue eradication from the dairy sector. No gain in market access appears to have been realised by achieving freedom in the Australian dairy sector, and with hindsight, no significant loss of market access would have occurred in the absence of freedom.

Criteria B. Feasibility of management intervention

EBL is a disease that is very easy to detect and eradicate from all dairy herds in Australia. Inexpensive, yet highly sensitive and specific, bulk milk tests organised through the milk production companies enable ready classification of all herds as infected or not infected. When EBL infection is detected through regular bulk milk monitoring, eradication is easily achieved in that herd by a process of further testing individual animals and culling the invariably small number of reactors. The main difficulty with the program of eradication from the dairy sector is

that there is an ever present risk of reintroduction (and loss of sectoral freedom) from beef herds, and hence ongoing preventive biosecurity measures need to apply, along with ongoing monitoring (of bulk milk), and ongoing intervention where positive bulk milk samples are detected.

Criteria C. Benefits of national coordination

National freedom from the dairy sector requires national coordination by industry and government. While individual milk factories could achieve a free status for their milk products, it would be more advantageous in the international market place (approximately 80% of Australia's dairy production is exported) if importing countries are persuaded to accept Australia's (self proclaimed) free status in the entire dairy sector. That of course assumes the questionable supposition that the market really cares about EBL.

How the draft assessment criteria might be applied?

Under the criteria (A to C above), EBL scarcely merits classification as an established disease of national significance because it fails to meet (A). Its real impacts are negligible and the benefits of continued monitoring and ongoing freedom in the dairy sector appear to be at worst imaginary, or at best to be realised in an uncertain future through preservation of existing markets or improved access to new ones. However, cost and other quality factors including genuinely important biosecurity statuses (e.g. FMD freedom) are likely to be far more important to international market access for Australian milk products than EBL status. The justification of EBL as a nationally notifiable disease in Australia merely on the basis of its being subject to a national industry program smacks of somewhat circular reasoning.

The circumstances under which government would intervene and the possible nature of intervention?

Governments have intervened significantly to achieve national freedom from EBL in the dairy sector, at a number of levels. Governments have used regulation and legislative compensation arrangements to mandate testing and culling of infected animals. Governments have developed the policy and program approach to freedom in conjunction with industry, and have coordinated the collection, collation and interpretation of program results into a dossier to support the claim of freedom in the dairy sector. Government officials have played a major role in coordinating and 'driving' many operational aspects of the program such as bulk milk testing and the elimination of infection from infected dairy herds. Some aspects of governments' contribution have been the things that only governments can do (e.g. regulation; reviewing the information to support and claim national freedom) but far too much has been done in an operational role to fill the vacuum where national industry project management should be in the case of a program solely for the benefit of industry.

The national EBL freedom program is now at a cross roads having relied on significant contribution from government biosecurity services recognised to be no longer viable given the absence of a role of government in managing this non-impact disease. The dairy industry will need to assume management of all aspects of the program other than the minor coordination and enforcement underpinning by government, with national industry funding to support government to carry out its minor role.

How might a review be instigated as to its consideration for listing or removal?

This case study briefly argues that EBL should not be properly considered a disease of national significance (i.e. as assessed against the working group's draft criteria) despite its listing as a nationally notifiable disease and despite the existence of a national ongoing eradication program in the dairy sector. EBL's significance is limited to questionable considerations around potential future market access for which industry would be the beneficiary (if realised). Governments should provide the minimal support to the national EBL program – those elements that only governments can do; however, that role should be fully funded by industry.

To some degree this case study highlights that it is a moot point whether an animal disease such EBL should be listed as a disease of national significance or not: what matters, is that if there is a management program at the behest of industry it needs to be cognisant of the extent and nature of role of government and funded in accordance with the beneficiary pays principle.

Case study 3: Potato cyst nematode

Criteria A. Impacts

Potato Cyst Nematode (PCN) is a serious pest of potatoes throughout the world. There are two species of PCN (*Globedera rostochiensis* and *Globedera pallida*) and a number of pathotypes of each. A pathotype of *G. rostochiensis* (golden nematode) is known to be present in parts of Victoria, however the status of other states & territories is not fully defined.

If allowed to build up PCN can devastate susceptible potato crops, especially in temperate regions, where it causes stunting of plants, reduced yields and sometimes even complete crop failure. This severe impact, and its small size, cryptic nature and capacity to lie dormant in soil for 20 years make it a very difficult pest to detect and manage. PCN is spread through the movement of infested soil adhering to unwashed/brushed potatoes and dirty machinery/equipment. Due to the impact on production and clear transmission pathways PCN infestations can severely impact market access to sensitive markets. As a consequence, Australian states & territories currently apply stringent quarantine procedures and market access requirements to host produce and other potential vectors from PCN infested land, associated and contingent land in an attempt to restrict its spread into non-infested regions.

Due to the commercial availability of 26 cultivars with high resistance to PCN for table, chip and processing uses, PCN infested properties are able to maintain productivity. Whilst a PCN infestation does impact production, including reducing the choice of cultivars used as seed, the main impact is on market access.

Criteria B. Feasibility of management intervention

PCN intervention strategies need to address both production and market access issues. The strategies applied, however, will need to be quite different and will need to be applied across the supply chain.

Production management intervention will need to be applied by growers at the property level with local industry coordination and support. Effective management of known infested land would rely on strategic crop rotations with non-host species and use of clean seed and resistant cultivars. Strict adherence to farm biosecurity measures is needed to prevent further spread of PCN off the infested land and periodic soil testing to determine the efficacy of management practices. This form of intervention is feasible due to known infestation being in geographical clusters in well-defined potato production districts currently operating in accordance with biosecurity controls.

Intervention to address the impacts of market access would need to be led by government, as it will rely upon a combination of legislation and inter-jurisdictional agreement. Compliance with agreed measures by industry will be required to reduce the risk of PCN spread. The intervention applied here will be based on identifying transmission pathways and addressing the risks posed by trade in vectors from known infested properties through appropriate risk mitigation measures. There will also be a need to fully define the extent of infestation particularly of “at risk land” through surveillance and periodic monitoring to validate property or area freedom. Biosecurity risks associated with PCN infestations have been assessed and mitigation strategies developed, and the feasibility of market access intervention relies upon nationally consistent

implementation of measures to manage risk to facilitate trade (as opposed to protecting industry in an individual jurisdiction).

Criteria C. Benefits of national coordination

Applying a nationally-consistent risk-based model to the domestic trade associated with PCN will both underscore the measures currently in place for importation of host products into Australia, while also demonstrating the overall maintenance of Australia's current pest status to facilitate exports.

In the absence of a nationally-consistent approach, there is a high likelihood that one or more individual jurisdictions would apply measures (or not apply them) in a manner which would compromise Australia's current import and export position.

How the draft assessment criteria might be applied?

PCN currently triggers the "Market access" criteria domestically due to the restrictions in place between Australian jurisdictions. In the absence of national coordination, this could become a more significant national market access problem due to the import and export issues outlined above.

The circumstances under which government would intervene and the possible nature of intervention?

Government intervention would only apply to address the market access implications associated with higher risk vectors as commercial forces would drive the response to production impacts. This intervention by government would be aimed at ensuring national consistency in the policies applied to management of PCN, using the same risk-based approach as is currently taken to assessments applied to imports and exports. These policies would be supported through legislation active in all jurisdictions.

How might a review be instigated as to its consideration for listing or removal?

This process has essentially commenced with the national Plant Health Committee currently working towards endorsement of a risk-based model for national PCN management. Delisting could be considered if PCN were to establish in a number of jurisdictions so that that official control is considered to be no longer technically feasible or economically warranted.

Case study 4: Northern Pacific seastar

Criteria A. Impacts

Northern Pacific seastar (*Asterias amurensis*) is a voracious introduced pest having proven and potential impacts on the economy, environment and social amenity. However, the national impacts are yet to be thoroughly quantified. It is widely recognised that *Asterias* causes impacts to scallop and mussel fisheries and aquaculture in Tasmanian waters. Of most concern is the influence of *Asterias* on scallop production in Australia (value \$AUD 25M per year) and in 2006, 25 tonnes of *Asterias* were caught as by-catch by commercial scallop fishermen on the east coast of Tasmania. There have also been recent reports of 'very large numbers' of *Asterias* in scallop spat collector bags and suspended 'grow-out' cages on the east coast of Tasmania, resulting in ~ 1 million dollar loss to the industry in 2000.

The presence of *Asterias* also has the potential to impact clam and cockle fisheries such as those targeting *Katelysia* sp. and *Venerupis* sp. in sheltered bays on the east coast of Tasmania (combined average beach value of \$AUD 234K per year, based on average earnings 2001-2005). Experimental evidence has demonstrated significant predation impacts of *Asterias* on some of these commercial bivalve species in Tasmania, resulting in significant reductions in population density. Other cockle fisheries (e.g. Goolwa cockle *Donax deltoides*) that harvest animals from high energy surf zones are not likely to be affected by *Asterias*, due to its preference for low energy, sheltered habitats.

Environment

Impacts in native range

Predation by *Asterias* in its native range influences the abundance of a wide range of benthic infauna including molluscs, ascidians, bryozoans, sponges, crustaceans, polychaetes, fish and echinoderms.

Impacts in Australia

The impact of *Asterias* on soft sediment habitats in Tasmania has been the subject of extensive research. Results from experimental manipulations and detailed observations of feeding have demonstrated a large impact of *Asterias* on bivalve populations, particularly those species that live on or just under the sediment surface. *Asterias* appears to be a generalist predator with strong food preferences, but can readily switch to other prey species if the abundance of preferred prey becomes low. At high densities, *Asterias* has the potential to impact a large variety of taxa, with significant and broad effects on soft sediment communities. While *Asterias* also occurs on rocky reef in sheltered habitats, its impacts on these communities remain poorly understood.

Asterias has also been implicated as a contributing factor to the decline of the endangered spotted handfish in the Derwent River Estuary. *Asterias* have been observed feeding on a stalked ascidian commonly used as a spawning substrate (*Sycozoa* sp.) and it is possible that predatory loss of the ascidian may impact spotted handfish by reducing the available spawning substrate. The impact of *Asterias* on other rare echinoderm species in the Derwent River (e.g. small five armed seastar *Marginaster littoralis*, holothurian *Psolidium ravum*) remains poorly known.

Asterias has the potential to spread along the Southern coast of Australia from Sydney to Perth out to a depth of at least 100m and is likely to represent a significant threat to the integrity of soft sediment communities if continued spread occurs.

Human health & Amenity

If *Asterias* is used for consumption by humans or other species exploited by humans, there is a potential for impacts on human health because *Asterias* can accumulate toxins. However, at this stage the risk of these effects is considered minimal.

The impacts of *Asterias* on biodiversity and the aesthetic values of the marine environment could potentially impact tourism and the recreational values of coastal areas.

Criteria B. Feasibility of management intervention

Asterias can be readily contained by quarantine, movement restrictions, biofouling inspections and manual removal by divers. These government interventions are necessary both to contain the outbreaks and for the fishing and aquaculture industry to remain safe and free from *A.amurensis*.

Criteria C. Benefits of national coordination

The implementation of a National Control Plan (NCP) for *Asterias* and the associated implementation of ballast water controls, inclusion of the species on the trigger species list under the Emergency management element, and inclusion as a target species for the National Monitoring Network will substantially reduce its spread in the short term.

Cost - Benefit Analysis

Cost Benefit analysis for the implementation of NCPs cannot be precise as the losses to production values and the marine environment that would occur in the absence of control measures cannot be estimated. For *Asterias*, the benefit to cost ratio was 2.3 where eradication of the species was not considered possible and 1.5 where eradication of some incursions was considered possible. When the potential benefits for the marine environment are included, these ratios of benefits to cost will be exceeded.

How the draft assessment criteria might be applied?

Under the criteria (A to C above) *A.amurensis* merits present classification as an established pest of national significance.

The circumstances under which government would intervene and the possible nature of intervention?

Governments virtually always need to intervene (as per B) to reassure markets, to reduce fear, to mitigate impacts on fisheries and aquaculture production, and to contain potential spread to ensure a localised incident does not become a large scale outbreak.

How might a review be instigated as to its consideration for listing or removal?

The distribution of *Asterias* is currently localised to two States (Tasmania and Victoria). Its review for listing or removal would become apparent if it was successful in also colonising NSW, SA and WA. Such a review would be unlikely given present the present range, ad-hoc control methods being applied and interest in *Asterias*. All jurisdictions are required to carry out surveillance and ongoing risk mitigation for *Asterias* although it is not national due to funding constraints in the eastern jurisdictions and Tasmania.

Case Study 5: European fan worm

This case study draws on the 2008 Aquenal report prepared for the Australian Government National control plan for the European fan worm '*Sabella spallanzanii*'.

Criteria A. Impacts

Economy

Impacts in native range

In its native range there are no documented economic impacts attributable to *Sabella*.

Impacts in Australia

The economic impacts of *Sabella* in Australia have not been quantified. Impacts on the scallop fishing industry in Port Phillip Bay were recorded following invasion where fishermen found it increasingly time-consuming to sort catches from dredges clogged with *Sabella*. Impacts on the Port Phillip Bay scallop fishery are not considered a current problem because the fishery has been closed since 1996 amidst concerns associated with the effects of dredging on benthic communities.

Future impacts on scallop fisheries operating on exposed coastlines are considered unlikely considering *Sabella's* apparent preference for sheltered, nutrient enriched waters. Impacts on commercial fishing operations in Western Australia have been reported as negligible, because of the minimal overlap between *Sabella* distribution and commercially fished areas. It should be noted that this assessment was made in the early stages of the *Sabella* invasion (1995) and that additional research is required to investigate whether subsequent impacts on commercial fisheries have occurred.

Sabella has the potential to influence aquaculture operations, both as a nuisance fouler and as a competitor of cultured filter-feeding species. In Western Australia, impacts of *Sabella* on mussel farms are perceived to be minimal based on interviews with commercial operators, constituting little more than a slight nuisance. The extent and impacts of *Sabella* fouling on aquaculture operations in Port Phillip Bay is poorly understood. Protocols designed to minimise translocation of *Sabella* and other marine pests between Port Phillip Bay and uninfected regions have been developed for the mussel industry and involve a combination of freshwater immersion and air drying. Quantifying the economic impact of implementing such protocols is complicated by the fact that unexpected benefits to the industry have been observed (better growth rates and product quality), due to the reduction in general fouling that accompanies treatment of aquaculture farming equipment.

Sabella also has the potential to influence operators of vessels as a result of decreased efficiency due to hull fouling. While the frequency and extent of *Sabella* fouling on commercial vessels remains poorly understood, the incidence of *Sabella* fouling should be significantly reduced by adherence to biofouling guidelines proposed under the National System (see section D).

Environment

Impacts in native range

Significant impacts of *Sabella* have not been documented in its native range.

Impacts in Australia

In Australia *Sabella* occurs on both soft-sediments and hard substrates in sheltered habitats (refer to NIMPIS for details on *Sabella* distribution in Australia). On hard substrates, detailed experiments examining ecological interactions between *Sabella* and sessile invertebrate assemblages have been conducted. The presence of a dense *Sabella* canopy has been shown to influence larval abundance and recruitment patterns of sessile fauna. In the early stages of community development (up until 10 weeks), impacts of *Sabella* on community composition have also been observed, however, after six months, there was little evidence that *Sabella* affected established assemblages despite good statistical power and a high *Sabella* treatment density (~250 *Sabella* m⁻²). The disappearance of apparent impacts after an extended period of time has implications for studies on the ecological effects of exotic species.

In soft sediment habitats, the spatial distribution of *Sabella* appears to influence impacts on benthic infauna, with *Sabella* individuals occurring randomly at some sites and in dense clumps at other sites (Ross et al. unpublished data). Recent experimental manipulations on soft sediment habitats in Port Phillip Bay concluded that the effects of *Sabella* on soft sediment assemblages in Port Phillip Bay are likely to be negligible in circumstances where *Sabella* individuals are randomly distributed in the benthos (Ross et al. unpublished data). A negative relationship between *Sabella* density and the abundance of lumbrinerid polychaetes and gammarid amphipods was observed, but these taxa represented only a small proportion of those present. *Sabella* appears to have a significant impact on benthic infauna in localised dense patches (clumps of 10 or more individuals). Significant changes to the abundance of taxa, particularly surface dwelling crustaceans, have been observed in the sediments occurring directly under *Sabella* clumps. The network of tubes in the clumps also provided a habitat for a range of sessile and mobile invertebrates. It is not known whether the clumps lead to larger scale effects beyond the sediments directly underneath the *Sabella* canopy.

The impact of *Sabella* on nutrient cycling has been the subject of recent detailed research efforts in Port Phillip Bay which are nearing completion (Ross et al. unpublished data). A focus of this recent research has been the influence of *Sabella* on rates of denitrification, since this is a key process that determines whether or not eutrophication occurs. The spatial arrangement and density of *Sabella* individuals again appears to have a significant influence on impacts, with significantly lowered denitrification efficiency associated with 'clumped' *Sabella* distributions, but not 'random' *Sabella* distributions. While significant reductions were observed, it is noted that reduction in denitrification efficiency is concluded to be relatively minor and should only become a management issue for very high density *Sabella* patches. Improved understanding of the overall impact of *Sabella* (i.e. impacts on benthic communities and nutrient cycling) within Port Phillip Bay clearly requires improved understanding of the spatial extent of the different *Sabella* distribution patterns (i.e. 'random' vs. 'clumped').

Impacts of *Sabella* on higher trophic levels have also been observed. For example, increased abundance of little rock whiting *Neodax balteatus* has been linked to *Sabella* invasion. The observed increase in *N. balteatus* was thought to be the result of "forests" of *Sabella* tubes providing these fish a refuge from predators.

Human Health & Amenity

There are no reported or anticipated human health concerns associated with establishment of *Sabella* populations. Impacts on amenity are considered to be relatively minor. Potential

negative impacts include reduced natural value of habitats frequented by recreational divers and fishermen.

Criteria B. Feasibility of management intervention

Sabella is a broadcast spawning organism which is difficult to manage and near impossible to eradicate. The main difficulty with any program of eradication of *Sabella* by manual removal is that juveniles are difficult to see and that it is not known whether manual removal in fact promotes colonisation via release of propagules. It is also likely that due to its preference for disturbed man made habitats such as marinas and harbours that it will re-infect from the same introduction vectors. Other management interventions that can be effective include encouraging vessels to be cleaned before moving to uninfected locations and research to determine the best time to clean vessels.

Criteria C. Benefits of national coordination

The implementation of a National Control Plan (NCP) for *Sabella* and the associated implementation of ballast water controls, inclusion of the species on the trigger species list under the Emergency management element, and inclusion as a target species for the National Monitoring Network could substantially reduce its spread in the short term. However as it is already found in isolated pockets across its temperate range in Australia (NSW, SA, Tas, Vic, WA) the benefits would appear to be minimal.

Cost - Benefit Analysis

Cost - Benefit analysis for the implementation of NCPs cannot be precise as the losses to production values and the marine environment that would occur in the absence of control measures cannot be estimated. Consultants have estimated that, taking into account only the potential benefits to fisheries and aquaculture at only three sites where each of the species may have impacts, the benefit to cost ratio for a NCP for the six species ranges between 0 and 2.8. For *Sabella*, the benefit to cost ratio was 0.0 where eradication of the species was not considered possible and 1.5 where eradication of some incursions was considered possible. When the potential benefits for the marine environment are included, these ratios of benefits to cost will be exceeded.

How the draft assessment criteria might be applied?

Under the criteria (A to C above), *Sabella* scarcely merits classification as an established disease or national significance because it fails to meet (A). Its real impacts are negligible and/or not experienced at all and the benefits of continued monitoring and ongoing freedom in the marine sector appear to have little impact on industry viability or environmental disturbance.

The circumstances under which government would intervene and the possible nature of intervention?

State Governments have intervened at a local scale under some circumstances such as the new introduction to Kangaroo Island from the mainland in South Australia. However, in this case the intervention was unsuccessful. New circumstances may occur on a local scale suggesting governments should intervene, where it began impacting a significant industry or environmentally significant area as an agreed range extension.

How might a review be instigated as to its consideration for listing or removal?

Sabella is present in NSW, SA, Tas, Victorian and WA waters which represents its possible colonisation range. Hence this case study highlights that it should potentially not be listed as a pest of national significance. A new review through a complete monitoring program of its potential range via the National Monitoring Network may indicate its consideration for listing or removal from a list of National Significance.

Case study 6: Chilean needle grass

Criteria A. Impacts

Chilean needle grass (*Nassella neesiana*, CNG) is a perennial tussock forming grass, native to South America and first recorded in Australia in 1934. Since then, CNG has extended its range across Victoria and New South Wales and into the Australian Capital Territory, South Australia, southern Queensland and Tasmania. In 1999, Chilean needle grass was listed as one of Australia's 20 Weeds of National Significance (WoNS).

CNG is a vigorous competitor in agricultural, natural and urban environments. It severely reduces pasture productivity and contaminates crops and hay. The needle-like seed can also injure stock or pets and downgrades wool and sheep carcasses. Considered to be one of the worst environmental weeds, CNG is highly invasive in native grasslands, urban parks and gardens. Its spread is facilitated by the movement of seed on vehicles, machinery and equipment, particularly along roadsides.

Environmental impacts of CNG

- CNG rapidly invades disturbed soils and degraded ecosystems including native vegetation
- It out-competes and displaces native grass species, especially if these are in a senescing state
- It interferes with revegetation programs and, once established, has a seed bank that is difficult to manage.

CNG is a particular problem in native grasslands and grassy woodlands in south-east Australia, and poses a threat to native species such as kangaroo grass (*Themeda triandra*) wallaby grasses (*Austrodanthonia* species), spear grasses (*Austrostipa* species), native tussock grasses (for example, *Poa* species), along with a multitude of native ground plants that form the diversity of these grassy ecosystems.

Agricultural impacts of CNG

CNG reduces pasture production and stock-carrying capacity by as much as 50% (Gardener 1998) by:

- displacing palatable pasture species
- being less palatable than pasture grasses and unpalatable whilst flowering and seeding

The panicle seed of CNG can degrade agricultural products such as wool, grain, hay and meat. Panicle seeds readily attach to stock, particularly sheep, and can cause injury by burrowing into the skin and muscle. The cost to control CNG has been estimated at between \$64 and \$119 per hectare per year.

Criteria B. Feasibility of management intervention

During its vegetative stage, the growth form and characteristics of CNG can show regional variability and be similar to many native species. Consequently, correct identification by non-specialists can be very difficult. A national program has developed a number of identification resources to assist land managers with the identification of CNG, however correct identification remains the single largest impediment to its management.

Strategic grazing has been investigated as a tool to manage CNG in pastures. A major drawback to use of grazing management is that many affected properties are not fenced and stocked in a way that allows for the necessary heavy grazing pressure (ideally by cattle rather than sheep) to be applied before seed head emergence.

Other management tools include spray topping, wick wiping with glyphosate, use of selective herbicide and burning. Best practice management material has been prepared that describes how different control techniques can be integrated. A major issue is that the cost of some techniques is excessive relative to the return from grazing.

Biological control of CNG has been investigated and a fungal pathogen *Uromyces pencanus* showed considerable promise. Further testing of this potential agent is required to obtain approval for release in Australia.

Management interventions to manage CNG are thus available in both agricultural and natural systems, allowing some prospect of slowing further spread and reducing impact where already established. There is also strong socio-political support for management interventions across the existing range of CNG. However, there remain substantial challenges in refining and promoting management tools that are cost effective for farmers and affordable for public land managers.

Criteria C. Benefits from national coordination

Eleven exotic stipoid grasses are naturalised in Australia. CNG and serrated tussock (*Nassella trichotoma*) are of such importance they have been identified as WoNS. However, the threat posed by lobed needle grass (*N. charruana*), cane needle grass (*N. hyalina*), Texas needle grass (*N. leucotricha*), Mexican feather grass (*N. tenuissima*), and the espartillo grasses (*Amelichloa caudatum* and *A. brachychaetum*) may be of equal importance as they have similar potential distributions and impacts on assets. This raises the question of whether national significance status for a single species is likely to produce substantial and lasting benefits if similar priority is not given to related species.

After CNG became a WoNS, it was declared a noxious weed under legislation in all states and territories within its potential distribution. However, the current legal declarations of CNG vary significantly across Australian states and territories. Legislative management requirements depend on the distribution and density of CNG, and range from a minimum of prohibiting the sale and transport of propagules through to the enforced requirement of the land manager to eradicate all infestations.

There appear to be some likely benefits from national coordination of CNG management over and above what has already been undertaken. Although many of the actions required for effective CNG management, such as training land managers in identification, could be delivered without national coordination, national coordination could provide efficiencies and a mechanism for consistent management approaches.

How the draft assessment criteria might be applied?

Under the criteria (A to C above) CNG merits its present classification as an established weed of national significance; however a number of other weeds affect pasture production in a similar way and there is inconsistency in that some are classified as weeds of national significance and others are not.

The circumstances under which government would intervene and the possible nature of intervention?

Government could intervene in a number of ways to prevent future impacts by limiting spread, or to mitigate current impacts by reducing the size of infestations or providing more cost-effective control options. Intervention to limit spread would provide protection to both production and to the environment. Whether intervention would actually occur in a specific case would depend on the expected costs and benefits of such intervention. Using legislation to create a requirement to control CNG or to avoid spreading CNG, is one intervention to reduce spread. Mitigation of impacts could potentially be achieved by developing and introducing a biological control agent, which has been attempted for CNG. Benefits from the control provided by a successful agent would be received by all land owners affected by CNG.

How might a review be instigated as to its consideration for listing or removal?

Several circumstances which singly or in combination might logically lead to the conclusion that CNG no longer merited national significance status include:

1) CNG reached something close to its full potential distribution in Australia. (Benefits of national coordination criterion become questionable)

Preventing infestation of new areas provides much greater returns on investment than managing existing infestations and is also an activity where coordinated action across jurisdictions is essential. If CNG reached a stage where preventing further spread was no longer feasible there would be a case for at least reviewing the appropriateness of continued national significance status.

2) Biological control of CNG had become highly effective. (Impact criterion no longer met)

3) There are instances in Australia and overseas where biological control of a weed is so effective that the weed's impact become relatively unimportant. Should this occur for CNG there would be little point in maintaining a nationally significant status.

4) Sufficient socio-political support no longer exists. (Feasibility of management intervention criterion no longer met).

Support from industry and government agencies could decline over time for reasons such as a perceived increasing threat from other weed species, because previous interventions have not produced successful outcomes or because CNG management becomes accepted as a normal part of pasture management (together with many other undesirable plants) and is no longer seen as a stand-alone issue. Without a sufficient level of support within all or most of the affected jurisdictions nationally coordinated action would be impractical.