PESTSMART

Invasive Animals Cooperative Research Centre



Consultation Draft

# National Incursion Prevention and Response Strategy for Potentially Invasive Animals

2017-2022

2017

M. Christy (Compiler)

Australian Government
Department of Industry and Science

Business Cooperative Research Centres Programme


# National Incursion Prevention and Response Strategy for Potentially Invasive Animals

# 2017-2022



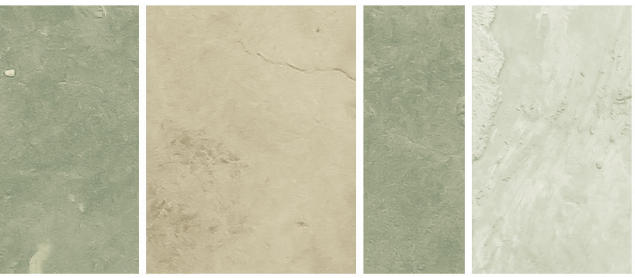
M. Christy

Department of Agriculture and Food, WA

3 Baron-Hay Court,South Perth, Western Australia 6151

2017

An IA CRC Project





**Report produced by:**

Published by the Invasive Animals Cooperative Research Centre, April 2017

Telephone: (02) 6201 2887

Facsimile: (02) 6201 2532

Email: contact@invasiveanimals.com

Internet: http://www.invasiveanimals.com



**Citation:** Christy, M (2017). Consultation Draft. National Incursion Prevention and Response Strategy for Potentially Invasive Animals (2017-2022). PestSmart Toolkit publication, Invasive Animals Cooperative Research Centre, Canberra, Australia.

ISBN XXXXXXXX (print)
ISBN XXXXXXXX (online)



**Authorised by:** The Invasive Plants and Animal Committee

# How to Make a Submission

The National Incursion Prevention and Response Strategy for Potentially Invasive Animals 2017 to 2022 (NIPR Strategy) aims at enhancing the current Commonwealth approach to incursion management by providing opportunities for further development of nation-wide incursion planning structures, information, and linkages. Its aim is to create a nationally recognised and implementable incursion framework that fills the geographic and taxa gaps in the current system and prevents animals entering, or moving within, Australia and establishing.

Public consultation of the NIPR Strategy is intended to encapsulate community, industry and government (i.e., stakeholders) views, owing to the vital role they play in the management of incursion risks in Australia. It encourages stakeholders across Australia to have their say on the national incursion system, what works, what doesn't, what could be done better and how to continue strengthening partnerships across the system. Your feedback will assist in identifying where improvements can be made.

When reading the revised NIPR Strategy, please consider the following:

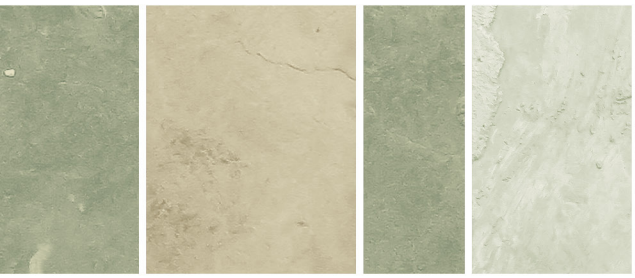
- Does the strategy effectively set out a vision for consistently managing incursions at and within Australia's borders?
- Are the goals, objectives, and actions of the strategy clear and capture the needs of our stakeholders?
- Are gaps in current incursion management adequately identified in terms of national effort, leadership, coordination, and responsibility?
- Does the strategy appropriately encourage collaboration and coordination between governments, landholders, industry, and community groups?
- Does the strategy have to the potential to maximise public benefit from public investment?

The public consultation process is being facilitated by Michelle Christy (National Incursion Response Facilitator, Invasive Animals Co-operative Research Centre) and reviewed by Invasive Plants and Animals Incursion Expert Group Committee.

The consultation period is open until 5pm AEDST 02 June 2017. Feedback may be provided through the on-line facility at www.pestsmart.org.au/national-incursions-strategy-consultation

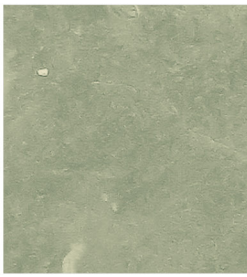


Photo: Brett Ciccotelli



# Contents

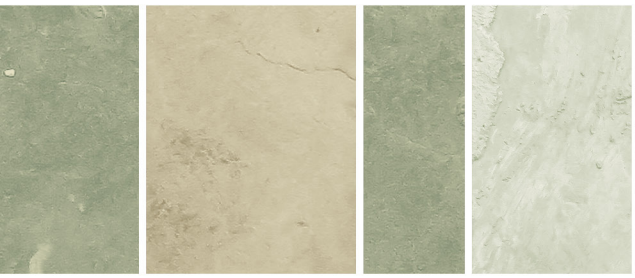

How to Make a Submission 1
Acknowledgements 3
Executive Summary 5
Introduction and Background Information 7
Incursion Prevention 9
Surveillance 10
Rapid (Emergency) Assessment and Response 12
Existing National Incursion Framework 13
NIPR Strategy's Place within the National Framework 13
Need For a NIPR Strategy 13
Scope of the NIPR Strategy 14
Guiding Principles 15
Actions Required to Fulfil NIPR Strategy Purpose 16
Goal 1 – Develop Management Structure 16
Objective 1.1: Develop Efficient NIPR Program 16
Action 1.1.1: Improve National Leadership and Coordination for Consistent Incursion Management 17
Action 1.1.2: Improve NEBRA Decision-Making for Incursion Response 18
Action 1.1.3: Ensure Accurate and Timely Communications on Incursion Management 18
Action 1.1.4: Establish Incursion Management Process for Key Sectors and Industry 20
Action 1.1.5: Investigate Options for Improving Ongoing Resourcing Arrangements 21
Goal 2 - Build Capability and Expertise 23
Objective 2.1: Establish and Enact Research Priorities 23
Action 2.1.1: Prioritise, Undertake and Adopt Research to Develop and Improve NIPR Capacity 23
Objective 2.2: Improve Prevention Proficiency and Capacity 24
Action 2.2.1: Establish a National Incursion Prevention Approach 25
Objective 2.3: Review and Enhance Surveillance Systems 26
Action 2.3.1: Develop Processes and Capacity for Taxonomic Identification 26
Action 2.3.2: Develop and Implement Surveillance Tools and Techniques for New Incursions 27
Objective 2.4: Improve Response Proficiency and Capacity 29
Action 2.4.1: Develop and Collate NIPR Preparedness Material 29
Action 2.4.2: Maintain and Enhance Response Capability through Existing Structures 30
Objective 2.5: Develop and Conduct Training 31
Action 2.5.1: Assess NIPR Capabilities and Training Needs 32
Action 2.5.2: Create and Implement Accredited NIPR Training and Education Modules 32
Goal 3 - Improve Stakeholder/Community Support and Engagement 34
Objective 3.1: Develop Partnerships 34
Action 3.1.1: Identify and Promote Effective Prevention and Emergency Management Relationships 35
Action 3.1.2: Assist Industries to Mitigate Incursion Risk 36
Objective 3.2: Enhance Communication 37
Action 3.2.1: Develop NIPR Awareness Extension Materials and Tools 37
Objective 3.3: Facilitate Involvement 39
Action 3.3.1: Generate and Streamline Reporting Protocols and Applications 39
Implementation, Governance and Delivery 40
Appendix A: Summary of goals, objectives and actions and adaptive management framework 41
Appendix B: A generalised flowchart of the typical stages or steps in an incursion incident 52
Appendix C: Glossary of Terms 53
References 61



# Acknowledgements

Although an initiative of the Invasive Animals CRC, the development of the NIPR Strategy was a collaborative process with significant contributions from:

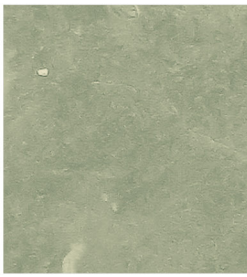
- Department of Agriculture and Food, Western Australia (DAFWA)
- Department of Economic Development, Jobs, Transport and Resources (DEDJTR), Victoria
- Department of Primary Industries and Regions, South Australia (PIRSA)
- Department of Agriculture and Fisheries (DAF), Queensland
- Department of Primary Industries, Parks, Water and Environment (DPIPWE), Tasmania
- Department of Agriculture and Water Resources (DAWR)
- Department of Environment and Energy (DoEE)
- Invasive Plant and Animal Committee Incursion Expert Group (IPAC IEG)
- Invasive Plant and Animal Committee Freshwater Fish Expert Group (IPAC FFEG)
- Department of Primary Industries (DPI), New South Wales
- Landcare Research NZ Limited
- University of Adelaide



## *Creating a Compatible and Functional Strategy*

*Because the NIPR Strategy is intended to be nationally implemented, it has been developed in line with national and state/territory strategic directions, policies, and legal drivers. It incorporates the following strategies and plans:*

- Australian Pest Animal Strategy (2007)
- Australian Pest Animal Strategy – revised draft (2014-2024)
- Freshwater Pest Fish Strategy – draft (2013)
- Biosecurity Strategy for Victoria (2009)
- Protecting Victoria's Environment: Biodiversity 2036 – draft (2016)
- High Risk Invasive Animals Response Plan - Consultation Draft (2012)
- Queensland Weed and Pest Animal Strategy (2016-2020)
- DAFWA Invasive Species Strategy (2012-2017)
- New South Wales Biosecurity Strategy (2016-2021)
- Tasmanian Biosecurity Strategy (2013-2017)
- Tasmanian Invasive Animals Incursion Response Strategy and Framework (2013)
- South East Pest Management Strategy (2009)
- South Australian State Biosecurity Policy (2013-2016)
- Intergovernmental Agreement on Biosecurity (2012)
- National Environmental Biosecurity Response Agreement (2012)



# Executive Summary

While controlling existing species will always be a significant aspect of invasive animal management, it is important to recognise that the prevention and early detection of incursions is a cost-effective alternative to long term control of established species. There is a growing need for an integrated approach to incursion management that fills in the gaps in the current system, and identifies and prioritises risks, threats, and responses across all sectors. As a result, Australia's national and state/territory government agencies, through the Invasive Plants and Animals Committee (IPAC), and National Biosecurity Committee (NBC) have agreed to a comprehensive national approach to incursion prevention and response. The approach aims to strengthen Australia's ability to further prevent and respond to new animal incursions.

The NIPR Strategy enhances the current national approach to incursion management by providing opportunities for further development of nation-wide incursion planning structures, information, and linkages. Its aim is to create a nationally recognised and implementable incursion framework that fills the geographic and taxa gaps in the current system and prevents animals entering, or moving within, Australia and establishing.

The NIPR Strategy is a forward-looking, flexible, innovative plan of action that will:

- Enhance and create a reliable vision for consistently managing potentially invasive animal incursions at all geographic levels;
- Outline the principles which support Australia's approach to animal incursion management;
- Describe and prioritise goals and actions outside the existing multi-jurisdictional arrangements for government, industry and community to minimise adverse economic, environmental and social impact of animal incursions;
- Provide guidance with respect to investment decisions (outside existing Commonwealth arrangements) and assist decision-makers to make wise and timely investment decisions;
- Encourage collaboration and coordination between governments, landholders, industry, and community groups, encourage partnerships, and maximize the extent to which the current capacity for partnership is leveraged to meet common goals;
- Identify gaps and clarify where national effort, leadership, coordination, and collaboration have the potential to reduce invasive animal risks and/or adverse impacts; and
- Maximise public benefit from public investment.

Once implemented, the NIPR Strategy will provide a roadmap of guiding principles, goals and objectives designed to assist practitioners in the prevention of animal incursions in Australia. Taxonomic scope includes animals (birds, mammals, reptiles, amphibians, and freshwater fish), but excludes marine fish and invertebrates.

Three primary goals and nine objectives will achieve this outcome. These are summarised in the table below.

| Goal | Objective | Action |
|---|---|---|
| **1 Develop Management Structure** | **1.1 Develop Efficient NIPR Program** | 1.1.1 Improve national leadership and coordination for consistent incursion management<br>1.1.2 Improve NEBRA decision-making for animal incursion response<br>1.1.3 Ensure accurate and timely communications on incursion management<br>1.1.4 Establish incursion management process for key sectors and industry<br>1.1.5 Investigate options for improving ongoing resourcing arrangements |
| **2 Build Capability and Expertise** | **2.1 Establish and Enact Research Priorities** | 2.1.1 Prioritise, undertake and adopt research to develop and improve NIPR capability} and capacity |
| | **2.2 Improve Prevention Proficiency and Capacity** | 2.2.1 Establish an incursion prevention management approach that can be applied at national and jurisdictional levels |
| | **2.3 Review and Enhance Surveillance Systems** | 2.3.1 Develop processes and capacity for taxonomic identification of animal incursions<br>2.3.2 Develop and implement surveillance tools and techniques for new incursions |
| | **2.4 Improve Response Proficiency and Capacity** | 2.4.1 Develop NIPR preparedness documentation<br>2.4.2 Maintain and enhance response capability through existing structures |
| | **2.5 Develop and Conduct Training** | 2.5.1 Assess NIPR capabilities and training needs<br>2.5.2 Create and implement accredited NIPR training and education modules |
| **3 Improve Stakeholder/ Community Support and Engagement** | **3.1 Develop Partnerships** | 3.1.1 Identify and promote effective prevention and emergency management relationships with community and industry stakeholders<br>3.1.2 Assist industries to mitigate incursion risk |
| | **3.2 Enhance Communication** | 3.2.1 Develop NIPR awareness extension materials and tools |
| | **3.3 Facilitate Involvement** | 3.3.1 Generate and streamline engagement plans, reporting protocols and applications |

# Introduction and Background Information

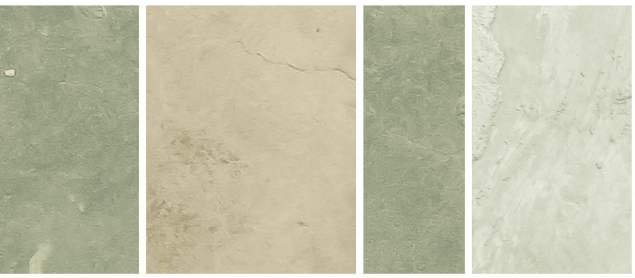
Biological invasions are the process by which species (or genetically distinct populations), with no historical record in an area, breach biogeographic barriers and extend their range. These invasions are possibly the most irreversible of environmental adverse impacts (Herkenrath and Harrison 2011; Roberts et al. 2013; Simberloff et al. 2013) because invasive species are capable of self-propagation, movement over long distances, and have the capacity for adaptation (Simberloff et al. 2005). Once established in a new environment, invasive species generally cannot be completely removed. Invasive species may soon exceed habitat loss as the number one adverse impact to biodiversity worldwide and are already thought to be one of the major cause of extinction of island species (Clout and Veitch 2002; Pereira et al. 2012).

In addition to loss of biodiversity, invasive animals present significant challenges to the sustainability of biologically-based economic systems such as agriculture, aquaculture, forestry, horticulture, tourism and social amenity/infrastructure. The United States has over 308 known invasive vertebrates (mammals = 20, birds = 97, reptiles and amphibians = 53, and fish = 138), and experiences economic damages and control costs of approximately US$ 44.8 billion annually (Pimentel et al. 2005). In Australia, estimates of the negative economic impact of pest animals from production losses due to predation on livestock, degradation of the landscape and control costs range from $48 to $60 million annually (National Landcare Programme 2015). McLeod (2004) estimates are higher, attributing $720 million to invasive vertebrates alone.

All invasions progress through the phases of arrival, establishment, and spread (Figure 1). With limited resources, it is essential to select the most cost-effective methods for invasive species management (Buhle et al. 2005). Incursion prevention and early detection/response (i.e., incursion management) of non-natives is the most cost effective stage of the invasion process at which to direct management effort (Kaiser and Burnett 2010). Across entire landscapes, removal of newly emerging populations has been demonstrated, both theoretically and empirically, to be a better strategy than the reduction of well-established species (Cook et al. 1996; Moody and Mack 1988). Considering the potential for enormous financial and environmental repercussions as the number of non-natives establishing in Australia continues to grow, greater resources must be allocated to incursion management.



Photo: Sandrine Néel Com



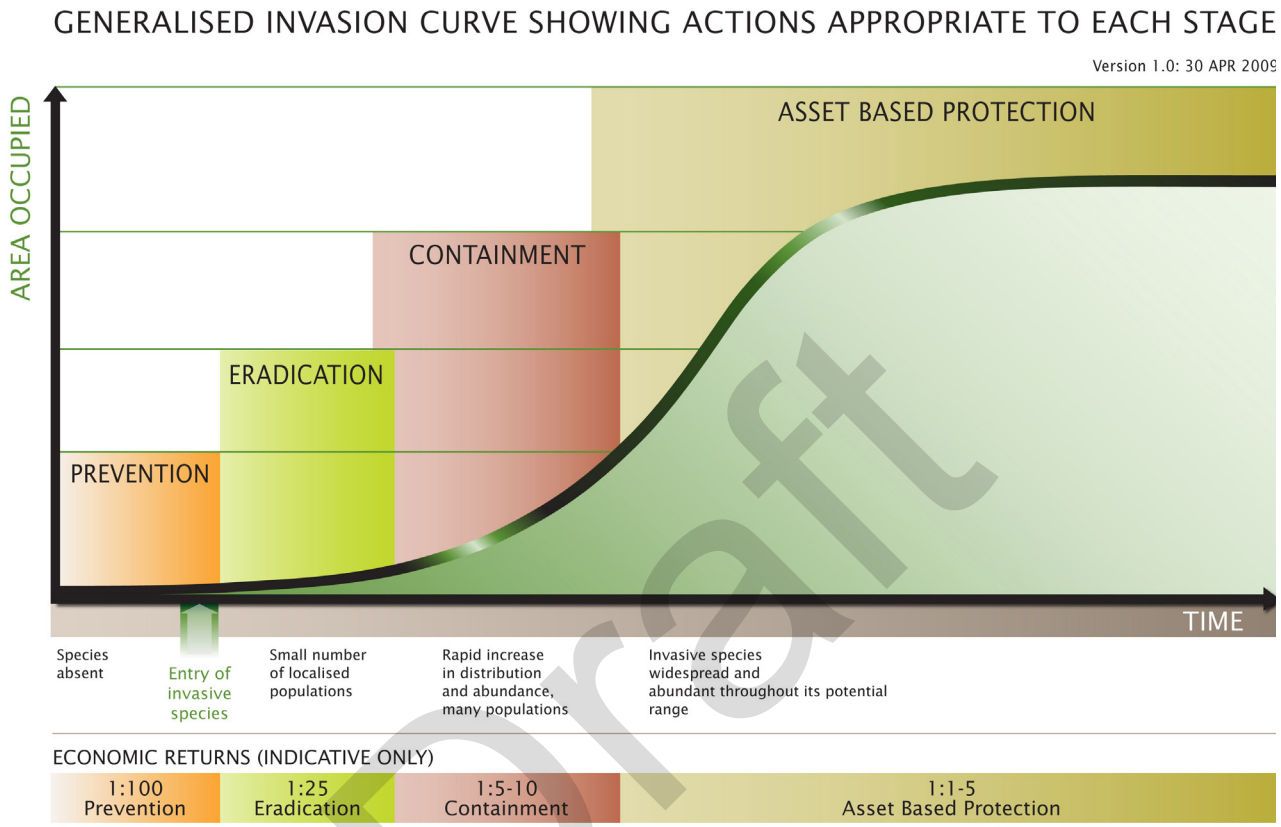





Figure 1. Generalised invasion curve indicating the four stages of an invasion; prevention, eradication, containment and asset-based protection. The dotted box indicates the part of the invasion curve covered in the NIPR Strategy (prevention and the early stages of eradication. Associated with the four stages is the estimated return on investment for the different phases (based on weed control activity). The greatest return on investment is achieved through investing in prevention and early intervention (inside red dotted box), compared to investing management of widespread and established species. This is the area covered by the NIPR Strategy.
Source: Interpretation by DPI (2009) after Chippendale (1991) and Hobbs and Humphries (1995).

# Incursion Prevention

The most efficient and cost-effective invasive species strategy is to prevent their arrival (Mehta et al. 2007). Although considered the cornerstone of invasive species management (Vander Zanden and Olden 2008), integrated approaches to proactively preventing incursions are typically difficult to develop and implement (Ruiz and Carlton 2003). Yet enhanced efforts to prevent or immediately detect incursions are critical to reducing ecological and economic harm (Lodge et al. 2006).

Australia has in place a range of incursion prevention tools, such as prohibiting importation of high-risk species or commodities, establishment of quarantine practices and facilities, risk assessment procedures, and education. These activities are important for anticipating threats and managing risks before, or as soon as a species arrives. Presently, mitigation of incursion risk is largely a border function undertaken by the Commonwealth government. The Commonwealth government also plays a major role in pre-border incursion prevention, engaging in activities such as off-shore and border quarantine inspections and screening, certification, and permitting.

Although the current Commonwealth biosecurity systems are effective at preventing border incursions, introductions as a consequence of international travel and trade continue to increase the cumulative number of species establishing (IPAC, unpublished data). No matter how good the biosecurity system, incursions will continue because the development of a no-risk system is not possible. Further, not all incursions occur exclusively at government-controlled ports and checkpoints or at Australia's border, and therefore government-only incursion programs will not be enough as trade increases and diversifies. To facilitate better coverage, national incursion management should be implemented collaboratively between government, community and industry at all levels. In doing so, not only is the risk of incursions decreased, but responsibility is shared between government and non-government entities.

Typically incursion prevention targets particular high risk species, often quite successfully. Nonetheless, it is important to think beyond individual species when identifying potential prevention needs (Carlton 2003). For unintentional introductions, the identification of major pathways and activities is a productive approach because each pathway can be a conduit for a suite of species. The current border biosecurity system uses pathway and commodity based surveillance and intervention to determine risk. Expanding on pathways and activities also complements the border regulatory roles of the Australian Government Department of Agriculture and Water Resources (DAWR) and Department of Environment and Energy (DoEE), but recognises that areas under DAWR control are not the only access for incursions. A strong incursion prevention framework will integrate pathways, activities and species beyond border security.

*What is an incursion?*

An incursion is an isolated population of a non-native organism recently detected in an area (e.g., country, jurisdiction, region or even a site) not known to be established, but expected to survive for the immediate future. Note that re-invasion of a species that has already been eradicated or controlled is considered a new incursion.

Modified from ICPM (2003) and MAFBNZ (2008)

## Surveillance

The importance of border, post-border and interstate/regional surveillance – defined as *"activities to investigate the presence or prevalence of a pest or disease in a given plant or animal population and its environment"* (COAG 2012a) is widely acknowledged as imperative for invasive species management (Epanchin-Niell et al. 2012; Lodge et al. 2006; NBC 2014). Surveillance allows us to determine the success of detection and eradication programs.

Cost-effective surveillance systems for invasive animals must balance the effort and cost of surveillance with the effort and cost of eradications. For example, rigorous surveillance effort will require a significant upfront investment, but will enhance the likelihood of detecting the initial stages of an incursion when control and eradication are feasible and less costly (Epanchin-Niell and Hastings 2010). Conversely, minimal surveillance effort may cost less and increase resources available for eradication, but the chance of detecting an incursion before it is sizeable, difficult and costly to manage, is reduced. Accounting for these trade-offs influences optimal levels of surveillance and is dependent on underlying assumptions about the invasion process and the decision-making environment.

A well-structured surveillance program will incorporate multiple stages which build on each other (Figure 2). Each stage relies on its own suite of skills, tools, and procedures to ultimately inform an appropriate management response (Kean et al. 2008). The National Surveillance and Diagnostics Framework (NBC 2014) is the mechanism through which incursion surveillance, including detection and animal identification, is addressed. This document provides a coordinated and integrated approach to animal incursion surveillance (in addition to that provided by the Commonwealth at the border).



Photo: Sergey Yeliseev

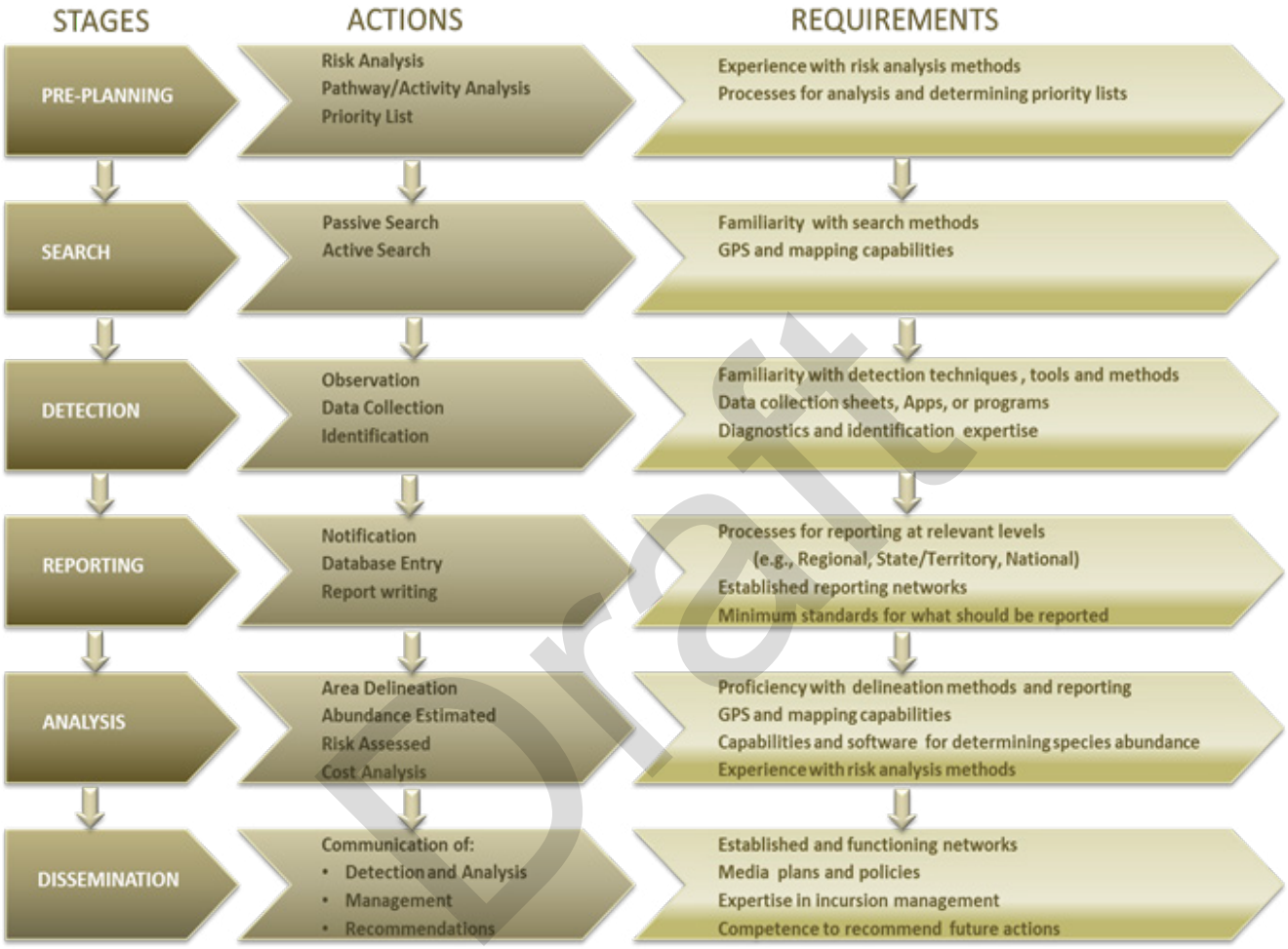
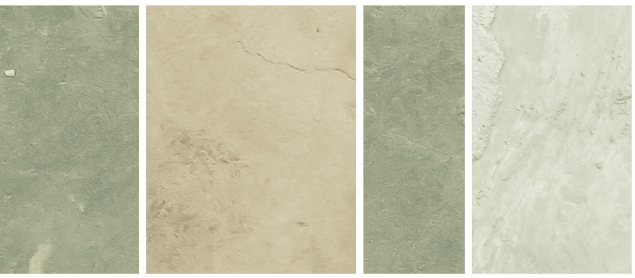



Figure 2. A well-structured surveillance program will incorporate multiple stages from pre-planning to dissemination of information. Each Stage requires specific actions and requirements. Source: MAFBNZ (2008) and Sheehan (2013).



## Rapid (Emergency) Assessment and Response

Despite best efforts, incursions will occur. Early detection, prompt assessment and rapid response are a critical second level of protection against the establishment of invasive animals. Emergency response increases the likelihood that incursions will be contained, and eradicated before they become widely established. Responses can slow range expansion, and avoid the need for costly long-term control efforts.

A successful emergency response program will identify potential threats in time for environmentally responsible decisions to be made and risk-mitigation measures taken. Rapid response will increase the effectiveness of eradication or prevent population expansion, and provide for collaboration and information exchange.

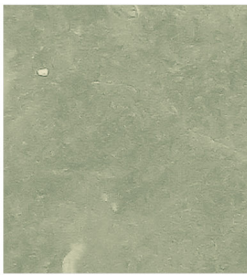
## Existing National Incursion Framework

National incursion management is governed by the Biosecurity Act 2015 which commenced on 16 June 2016, replacing the Quarantine Act 1908. It represents a comprehensive modernisation of Australian biosecurity legislation and was developed through consultation with industry, state and territory governments, environment groups, health professionals, the general public and Australia's trading partners. The Act provides the Commonwealth with the powers and tools to manage modern biosecurity threats and is jointly administered by the Health and the Agriculture and Water Resources portfolios.

The Intergovernmental Agreement on Biosecurity (IGAB), which came into effect in January 2012, is an agreement between the Commonwealth and all state and territory governments except Tasmania. It aims to strengthen the working partnership between governments, identify the roles and responsibilities of governments, improve the national biosecurity system, outline priority areas for collaboration, and minimise the impact of pests and disease on Australia's economy, environment and the community.

The National Biosecurity Committee (NBC) is the governing body tasked with identifying and implementing collaborative projects to meet the national priorities identified in the IGAB. The NBC is also responsible for managing a national, strategic approach to biosecurity threats relating to plant and animal pests and diseases, marine pests and aquatics, and the impact of these on agricultural production, the environment, community well-being and social amenity. In late 2015, Australian Agriculture Ministers agreed to initiate a review of the national biosecurity system and the underpinning IGAB; the review commenced on 31 March 2016 (DAWR 2016).

The National Environmental Biosecurity Response Agreement (NEBRA) was the first deliverable of the IGAB and sets out emergency response arrangements for responding to incursion incidents that primarily impact the environment and/or social amenity and where the response is for the public good (NBC 2013). The NEBRA is consistent with the arrangements under the Emergency Animal Diseases Response Agreement (EADRA) and the Emergency Plant Pest Response Deed (EPPRD), but does not displace those deeds. The EADRA and EPPRD are still used for disease and plant incidents that have a significant impact on primary production industries. Administration and application of the NEBRA is the responsibility of DAWR on behalf of the Commonwealth. Lead agencies within jurisdictions have corresponding responsibilities at the state and territory level. DAWR is also the custodian of the NEBRA and is responsible for overseeing its implementation and coordinating party reimbursements arising from emergency responses.



Under the current national framework, the DAWR and DoEE work collaboratively to develop and implement the policies and programs that protect Australia from incursions. DAWR has accountability for managing Australia's biosecurity system. DoEE is responsible for protecting and conserving the environment, including regulation of international movement of wildlife and wildlife products.

Controlling animal incursions is an important element in the national biosecurity approach. Other elements include animal disease health, plant disease health, weeds, and marine pests, all of which are covered elsewhere (e.g., Animal Health Australia (AHA), Wildlife Health Australia (WHA), and Plant Health Australia (PHA)).

## NIPR Strategy's Place Within the National Framework

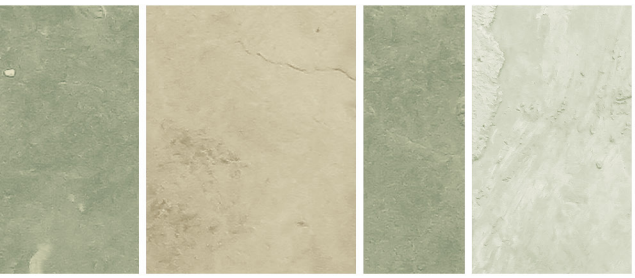
The National Incursion Prevention and Response Strategy (henceforth referred to as the NIPR Strategy) is a deliverable of the Australian Pest Animal Strategy (NRMMC 2007); revised version due for completion in 2017 (IPAC 2017). The NIPR Strategy supports and expands on the draft APAS (IPAC 2017) goals 1 (improved leadership and coordination) and 3 (prevention of new species establishment) specific to incursion management. The development of NIPR Strategy was guided by the Invasive Plants and Animal Committee (IPAC), which is responsible for implementing the IGAB for animal pests (COAG 2012b). The goals, actions and outcomes specified in the NIPR Strategy are consistent with those of the draft APAS, IGAB, NEBRA, as well as NBC and IPAC.

## Need for a NIPR Strategy

While controlling existing species will always be a significant aspect of invasive animal management, it is important to recognise that the prevention and early detection of incursions is a cost-effective alternative to long term control of established species. Prevention and detection as close to the point of incursion as possible will minimise adverse species impact and maximise management outcomes.

Ever increasing biosecurity threats require ever increasing incursion capabilities. An integrated approach to incursion management that identifies and prioritises risks, threats, and responses across commercial and government sectors will increase capabilities. The approach will do this by recognizing and filling the gaps (e.g., in the areas of environmental, invertebrate, and interstate incursions, and industry involvement beyond the border) in the current system and providing co-ordination across jurisdictions and industries. The development of the NIPR Strategy is a direct consequence of that need.

Augmenting the current comprehensive national approach to incursion management and strengthening Australia's ability to further prevent and respond to new animal incursions is central to the NIPR Strategy. A cohesive national strategy that operates on all levels, from continent to site, and across all animal taxa including freshwater, will deliver an even greater coordinated approach to incursion management that presently exists. The efforts of stakeholders including government, industries, landholders, community groups and the general public, can be better integrated through established and new processes, collaboration and enhanced communication.



## Scope of the NIPR Strategy

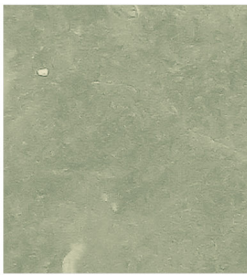
The ultimate purpose of the NIPR Strategy is to produce outcomes that protect Australia from new incursions of non-native animals. Specifically, it is designed to provide a sound approach to assist national, state/territorial, and regional entities design effective and cohesive animal incursion management.

The NIPR Strategy enhances the current national approach to incursion management by providing opportunities for further development of nation-wide incursion planning structures, information, and linkages that offer guidance to various levels of government, community, industry and individuals to, and across, Australia. Its aim is to create a nationally recognised and implementable incursion framework that fills the geographic and taxa gaps in the current system and prevents animals entering or moving within Australia and establishing.

Once implemented, the NIPR Strategy will provide a roadmap of guiding principles, goals and objectives designed to assist practitioners in the prevention of animal incursions in Australia. The strategy deals primarily with animals not already in Australia or those for which an established population does not exist in most states/territories. Taxonomic scope includes animals (birds, mammals, reptiles, amphibians, freshwater fish), but excludes marine fish and invertebrates. Although the NIPR Strategy is focused particularly on animals, its principals and general framework can be applied to other taxa. Only goals, objectives and actions considered as "must happen" are included in the NIPR Strategy.

The NIPR Strategy is a forward-looking, flexible, innovative plan of action that will:

- Enhance and create a reliable vision for consistently managing potentially invasive animal incursions at all geographic levels;
- Outline the principles which support Australia's approach to animal incursion management;
- Describe and prioritise goals and actions outside the existing multijurisdictional arrangements for government, industry and community to minimise the adverse economic, environmental and social impact of animal incursions;
- Provide guidance with respect to investment decisions (outside existing Commonwealth arrangements) and assist decision-makers to make wise and timely investment decisions;
- Encourage collaboration and coordination between governments, landholders, industry, and community groups, encourage partnerships, and maximize the extent to which the current capacity for partnership is leveraged to meet common goals;
- Identify gaps and clarify where national effort, leadership, coordination, and collaboration have the potential to reduce invasive animal risks and/or adverse impacts; and
- Maximise public benefit from public investment.



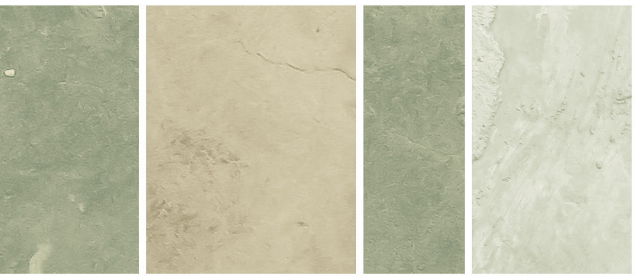
# Guiding Principles

Not all introduced animals become invasive. In order to maximise effectiveness and value for money, incursion risk assessment, prioritisation and management must be based on sound science.

Where scientific knowledge is insufficient to assess species likelihood of becoming invasive, or its present or future impact, it will be assumed that adverse impacts will occur and action should be taken to prevent the species becoming established.

Guiding principles for invasive animal incursion management are:

1. **Incursion management is integral** to sustainable management of natural resources for the benefit of the economy, the environment, human health and amenity.
2. **Prevention** is more effective and cheaper than management of established invasives, so national exclusion of invasive animals is the first line of defence.
3. **Eradication** of a new incursion is more effective and cheaper in the long run than ongoing management of an invasive population, so eradication should be considered where feasible.
4. Incursion threats **recognise no political boundaries**, **occur without warning**, and need to be addressed as such.
5. Animal incursion management must be a **shared responsibility** between landholders, community, industry and government that requires all parties to have **a clear understanding of their roles and responsibilities**.
6. Resource managers have an **obligation to prevent animal incursions** in their area of control.
7. **Evidence-based decision making centred on sound science and technology** is necessary to develop innovative and cost effective solutions that support strategy, policy and operations.
8. **The cost of incursion management should be borne by both those who create the risk and those who benefit from its management.** Governments may invest where there is a net public benefit from any such intervention.
9. Setting priorities for and investment in, incursion response management should be informed by a **risk management approac**h, underpinned by clear, transparent and consultative processes for decision making and investment.
10. **Feasibility, cost effectiveness, and social licence are key** to strategic incursion management.
11. Animal incursion management **requires coordination** among all levels of landholders, community, industry and government, regardless of tenure and resourcing.
12. Animal incursion management needs **effective funding, capability and capacity** across landholders, community, industry and government.
13. **Best practice** will balance efficacy, humaneness, sustainability, community perceptions, feasibility and emergency needs, and ensure incursion management planning and delivery is timely, professional and effective.
14. Incursion management **complies with** animal welfare and work health safety standards.



# Actions Required to Fulfill NIPR Strategy Purpose

## Goal 1 – Develop Management Structure

Australia's biosecurity system entered a transformative stage over the past decade and much of the transformation has largely been undertaken. The impetus for change was based on the findings and recommendations of several reviews (e.g., Beale et al. 2009; Nairn et al. 1996), parliamentary inquiries (Commonwealth of Australia 2015), and reports (CSIRO 2014; DAFF 2012b) and the Australian Government's response to these, such as the recent development of the Commonwealth Biosecurity Act (2015). This type of transformation will enable Australia to meet increasing demands on biosecurity and to ensure incursion management is effective and sustainable into the future. Key changes are:

- Implementation of a risk-based approach;
- Management of biosecurity risk across the continuum from pre-border, at the border and post-border;
- Strengthening of partnerships with clients and stakeholders;
- Incorporation and advancement of robust science; and
- Development and implementation of modern legislation, technology, funding and business systems.

The focus on the continuum from pre- to post-border better supports the full spectrum of incursion management than previously occurred. It potentially provides effective incursion management supported by sound evidence and policy, facilitates better communication and cooperation between stakeholders, and improves efficiency and responsiveness to incursion incidences through the administration of modern legislation and technology.



### Objective 1.1: Develop Efficient NIPR Program

General processes designed to deal with new animal incursions exist (Appendix B), but are not implemented consistently at all geographic levels. The NEBRA establishes emergency response arrangements when nationally significant incursion events occur (DAFF 2012a). The gaps are primarily in areas outside NEBRA control, particularly around jurisdictional and regional incursions that are not considered of national significance (e.g., starlings, corn snakes, or cane toads).

Successful incursion management exists as part of national and jurisdictional biosecurity programs (e.g., Animal Health Australia (AHA), Wildlife Health Australia (WHA), Plant Health Australia (PHA), and border biosecurity), although they do not cover animals (except as hosts for disease), particularly those outside the agricultural industry. Australia would benefit from a structure that will identify and prioritise known threats to prepare for future animal incursions. This risk-management program should deliver a creative and transparent approach to identifying threats and developing options for incursion management.

Action 1.1.1: Improve National Leadership and Coordination for Consistent Incursion Management

All communities, whether government incursion specialists or members of the public, must take action to prevent/respond to incursions. This responsibility includes taking action to avoid or reduce negative impacts (such as providing early notification of an animal incursion) and refraining from activities that may impact others (such as introducing a new animal, or not responding adequately, or at all, to a new incursion). This can be achieved by improving on existing national leadership and coordination outlined under the NEBRA, and developing consistent animal incursion management approaches similar to AHA and PHA.

Other important aspects include:

- Creation of Animal incursion planning manuals and documents
  - The development of a comprehensive series of manuals that sets out the various roles, responsibilities and policy guidelines for organisations involved in an animal incursion, akin to the Australian Veterinary Emergency Plan (AUSVETPLAN) produced by Animal Health Australia (AHA) for animal disease. These documents would also be used for training to ensure that the plans are effective and personnel are trained in advance of an animal incursion.
- Adoption of plans, techniques and tools
  - Mechanisms for ensuring stakeholders across Australia have adopted and implemented relevant aspects of the NIPR program incorporating operations, policy, strategy development, risk analysis, resourcing and project planning
  - Ensure ongoing support and distribution of updated information is made available
- Establishment of a communication network
  - Although a national communication network currently exists in other areas, a network in response to animal incursions does not exist. Establishment of such a network for animal incursions is necessary.
  - Establish key points of contact at national and jurisdiction level facilitating implementation of the NIPR program
  - Create and keep up to date a list of organisations/ stakeholders participating, which could be included in annual report



## *SYNOPSIS*

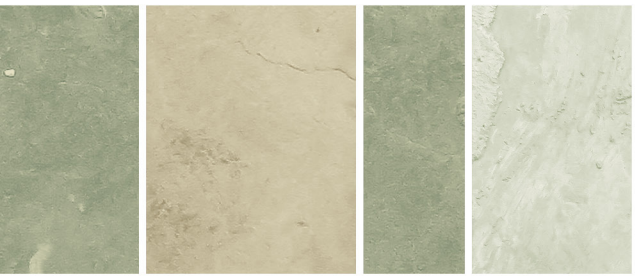
*1.1.1: Provide national leadership and coordination for consistent incursion management*

**Impacted Phase:** Prevention, surveillance, and response

**Feasibility:** Can be achieved within current capabilities

**Resourcing:** Can be achieved within existing resources

**Time Frame:** Can be completed by 2018; updating of information and key contact will be ongoing



### Action 1.1.2: Improve NEBRA Decision-Making for Incursion Response

Improvement of the NEBRA process is expected as part of the NEBRA 5-year review in 2017. A guide was partially developed by the NBC (NBC 2013)and modified by the Vertebrate Pest Committee (VPC) to expand on the provisions of the NEBRA and provide guidance on its interpretation and potential application for vertebrate pests (VPC 2013). Modification of this document will likely be necessary in light of the NEBRA review. Desirable outcomes regarding NEBRA decision making that include:

- Defining roles and responsibilities of all parties in the national biosecurity system including how the concept of shared biosecurity responsibility can be better implemented across government, industry, environmental, community groups and individuals. At present, the process is still heavily weighted toward government responsibility;
- Incorporating national significance criteria measurability and consistently to the NEBRA process. This is particularly crucial for incursions that are considered high priority by some jurisdictions but not others; and
- Updating the NEBRA Interpretative Guide for vertebrates (VPC 2013) to provide better coverage of freshwater fish amongst other revisions.

*SYNOPSIS*

*1.1.2: Improve NEBRA decision-making for animal incursion response*

**Impacted Phase:** Surveillance and response

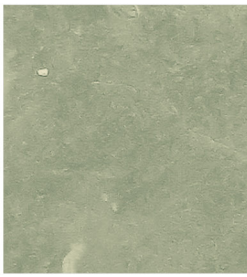
**Feasibility:** Can be achieved within current capabilities

**Resourcing:** Can be achieved within existing resources

**Time Frame:** Can be completed by 2018; updating the NEBRA Interpretative Guide for Vertebrates completed by 2018; updating of information and program improvement are ongoing

### Action 1.1.3: Ensure Accurate and Timely Communications on Incursion Management

Sharing information between the Commonwealth government and state and territory jurisdictions has been flagged as a major shortfall in biosecurity management (Commonwealth of Australia 2015). In relation to environmental biosecurity, the senate report focussed on information sharing around threats and risks. Better mechanisms for information sharing are required to ensure relevant and sufficient material is adequately exchanged between the Commonwealth government and jurisdictions, and vice versa. This is especially important in light of the recent emphasis on using risk assessment to rank manage incursion priorities. Much of Australia's biosecurity system will be supported by a risk-management framework under the new Biosecurity Act (2015). Any risk analysis or assessment process requires available, quality information, some of which is not currently or widely available. Therefore sharing and building on this information is important.



Improvement has been made in the area of communication; however there remain a number of unresolved issues:

- *Reporting is not consistent*. Not all states report through the NEBRA process and consistency of reporting is dependent on motivated individuals. Additionally, information and data for species not considered of national significance are generally reported to other jurisdictions.
- *Reports aren't reliably delivered to operational personnel*. Reports and information are often not disseminated effectively through and between jurisdictional organisations because of information bottle-necks or a misunderstanding of the importance of passing information to subordinates and collaborators.
- *Inconsistency in sharing border/post-border information*. Although most post-border information is readily shared, at-border data and information is generally not disseminated to states/territories. This creates a significant gap in information that can compromise incursion management.

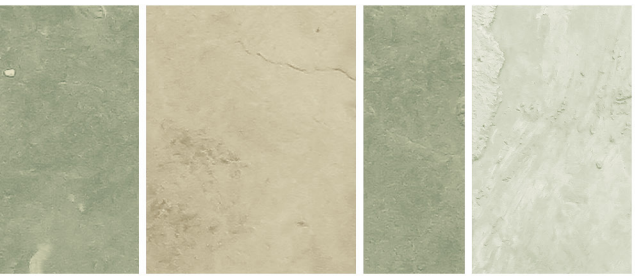
**Reporting incursions** - As incursion threats do not respect political boundaries, jurisdictions must be consulted and be an integral part of the reporting process. Local or jurisdictional incursions that do not trigger NEBRA must also be reported and disseminated widely. This may necessitate the appointment of a centralised reporting point to cover non-national incursion reporting.

**National reporting standards** - Incursion management data should be nationally recorded using agreed data standards and secure web accessibility. These standards should be compatible with jurisdictional reporting systems to enable information to be easily fed into the national reporting database. IPAC has agreed to a national data standard for invasive plants and animals for data management and surveillance systems, including a Surveillance National Minimum Data Set. Ideally, data for all jurisdictions will be centrally located and accessible to all relevant government stakeholders.

**Risk assessments for priority species** - Animals considered a priority based on their perceived invasiveness and adverse impact should have risk assessments completed. Gaps in assessments, including ornamental fish on the grey list (DAFF 2007; Fredberg and McNeil 2010), require completion. These individual assessments form the basis of risk profiles specific to habitats, sectors or industries. Collectively, they form a national risk profile that can be used to inform jurisdictional policies and declarations.

Various risk assessments are held nationally and within jurisdictions. Collation in one location of all assessments in a consistent format is an outcome sought under the NIPR Strategy. Additionally, the draft IPAC Australian list of non-indigenous vertebrate threat Categories of Non-indigenous Vertebrates (IPAC 2015), under review, should be available to all jurisdictions upon its completion.

**Publications and information sharing** – The NIPR Strategy supports and actively encourages the publication of incursion management information including risk assessments, tool and technique development, response outcomes and lessons learned. This information can be stored on a web-based library in a central location (e.g., PestSmart.com.au) immediately following publication or development, ensuring ready availability to incursion practitioners.



## *SYNOPSIS*

*1.1.3: Ensure accurate and timely communications on incursion management*

**Impacted Phase:** Prevention, surveillance, and response

**Feasibility:** Support of publication and information sharing can be achieved within current capabilities; reporting protocols and standards and risk assessment completion will require additional expertise

**Resourcing:** Support of publication and information sharing can be achieved within existing resources; all others will require additional resources

**Time Frame:** Reporting protocols and standards can be completed by 2019; risk assessment can be completed by 2022; support of publication and information sharing will be ongoing



### Action 1.1.4: Establish Incursion Management Process for Key Sectors and Industry

As volumes and patterns of trade, migration, tourism, industry, land use, and climate change, evolve and interact, so too does the range of possible animal incursions. In terms of threats to social and amenity assets, animal incursion management has been limited. This creates a range of new and complex issues that need to be addressed at a national scale.

Each of these areas requires examination, with the aim of establishing or formalising incursion management programs that can be applied across all sectors including industry, services, environmental and social amenities. Ideally, the system would be incorporated into the planning processes for incursion management (Objectives 2.2 to 2.4), training (Objective 2.5), public outreach and community engagement (Objectives 3.2 and 3.3).

Performance measures could include:

- Reviewing significant incursion threats in each key area (sector or industry);
- Determining priorities for development and implementation, such as
  - Establishing a need for incursion management in each sector/industry
  - Listing and ranking sectors, industries and other entities in terms of incursion risk
- Describing how to implement and administer the program.

## *SYNOPSIS*

*1.1.4: Establish incursion management process for key sectors and industry*

**Impacted Phase:** Prevention, surveillance, and response

**Feasibility:** Priorities determined and local/industry plans and systems in place will require additional expertise to achieve

**Resourcing:** Will require additional resources to achieve

**Time Frame:** Priorities can be completed by 2019; local/industry plans and systems in place may be completed by 2022



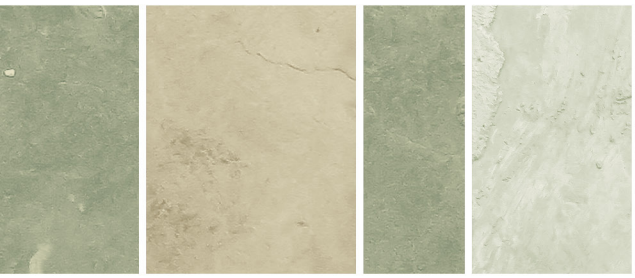
### Action 1.1.5: Investigate Options for Improving Ongoing Resourcing Arrangements

The management of animal incursions involves managing risks and making resource allocation decisions. A consistent approach is required to assess investment to mitigate threats to Australia's industries, environment, social amenity and human health. This decision-making process must be transparent, and include consultation and input from all stakeholders. Priorities must be set and investment decisions based on a robust assessment of risks and benefits.

Resourcing strategies and decisions for vertebrate incursions are made in the context of broader resourcing decisions across the entire biosecurity continuum. Funding protocols currently exist, such as the national cost sharing arrangements specified under NEBRA. Fifty per cent of eligible costs associated with implementing an agreed incursion response are borne by the Australian Government, the remaining fifty per cent distributed among the affected states and territories (NEBRA, Schedule 5). A review of NEBRA is currently underway; how and if these arrangements are modified is unknown.

Resourcing arrangements may be improved in a number of ways (note the ongoing NEBRA review may address these issues):

- NEBRA's cost sharing arrangement does not include incursion prevention. Other means of funding are required to prevent incursions.
- There is currently little provision for risk creators, particularly industries outside food production, to contribute to animal incursion management.
- The cost or lead time required before a NEBRA response is triggered (or not) is often quite substantial and those costs are borne by the state/territory where the incursion occurred. In some cases, it has been quicker and more cost effective for a jurisdiction to respond to an incursion than work through the current NEBRA system.
- Inter-jurisdictional incursions that are not considered of national significance but impact other states/territories are not covered under existing arrangements. Who is responsible if an established animal in one jurisdiction spreads or translocates to another jurisdiction where it does not occur?



The IGAB review is considering and providing recommendations on cost sharing and investment decision making that cover some of the current shortfalls. These include:

- Enquiry into relative contributions of risk creators and beneficiaries to NIPR activities, taking into account the identification of groups or activities that create risk, and an analysis of the level of public and private benefit accrued from incursion management activities; and
- Examination of potential responsibility-sharing models for incursion prevention such as fee for service, in-kind delivery of services and functions, or cost recovery models.

A range of additional performance measures are considered with regard to investment decision-making.

- Estimates of prevention, surveillance, and response effort requirement scenarios based on feasibility of eradication. Risk-based information (e.g., Henderson and Bomford 2011) and associated papers reviewing animal incursions in Australia can guide the decision-making process.
- Engagement with industry where government-industry partnerships in programs for education, awareness, prevention and response are developed. This includes investigating systems that facilitate industry provision of funds, services and/or functions that facilitate incursion prevention.

Note that a cost recovery system does not necessarily mean fees are charged and collected (e.g., permit fees, import or export costs etc.). Systems may be developed whereby industry provides and absorbs the cost of services or functions that facilitate incursion management, such as inspections, reporting, and risk ranking. There are many pragmatic reasons why this may be preferable over fee collecting models.



## *SYNOPSIS*

*1.1.5: Investigate options for improving ongoing resourcing arrangements*

**Impacted Phase:** Prevention, surveillance, and response

**Feasibility:** Economic analysis may be achieved within current capabilities; engagement with industry will require additional expertise

**Resourcing:** Will require additional resources

## Goal 2 – Build Capability and Expertise

Developing knowledge, skills, and infrastructure required to manage incursions effectively necessitates a wider range of technical capability in policy and strategy development, risk assessment, species identification and project planning. This is particularly important for experts who work collaboratively to provide expertise to other groups, and guide and manage future biosecurity planning. To deliver an effective animal incursion program, building necessary capacity and processes, developing information technology and communication strategies, and streamlining delivery processes must be created.

## Objective 2.1: Establish and Enact Research Priorities

A sound science approach is multi-pronged; cost-effective, science-based and risk-managed. Since resources for research, development and extension are limited, they must be effective and collaborative. The government's capacity to support research is finite. Presently, states and territories support incursion management as the need and funding allows. With limited funding and diverse investments in research across the entire invasion curve, incursion research capacity must be built in a way that enhances capability through sustainable and thoughtful research prioritisation and coordination.

Contributions by jurisdictions can be shared nationally, and outcomes that significantly increase Australia's ability to rapidly and reliability identify and respond to incursions prioritised. This ability is significantly supported by active research programs that facilitate the development of new diagnostic technologies and their use in surveillance and incursion response situations. Importantly, research programs have demonstrated the ability to provide essential capacity at times of high demand such as emergency incursion responses (e.g., Genovesi 2005; Stanford and Rodda 2007).

An example of a diagnostic technology is risk management. The effectiveness of the risk assessment approach is strengthened by knowledge generated from national and international research. A comprehensive risk-management framework is required to deal with the breadth and complexity of incursion threats facing Australia and to identify the range of possible interventions. A risk-based incursion management program will necessitate more personnel with risk assessment expertise. Presently, the capacity to complete risk assessments is limited. This type of research is fundamental for providing incursion knowledge, new technologies and methodologies.

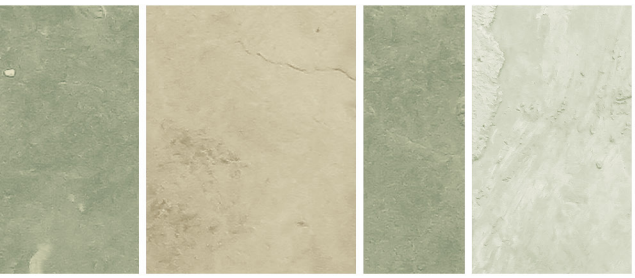
### Action 2.1.1: Prioritise, Undertake and Adopt Research to Develop and Improve NIPR Capacity

Improving capacity will require a review of existing knowledge to identify gaps and prioritise future research. Optimal incursion management can then be considered within the context of benefits and costs (or risks and returns), stakeholder support and available resources. Furthermore, communication at each step of the process can be established to ensure stakeholder input and understanding is considered with respect to decisions made.

**Address significant gaps** - Addressing significant gaps in incursion management and setting research priorities is a priority. This can be achieved though the development of IPAC endorsed priority list of incursion research, similar to Animal Health Australia's animal biosecurity research and development strategy (Rowland and Adams 2014). IPAC IEG will be responsible for providing priorities to IPAC's research, development and extension (RD&E) Expert Group, and/or incursion research organisations and institutions.

This priority document:

- Can be used to inform stakeholders and funders;
- Provides incentives for collaboration that strengthen Australia's position internationally;
- Is aligned nationally with future industry and community needs; and
- Ensures that Australia's incursion RD&E capacities are delivered efficiently and effectively.



A nationally coordinated incursion research program will cover areas such as risk assessments, climate change, pathways, activities, prevention, surveillance, and rapid response.

**Risk Assessment** - Further improvement of the predictive ability of risk assessment processes will greatly facilitate the ability to prepare and respond to incursions. This should include processes for identifying pathways and activities, and protocols for reptile, amphibian and freshwater fish assessments. Coupled with documentation of species adverse impacts overseas, these processes will better gauge possible risk to Australia.

**Develop and utilise specialised proficiencies** - The Commonwealth and state/territory governments facilitate the development of a number of linked, specialised capabilities in government, CSIRO, universities, co-operative research centres and industry through coordination and resource allocation. These groups deliver national research, providing benefits across Australia. Successful collaboration and building of linkages between research groups can be measured by the routine uptake of research information, establishment of standard procedures, and operational use of tools and techniques (such as eDNA).

**Strengthen international linkages** – Facilitating strong connectivity with international collaborators strengthens our ability to draw on the expertise of the global incursion management community. The NIPR Strategy encourages the assembly of strong international multidisciplinary teams to enhance knowledge development and the dispersal of new technologies. These collaborations can more efficiently address global challenges that impact upon Australia. Outcomes can include peer reviewed published research and annual reporting.



## *SYNOPSIS*

*2.1.1: Prioritise, undertake and adopt research to develop and improve NIPR capability and capacity*

**Impacted Phase:** Prevention, surveillance, and response

**Feasibility:** Determine significant gaps can be achieved within current capabilities; facilitating specialised capabilities and strengthening international linkages may require additional expertise

**Resourcing:** All will require additional resources; specialised capacity building may be high cost unless in-kind arrangement can be made

**Time Frame:** The initial determination of significant gaps can be completed by 2018 and maintained on an ongoing basis; facilitating specialised capabilities and strengthening international linkages will be ongoing

## Objective 2.2: Improve Prevention Proficiency and Capacity

Effective incursion prevention necessitates activities offshore to reduce the risk of potential invasive animals reaching the border, and actions onshore to deal with incursions as soon as they occur. This requires allocating resources to target the areas that pose the highest biosecurity risks (Lodge et al. 2006). Expanding

prevention capabilities from border control to sites/regions/jurisdictions throughout Australia, understanding pathways and activities, and developing plans to reduce incursion risk are critical to improve policy actions, guide integrated management strategies, and enhance educational campaigns aimed at reducing the threat of future invasions.

### Action 2.2.1: Establish a National Incursion Prevention Approach

Having a streamlined, universally implementable, structured approach for preventing incursions at national and jurisdictional levels is necessary. To achieve this goal, the development of a simple but comprehensive system that enables government and non-government stakeholders to actively prevent animal incursions at national, state/territory, regional and local levels is required. This will be achieved through the development of an IPAC-endorsed feasibility plan that outlines advantages and disadvantages of the approach, and how incursion prevention can be implemented.

There exist a few management processes that can be utilised for incursion prevention (e.g., Hazard Analysis and Critical Control Point Planning, Environmental Management Systems, etc). These will be examined during the feasibility assessment to determine which, if any, are most suitable for incursion prevention. The process must identify pathway and activity risks and establish where and how potentially invasive animals can be removed or controlled. It must also be adaptive and flexible, and emphasise appropriate procedures and verification processes to ensure government and non-government stakeholders pose minimal risk of invasive animal importation and translocation. The process will allow decision-makers, regulators and others to look at various operations and evaluate how potential incursions are being handled.

For any approach to be widely adopted and utilised, it must be accepted by industry, community, and government. A co-operative approach that is reviewable and allows participants to gain positive outcomes is essential. Concurrently, the approach should facilitate reporting and building remedial action into the process.



## *SYNOPSIS*

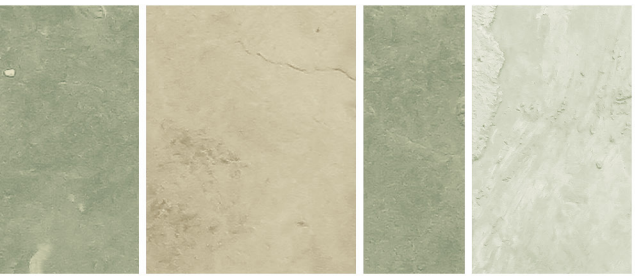
*2.2.1: Establish an incursion prevention management approach that can be applied at national and jurisdictional levels*

**Impacted Phase:** Prevention and surveillance

**Feasibility:** Conceptual, feasibility and case studies can be achieved within current capabilities; implementing a program will require additional expertise

**Resourcing:** Can be achieved with additional resources

**Time Frame:** Conceptual and feasibility studies can be completed by 2019; case studies can be completed by 2022; implementing a program will be ongoing



## Objective 2.3: Review and Enhance Surveillance Systems

Effective surveillance and diagnostic services are pivotal to the successful operation of any incursion program. However, much of the surveillance and diagnostic activity currently undertaken by governments is fragmented and requires review. Decision making on where and when resources are allocated is applied differently across activities and across jurisdictions.

As a result, the National Surveillance and Diagnostics Framework was developed by the IGAB Schedule 4 working group to provide an integrated approach to the funding and management of these activities (NBC 2014). The aim of the framework is to ensure that surveillance and diagnostics are supported by risk based decision making to help prioritise the allocation of government resources and investment to areas of greatest return, and to maximise the use of existing capability and infrastructure. This document provides valuable and relevant guidance that can be used for incursion surveillance. Actions below augment the framework's goals specifically in the area of incursion management.

### Action 2.3.1: Develop Processes and Capacity for Taxonomic Identification

Timely scientific identification of new incursions - The continued adoption of rapid diagnostic capabilities and technologies is essential for maintaining competence in the face of Australia's changing biosecurity profile. Without the skills to detect and identify potentially invasive animals, there will be no way of identifying new incursions and accurately assessing risk in a time period necessary to affect a positive response. Performance measures may include:

- Memorandums of Understanding (MOU) or equivalent agreements to provide identification services with government agencies, museums, and institutions ;
- Succession and/or institutional collaboration plan/s developed with scientific organisations to address numbers are declining rapidly (less than one percent employed by government in 2003 (ABRS 2007)). Succession planning is necessary as taxonomists retire and are not replaced. Some taxa, such as freshwater fish, currently have the majority of their identification expertise within private industry which can be difficult or expensive to access. Diagnostic capacity can be further expanded by forming collaborative international networks;
- Implement DNA-typing technology for identification processes. Although inherent challenges in developing accurate and reliable technologies exist, this method could become a widespread and useful tool for incursion management (Pereira et al. 2008). Of particular importance would be the identification of species, hybrids and origin of illegal seizures;
- Build DNA libraries for incursions risk management. The DNA library should be centrally located and readily accessible by incursion practitioners. DNA libraries already exist, however, there are major gaps in information available (e.g., ornamental freshwater fish, reptiles). Efforts to fill these gaps would be valuable; and National and international diagnostic capability available online. All diagnostic information, from lists of taxonomic experts, to identification materials and DNA results should be easily accessible via a secure online site.

## *SYNOPSIS*

*2.3.1: Develop processes and capacity for taxonomic identification of animal incursions*

**Impacted Phase:** Surveillance and response

**Feasibility:** Will require additional expertise

**Resourcing:** Setting up identification reviews can be achieved within existing resources; developing processes and techniques will require additional resources

**Time Frame:** Setting up identification reviews, processes and techniques can be completed by 2022 with ongoing updates; developing taxonomic capacity will be ongoing



### Action 2.3.2: Develop and Implement Surveillance Tools and Techniques for New Incursions

The development and implementation of useful surveillance tools/techniques will assist in:

- identifying priority species and pathways;
- establishing and improving routine practices; and
- facilitating collaboration and sharing of information.

Some useful foundations were developed to identify 'national significance' and 'alert lists' which were reported as required to support effective monitoring and surveillance of high risk species.

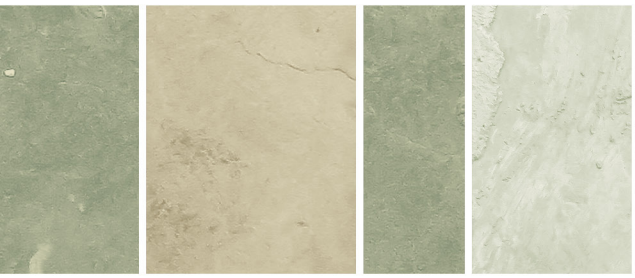
**Rapid detection and identification of animals in the 'field'** – Detecting and responding to invasions requires a complex series of interlacing, coordinated, and sustained actions that can be grouped into three main categories: 1) Early Detection, 2) Rapid Assessment, and 3) Rapid Response. Development and adoption of technologies and tools for identification of potentially invasive animals at large is necessary. This outcome is connected to Action 3.2.1, and allows for coordinated planning, creation of high priority species identification material, storage of voucher specimens, and the sharing of resources and information across jurisdictions. Measurable outcomes will include the collation of early detection/identification tools and experts for routine use by jurisdictions and other stakeholders.

**Priority species, pathways and activities for surveillance identified** – Nationally agreed surveillance guidelines and protocols for prioritising species, pathways and activities will be developed using existing information, guidelines, and expertise (e.g., Cacho et al. 2010; Hulme 2009; MAFBNZ 2008; NBC 2014).

Routine use of active and passive surveillance practices – Detection of invasive animals can occur during surveillance activities either deliberately (active surveillance) or anecdotally during other activities (passive surveillance). Standardising surveillance practices will facilitate and streamline the process for use by government, industry and the community. It can be achieved by:

- Developing a business case for a national passive surveillance program. This will include agreed national protocols for searching, information sharing and reporting;

[1] Note that most states/territories have informal agreements and/or payment systems with museums and other government agencies providing diagnostic services



- Creating or formalising active detection networks that focus on high priority animals, and passive detection networks that fortuitously detect invasions, augmenting active detection networks; and
- Implementing new technologies such eDNA, trapping, remote censusing, and incursion management structures as they are developed.

### Case Study – Black Spined Toad

**The Asian black-spined toad (ABST; Duttaphrynus melanostictus), native to parts of Asia, is frequently found as a stowaway in anything from straw and cargo in shipping containers to personal effects of travellers. One hundred incidents of ABST incursions have been recorded between 2003 and 2012 (Henderson and Bomford 2011; Minister for Agriculture 2013). Tourism provides one major pathway to Australia. Travellers often leave shoes, towels and clothing outside overnight while vacationing in Asia. If these items are not checked before packing, the ABST can inadvertently find themselves in the luggage of those returning to, or visiting, Australia.**

**Establish a centralised community of practice for web surveillance of illegal animals** – A centralised community of practice will involve generating a feasibility study into a nationally coordinated web surveillance of illegal trade in non-native animals. The web surveillance procedure would be used by government, industry, and the wider community.

**Monitor and improve current information technology, mapping and information systems** – Periodic review of technology, mapping and surveillance systems is needed to understand, monitor, and model parameters that may contribute to invasions, such as climatic conditions, ecosystem disturbance patterns, and land use changes. This information will ensure quality, availability, analysis and reporting of data.

## *SYNOPSIS*

*2.3.2: Develop and implement surveillance tools and techniques for new incursion*

**Impacted Phase:** Surveillance

**Feasibility:** Identification of priority species and pathways, adoption of rapid detection tools, and active and passive routine surveillance feasibility studies can be achieved within current capabilities; a centralised web surveillance community of practice for illegal wildlife, and monitoring and improving information technology will require additional expertise

**Resourcing:** All will require additional resources; some such as active and passive routine surveillance implementation may require greater additional resources

**Time Frame:** Identification of priority species and pathways, and business case for adoption of rapid detection tools can be completed by 2019; a feasibility study for active and passive routine surveillance, a centralised web surveillance community of practice for illegal wildlife and monitoring and improving information technology can be completed by 2022; adoption of rapid detection tools and active and passive routine surveillance will be ongoing

## Objective 2.4: Improve Response Proficiency and Capacity

Early detection and the ability to respond quickly to a new incursion give the best chance of successful eradication or containment (NISC 2003). The characteristics of successful response efforts include:

- Potential incursions are identified and detected in time to allow risk-mitigation measures to be taken and efficient and environmentally sound decisions to be made;
- Responses to invasions are effective and environmentally sound and prevent the spread and permanent establishment of invasive animals;
- Adequate and timely updated information is provided to decision-makers, the public, and stakeholders; and
- Lessons learned from past efforts are being used to guide current and future efforts.

### Action 2.4.1: Develop and Collate NIPR Preparedness Material

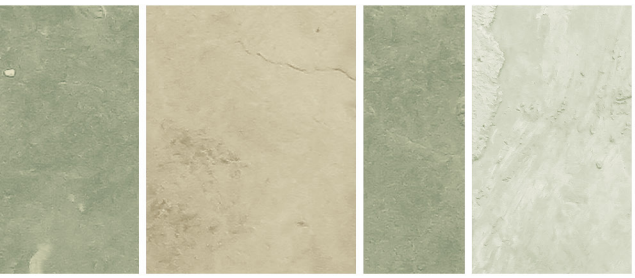
A coordinated national structure for early detection and rapid response, integrated with passive and active surveillance and prevention procedures, will ensure constant, integrated and timely incursion responses. Some aspects are covered under Biosecurity Emergency Management (DAFF 2012a), NEBRA and state/territory procedures and response plans. Note that Biosecurity Victoria has produced pre-incursion plans for ten scenarios (species or taxa groups) which are available for use by all jurisdictions. Systemising existing information and creating new material is necessary.

The preparation of preparedness material calls for working with national, state/territory, local, indigenous, and private entities and will provide direction in the case of resource allocation and assigning response priorities. This will involve the development of plans, manuals, operating procedures, and best management practices.

Response manuals should also be developed to support training programs. It is not possible for even the best-trained teams to retain all the specific knowledge needed. It is essential that they have adequate manuals and other materials. Materials should be up to date and include population containment, species removal, safety, regulatory responses, information sharing, and public outreach planning.

Preparedness plans other documents should address the following:

- Government and non-government requirements and need;
- High risk species, pathways and/or activities;
- Relative and potential risk assessments associated with an introduction;
- Coordinated planning and common approaches to incursion response across Australia, including cross-border support in emergencies where needed;
- Priority setting and resources sharing across jurisdictional boundaries;;
- Prevention, delineation and containment efforts;
- Intentional release of surplus, animals, illegal pet trade and procedures for zoos/wildlife parks;
- Collection, identification, and storage of voucher specimens where appropriate;
- Methods for monitoring, treating and removing populations and restoring habitats;



- Start-stop rules;
- Reporting activities including data collection and management;
- Training volunteers and professionals in detection, identification, and removal techniques;
- Coordinated public communication efforts; and
- Sharing information and developing case studies.

The uptake and implementation of preparedness material should be periodically reviewed.

## *SYNOPSIS*

*2.4.1: Develop NIPR preparedness documentation*

**Impacted Phase:** Prevention, surveillance, and response

**Feasibility:** Majority can be achieved within our current expertise; however, additional expertise may be required

**Resourcing:** Will require additional resources, particularly in developing implementation and deployment protocols

**Time Frame:** Can be completed by 2018



### Action 2.4.2: Maintain and Enhance Response Capability through Existing Structures

As the government implements a more proactive response framework across a wide range of sectors, the need to maintain response capability is apparent. Critical gaps in national incursion planning and response need to be identified and being addressed.

Response capability can be maintained and enhanced through existing structures:

- **Development of plans, tools and techniques** - This includes the development of an incursion planning "toolkit" that incorporates broad use for applying to NEBRA and non-NEBRA eradications;
- **Training and emergency exercises** - These include continuous improvement in monitoring, responding, data collection and dissemination in responses; and
- **Procedure for biodiversity data collection during responses** – These will standardise and measure invasive animal impacts, and the benefits of eradication. This Information should be considered in response monitoring plans and used to improve reporting on investment benefits

## *SYNOPSIS*

*2.4.2: Maintain and enhance response capability through existing structures*

**Impacted Phase:** Prevention, surveillance, and response

**Feasibility:** Will require additional expertise

**Resourcing:** Identification of critical gaps in reporting and continuous improvement in monitoring and data collection will require additional resources; depending on complexity, development of a planning toolkit will require higher additional resources

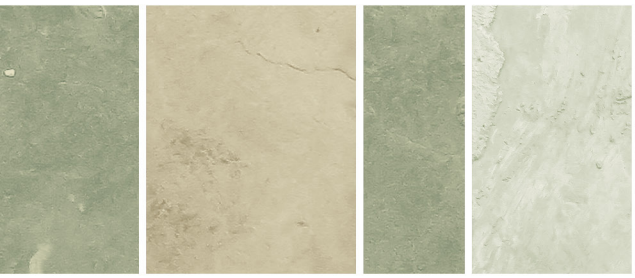
**Time Frame:** Identification of critical gaps in reporting identified can be completed by 2019; development of a planning toolkit should be completed by 2022; continuous improvement in monitoring and data collection will be ongoing



### Objective 2.5: Develop and Conduct Training

It is important for professionals and volunteers engaged in incursion management to have sufficient training so that their efforts can support subsequent action, ensure reporting quality. The need to train those engaged in detection and response networks and to develop educational materials, trainers, and related resources must be on-going.

Photo: Ian Jacobs



### Action 2.5.1: Assess NIPR Capabilities and Training Needs

Training in the area of animal incursions is significantly under-developed compared to its equivalent in Animal and Plant Health (see AHA's emergency animal disease training program and PHA's national emergency plant pest training program). In fact, there is currently no national training program that ensures incursion practitioners are well prepared in the event of a new animal incursion.

As a result, a scoping document and analysis of need to determine desired training needs, outcomes and target audience is required. This will involve consultation with project participants and target end users to establish training objectives, gaps in knowledge, content, and structure and should:

- Ensure the availability of training for those involved in incursion management; and
- Engage with and identify stakeholder skills, knowledge and resources to contribute to, and achieve, desired outcomes.

*SYNOPSIS*

*2.5.1: Assess NIPR capabilities and training needs*

**Impacted Phase:** Prevention, surveillance, and response

**Feasibility:** Can be achieved within current capabilities

**Resourcing:** Can be achieved within existing resources

**Time Frame:** Completed by 2017



### Action 2.5.2: Create and Implement Accredited NIPR Training and Education Modules

The Australian governments recognise the importance of an integrated national emergency incursion preparedness approach to prevent new animal incursions establishing in Australia. As part of that approach, a national accreditation and structured incursion training program is critical.

- Budgetary and time constraint analysis to ensure sound investment of time and resources;
- Program design and preparation incorporating content, timelines, materials, delivery and media style, and prioritisation of content;
- Delivery and implementation taking into consideration economical and personnel resource availability; and
- Evaluation by monitoring progress and assessing its effectiveness by determining the ability of participants to successfully and consistently perform key incursion response tasks presented during training.

Pre-response Training - Training prior to any incursion response is essential since there often is not sufficient time to train a response team following the detection of an incursion. This training should include mock exercises and emergency response training in addition to programs that provide core competencies.

Needs Analyses – Understanding need is essential and an analysis will be applied at both the organisational and individual level. Activities will involve personnel from government agencies, industry and the community, to create and maintain a base of skilled people for key response roles during incursion incidents. Rapid response exercises will provide important opportunities to develop and practice skills and teamwork, to review and improve procedures and to design and develop tools and resources needed for effective response.

Delivery - Delivery method will vary depending on the content presented. Simulated exercises, face-to-face, classroom and field courses are highly recommended, and will be augmented with online content to reduce overall training costs and ensure training accessibility.

Evaluation - To evaluate the training program and adapt the design to address overlooked or additional factors, the development team will coordinate internally among the member agencies and external partners to further develop and test the modules and delivery systems. Where appropriate, implementation may be limited by current funding, or expanded if additional funding becomes available. Finally, a plan to guide nationwide adoption and implementation will be developed. Ultimately, national implementation depends on lessons learned during development and testing of the conceptual design and how incursion and other biosecurity training might function complementarily.



## *SYNOPSIS*

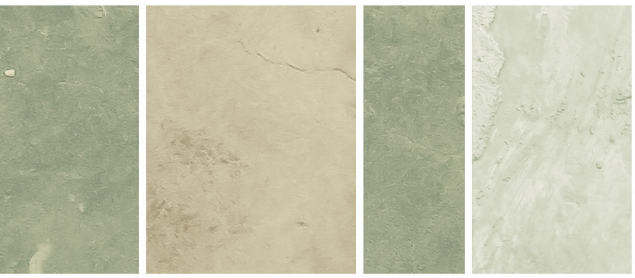
*2.5.2: Create and implement accredited NIPR training and education modules*

**Impacted Phase:** Prevention, surveillance, and response

**Feasibility:** Design and development can be achieved within current capabilities; implementation will require additional resources to achieve

**Resourcing:** Can be achieved within existing resources

**Time Frame:** Design and development can be completed by 2018; implementation and delivery will be ongoing



## Goal 3 - Improve Stakeholder/Community Support and Engagement

A great foundation for engagement and communication already exists and will form the basis for improving these areas in the incursion space. The National Biosecurity Engagement and Communication Framework (NECWG 2013) was developed to improve cooperation between parties, increase stakeholder and beneficiaries awareness, and enhance the effectiveness, of biosecurity activities through communication and engagement. It assists the jurisdictions to adopt a consistent approach when developing engagement and communication plans.

### Objective 3.1: Develop Partnerships

Strategically, government's role is becoming more suited to guiding and educating stakeholders than the current hands on approach. Under this model, the role of government would be to assist stakeholders, industries and community to develop management practices to mitigate incursion risk. This would require:

- Achieving greater understanding of stakeholders' perceptions and priorities for incursion management; and
- Improving awareness of issues and solutions, and what role stakeholders play in the creation and mitigation of risk. This includes knowledge of activities and pathways that create risk, impacts of potential animal species, and development of management techniques.

An integrated NIPR program will be more effective, efficient and equitable if there is clear communication and a sound understanding between all stakeholders about the responsibilities, commitments, and approaches required. Partnerships, such as AHA, demonstrate that nationally coordinated, collaborative invasive animals programs can be successful. The NEBRA is another example of strong partnerships at work.

*Case Study - Freshwater Fish and the Aquarium Trade*

The large numbers of non-native freshwater fish imported into Australia through trade each year (Ovenden et al. 2015) pose a significant threat to Australia's freshwater ecosystems if released into the wild. In the past 40 years, 1,181 non-native ornamental fish species have been detected in Australia, predominantly introduced via the freshwater aquaria trade, despite only 481 of these being approved for importation by the Australian Government (FFEG 2013). The keeping of ornamental fish is a popular hobby in Australia and when kept appropriately in aquaria they present little risk. However, released ornamental fish present a major risk to freshwater ecosystems in Australia because of their potential to become a pest in natural environments or to transfer diseases and pathogens to native species. In light of this, IPAC has established a Freshwater Fish Experts Group (FFEG) which is tasked to coordinate and promote national collaboration and communication between jurisdictions, community, and ornamental industry stakeholders. FFEG helps to raise awareness in the community and industry about the management, control and regulation of ornamental fish, as well as raising awareness of pest fish and their management.

Action 3.1.1: Identify and Promote Effective Prevention and Emergency Management Relationships with Community and Industry Stakeholders

The NIPR Strategy is strongly focused on strengthening collaboration between government and non-government stakeholders. This approach starts with the understanding that each jurisdiction and stakeholder shares the accountability of incursion management (NBC 2013) and respects each other's roles and responsibilities. Groups such as universities and cooperative research centres are also important contributors to incursion management.

Adopting strong, formalised shared responsibility with industry and community for prevention, early detection and response to a new incursion is inevitable and can be undertaken through existing structures. Under the NIPR Strategy, industry and community organisations that manage high incursion risk pathways or activities will have greater responsibilities and ownership in partnership with government. Governments may co-invest where there is a net public benefit. This will be based on negotiated partnership arrangements including options for industry participation, adoption for community-coordinated surveillance, and provisions for an integrated incursion program.

Key considerations for the formation of collaborative relationships are:

- Memoranda of understanding or equivalent can be established between relevant governments and stakeholder organisations for implementing incursion prevention and assisting with responses. These agreements should clarify of roles and responsibilities, encourage collaboration amongst stakeholders and outline how equitably between jurisdictions is to be achieved;
- Provisions can be made for incursion management to be written into contracts (i.e., becoming the "cost of doing business");
- Animal industries must be responsible for minimising the risk of escapes from captivity, and mitigating the cost should species escape; and
- Maintenance and consistent jurisdictional application of the IPAC Guidelines for the Import Movement and Keeping of Non-Indigenous Animal Animals in Australia (VPC 2014) need to be considered.

## *SYNOPSIS*

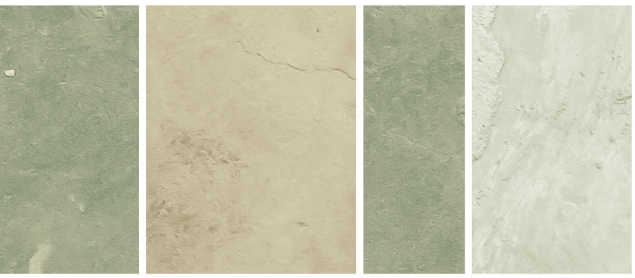
*3.1.1: Identify and promote effective prevention and emergency management relationships with community and industry stakeholders*

**Impacted Phase:** Prevention, surveillance, and response

**Feasibility:** Will require additional capabilities to achieve

**Resourcing:** Will require some additional resources to achieve

**Time Frame:** Design and development can be completed by 2018; implementation and delivery will be ongoing



Action 3.1.2: Assist Industries to Mitigate Incursion Risk

Presently, mitigation of incursion risk is largely a border function undertaken by the Commonwealth. If the cost of incursion management is to be borne by those who create the risk and benefit from its management, then consultation, input, and accountability by industry is necessary (NECWG 2013). All stakeholders have a role in ensuring that incursion management standards are set and executed proficiently. This will ensure that roles and responsibilities are equitably developed and implemented, and that all groups understand their role.

To achieve this, mechanisms are required to assist industries with high risk activities/pathways to develop tools for mitigating incursion risk. These may be incorporated into the proposed prevention management approach (see Action 2.2.1), company/specific stand-alone procedures in the form of best management practices (BMP) and industry codes of practice (ICP), or a combination of both. The establishment of a system where new or revised national BMPs and ICPs for managing common risks are developed, reviewed and shared is recommended.

Implementation of the process will be considered based on expertise and resources. This includes:

- How assistance is incorporated into the NIPR program (e.g., process as part of the program, or tools as part of the NIPR toolkit);
- Selection criteria for engagement of priority industries (based on activity/pathway risks);
- Whether feasibility proof of concept studies are necessary; and
- How and by whom tools and materials are created or revised, and how they will be available to relevant stakeholders and other industries.



## *SYNOPSIS*

*3.1.2: Assist industries to mitigate incursion risk*

**Impacted Phase:** Prevention, surveillance, and response

**Feasibility:** Can be achieved within current capabilities

**Resourcing:** Will require additional resources

**Time Frame:** Can be completed by 2022; support of publication and information sharing will be ongoing

## Objective 3.2: Enhance Communication

Better outcomes will be achieved if key stakeholders, including industry, community groups and the general public, are involved. Many in the wider community have little awareness of animal incursions, which are less visible or considered less important than the control of already established species. For example, wild dogs, rabbits, and cane toads are known threats and have tangible repercussions that the public can see and understand. When these repercussions personally touch communities, their perceived importance is further elevated, often at the expense of other species or incursions posing greater actual threats. Shifting public awareness to potential/emerging species with no public profile is challenging.

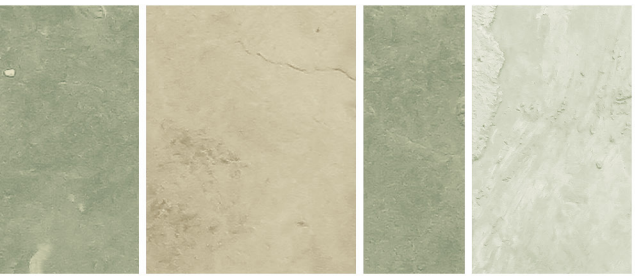
Preparation - Most stakeholder and community communication is reactive, occurring as a consequence of an incursion event. The unexpected nature of such events focuses resources and attention on the response itself resulting in delaying or halting communication and education effort. Not only does this scenario "miss the boat" with regard to providing education on that particular incursion, but it does not allow for broader incursion education. Previous inquiries have highlighted the need to refine and target communication strategies for emergency response and management of high-risk biosecurity threats. Key steps, processes and timing must be in place to ensure effective communication between all relevant stakeholders and communities.

Targeted Messaging - Setting clear and specific goals in terms of messaging is the key to designing awareness communication. It is not enough to have stakeholders and community awareness of incursion management; the aim is to actually engage in these practices. Not everyone will view incursion management in the same way. Therefore, communication will be most effective if the number and nature of these audiences are understood before design and implementation of education and awareness materials.

### Action 3.2.1: Develop NIPR Awareness Extension Materials and Tools

National awareness education and industry/community engagement programs will be developed in consultation with relevant jurisdictions, stakeholders, and community to improve understanding and promote:

- Incursion prevention including high risk species, pathways and activities;
- The need for early detection and reporting and how stakeholders, communities, and individuals can contribute;
- Clear points of contact for access to information;
- Improvement of both formal and informal networks at all levels from Australian government to community;
- Greater responsiveness during incursion responses;
- Effective public awareness material in a variety of media; and
- A clear review process.



### *The Iconic 10*

IPAC is in the process of developing a list of 10 'iconic' vertebrates which represent species that could become established in Australia either through an accidental pathway or an illegal or deliberate introduction. These 10 species are not necessarily those considered the highest risk of entering Australia; in effect the ten examples would become symbols of a new wave of potentially destructive vertebrate incursions highlighting different issues or pathways associated with their introduction. Materials developed around the iconic 10 will be valuable tools for increasing public support and awareness.

Communication must anticipate and respond strategically and quickly to inclusion threats. Targeted and well-managed communications campaigns, and the capacity for crisis and issues management, are a priority. Part of the message needs to include that community and industry are important partners in incursion management. This will be achieved through the following initiatives.

1. Develop education materials that enable industry and community to recognise new animals as quarantine/biosecurity risks, engage in passive surveillance and report unusual sightings. Materials will include national factsheets for high risk species, reporting information, and streamlined web extension and reporting tools (e.g., such as FeralScan and PestSmart). Since information on a range of non-native species is already available, a review of these and consideration on making them available in one location is also an option.
2. Create a paradigm shift whereby stakeholders understand incursion management is a shared responsibility between landholders, community, industry and government that requires all parties to have a clear understanding of their roles and responsibilities.
3. Centrally locate relevant, shared operational and decision-making tools so they are readily available for adoption by industry, government and the community. This does not include specific or sensitive information not for general access. Use of the internet to centrally locate information is a likely preferred option.

## *SYNOPSIS*

### *3.2.1: Develop NIPR awareness extension materials and tools*

**Impacted Phase:** Prevention, surveillance, and response

**Feasibility:** Can be achieved within current capabilities

**Resourcing:** Development of initial material can be achieved within existing resources

**Time Frame:** Initial material will be completed by 2017; additional information and updates will be ongoing will be ongoing

## Objective 3.3: Facilitate Involvement

Facilitating involvement is dependent upon effective communication effecting public support and behaviour. Understanding patterns of behaviour or attitudes that may promote or block incursion efforts will be useful in planning a comprehensive incursion management program (Hine et al. 2014). For example, the language used in the field of invasive species is often technical and military based (e.g., invasion, incursion, capture, defence, incipient, surveillance, etc.), which can disconnect the individual from the message (Invasive Species Council 2015). Further, the necessity for capture and killing of invasives adds to general public discomfort and confusion, particularly regarding animal welfare (see Text Box below for an example). To achieve success, an understanding of individual and community behaviour needs to be matched with program design.

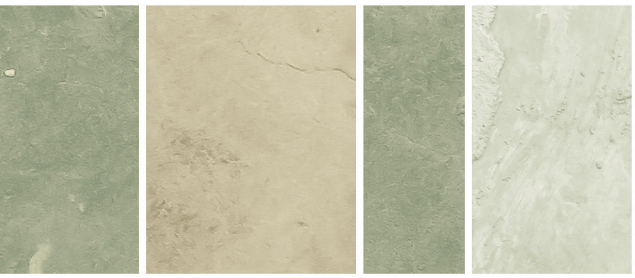
*Case Study – Public outcry; when the take home message isn't what was planned*

In May 2015, a 2.6m long female red-tailed boa constrictor (Boa constrictor) was captured in suburban Melbourne. Although the media mentioned the threat this snake posed to the environment should it have remained in the wild, it was the planned euthanasia of the snake that caught the public's attention. Photographs showed an attractive and healthy snake that many did not want to see killed. It seems the message that the boa is an extreme risk to Australia was overshadowed by animal welfare issues.

### Action 3.3.1: Generate and Streamline Reporting Protocols and Applications

Reporting protocols and applications will be developed to facilitate timely and accurate notification and recording of incursions (see Action 1.1.3). IPAC will assist with the development of record-keeping and quality assurance protocols to facilitate recognition and reporting of incursions, with particular emphasis on achieving early detection and rapid response. Valuable baseline information on animal and ecosystem health may also be collected. The reporting protocols should consider:

- Accessibility and functionality in field situations;
- Accessibility and functionality government, stakeholders, industry and the community; and
- Ability of individuals to readily access reporting systems for suspected new animal incursions, such as the existing National Pest Alert Hotline (NPAH). A review of the hotline's current effectiveness may be all that is necessary.



## *SYNOPSIS*

*3.3.1: Generate and streamline engagement plans, reporting protocols and applications*

**Impacted Phase:** Prevention, surveillance, and response

**Feasibility:** Will require additional expertise

**Resourcing:** will require considerable additional resources

**Time Frame:** Can be completed by 2022; updating systems will be ongoing

# Implementation, Governance and Delivery

The next step is for the development of an implementation plan to guide delivery of the NIPR Strategy and ensure that progress is regularly reported to the appropriate entities. To achieve consistent incursion management, state, territory and Australian government capabilities must support implementation of the NIPR Strategy, of which NBC has reviewed across broad jurisdictional biosecurity capacity. National, state and territory government agencies through IPAC will be responsible for implementation oversight.

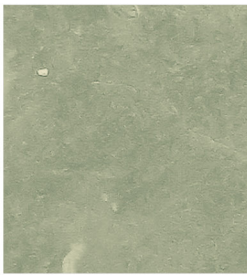
No single group can deliver the ambitious actions and meet the goals set out in this strategy for managing Australia's animal incursions. Government needs to work with non-government representatives to make this strategy's vision a reality; and to ensure the gaps and exposures that have been identified are addressed.

The implementation plan will include a set of milestones that will be used to track the progress of implementation. The milestones will be reported in an annual progress report to IPAC IEG that includes:

- Reports by IPAC jurisdictions on incursion and response
- Reporting by NBC of funding allocation and government incursion capacity across all biosecurity sectors
- Reporting on strategy implementation to IPAC in areas such as performance indicators and changes to resourcing and capability

This information will be used to update all biosecurity stakeholders in Australia.

It is also important that the implementation and success of the NIPR Strategy is reviewed periodically to ensure that it is working effectively and that the measures are sufficiently flexible to adapt or respond to changing circumstances. Interim reviews will be conducted by IPAC IEG on an annual basis with a formal review and evaluation by IPAC IEG and other stakeholders on a five yearly basis. The first formal review will be June 2022.



# Appendix A

Summary of goals, objectives and actions and adaptive management framework for incursion prevention and response program

## Priority Key

**Feasibility**
H – within current capabilities
M –need extra expertise to achieve
L – need high level expertise

**Resourcing**
$ - within existing resources
$$ - utilize/source some additional resources
$$$ - high cost

**Impacted Phase**

P – Prevention
S – Surveillance
R – Response

**Time Frame**

Short – completed by 2017
Medium – completed by 2018
Long – completed by 2022

[1]NMG - National Management Group
[2]NDMIG - National Decision-Making and Investment Group
[3]NSDG - National Surveillance and Diagnostics Group
[4]R&D - Research & Development
[5]NECG - National Engagement & Communication Group

| Objectives and Actions | Outcomes Sought | Responsible Parties | Priority and Resources | Time Frame | Performance Measures |
|---|---|---|---|---|---|
| **1 Develop Management Structure** | | | | | |
| **1.1 Develop An Efficient Nipr Program** | | | | | |
| 1.1.1 Improve National Leadership and Coordination for Consistent Incursion Management | Creation of planning documents that set out the various roles, responsibilities and policy guidelines | IPAC | H$<br>P, S, R | Short | Comprehensive series of manuals developed<br>NIPR program is consistent and supports the outcomes of the Australian Pest Animal Strategy (APAS) |
| | Adoption and implementation of relevant aspects of the NIPR plan | | H$<br>P, S, R | Medium | Mechanisms for ensuring adoptio and implementation of relevant aspects of the NIPR program<br>Ensure ongoing support and distribution of updated information is made available |
| | Establishment of a communication network specific to incursions | | H$<br>P, S, R | Short | Establish key POC at national and jurisdiction level facilitating NIPR program implementation<br>List of organisations/ stakehold participating included in annual report |
| 1.1.2 Improve NEBRA decision-making for incursion response | Enhance decision-making structures within the NEBRA incorporate criteria measurability and consistency to the process | Comm. Government<br>via NMG[1] Secretariat | H$$<br>S, R | Ongoing | Enhancement is included in the NEBRA 5-year review |
| | • Updated NEBRA Interpretative Guide for Vertebrate Pests (including freshwater fish) | | H$<br>S, R | Short | 2017 NEBRA interpretative guide for Vertebrate Pests approved by IPAC |

| Objectives and Actions | Outcomes Sought | Responsible Parties | Priority and Resources | Time Frame | Performance Measures |
|---|---|---|---|---|---|
| 1.1.3<br>Investigate options for improving ongoing resourcing arrangements | Consistent sharing and dissemination of all incursion information including border/post-border, and may be candidates for consideration under the NEBRA | Comm. Government IPAC | M$$<br>P, S, R | Short | All jurisdictions and relevant organisations receive prompt notice of new animal detections<br>System will compliment and no duplicate existing systems |
| | Animal detection and incursion response data is nationally recorded using agreed data standards and secure web accessibility | IPAC jurisdictions | M$$<br>P, S, R | Short | New animal detection data for all jurisdictions is centrally collated and accessible to all relevant government stakeholders |
| | Priority animal species have risk assessments completed to inform jurisdictional policies and declarations | IPAC | M$$$<br>P, R | Long | Current IPAC Australian List of Threat Categories of Non-indigenous Vertebrates is complete and available to all jurisdictions<br>Risk assessments completed for ornamental fish - Grey List |
| | Support/encourage publication of incursions/ detections/responses (including lessons learnt from unsuccessful responses) | IPAC<br>NIPR Facilitator | H$<br>P, S, R | Ongoing | Web-based library for species risk assessments and other risk-based information is operational<br>Facilitate information sharing with research/tool developers<br>Scientific publications and reports are available to all jurisdictions immediately following publication |

| Objectives and Actions | Outcomes Sought | Responsible Parties | Priority and Resources | Time Frame | Performance Measures |
|---|---|---|---|---|---|
| 1.1.5 Investigate options for improving ongoing resourcing arrangements | • Include cost sharing arrangements for incursion prevention and inter-jurisdictional | Comm. Government<br>IPAC via linked with NBC NDMIG[2] | H$$<br>P, S, R | Medium | • Government-industry partnerships in programs for education, awareness, prevention and response<br>• Ability for risk creators to contribute resources |
| | • Engagement with industry on seeking partnerships in implementing NIPR | linked with NBC NDMIG2 | M$$<br>P, S, R | Long | • Government-industry partnerships in programs for education, awareness, prevention and response<br>• Ability for risk creators to contribute resources |

| | | | | | |
|---|---|---|---|---|---|
| **2 Build Capability and Expertise** | | | | | |
| **2.1 Establish and Enact Research Priorities** | | | | | |
| 2.1.1<br>Prioritise, undertake and adopt research to develop and improve NIPR capability and capacity | Research priorities to address significant gaps in incursion knowledge and tools determined | IPAC<br>NIPR Facilitator<br>Jurisdictions | H$$<br>P, S, R | Short then Ongoing | IPAC-endorsed priorities for NIPR research<br>Nationally coordinated research program into incursion prevention, detection and response that is linked, where possible, to other biosecurity and RD&E strategies |
| | Further improvement in predictive ability of risk assessment processes | Comm. Government via NMG[1] Secretariat | H$$$<br>S, R | Medium and Ongoing | Risk assessment processes for reptiles, amphibians and freshwater fish are inclusive of impact<br>Documentation of species impacts overseas to better assess potential risk to Australia |
| | Specialised capabilities in government, CSIRO, universities, co-operative research centres and industry deliver national incursion research capabilities | NBC via IPAC<br>Research Groups | M$$$<br>P, S, R | Ongoing | Implementation and routine use of relevant research and tools following development<br>Build linkages between research institutions to establish standard procedures and tools for operational use (e.g., eDNA) |
| | International linkages are strengthened and maintained to draw on the skills, knowledge and experience of the global incursion management community | IPAC<br>Jurisdictions<br>Research Groups | M$$<br>P, S, R | Ongoing | Collaborations included in annual reporting and collaborative research published |

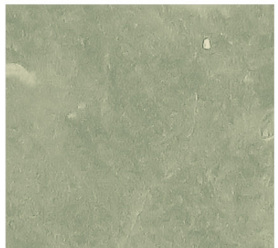
| | | | | | |
|---|---|---|---|---|---|
| **2.2 Improve Prevention Proficiency And Capacity** | | | | | |
| 2.2.1<br>Establish an incursion prevention management approach that can be applied at national and jurisdictional levels | Develop a comprehensive system that enables government, industry, and community to actively prevent animal incursions at national, state/ territory, regional and local levels | NIPR Facilitator<br>Jurisdictions<br>Industry<br>Community Groups | H$$<br>P, S | Medium to Long | IPAC-endorsed feasibility planning document that outlines how an incursion prevention approach can be implemented<br>Implementation of an incursion prevention process used by industry, government and community<br>Processes in place to ensure ongoing, timely sharing of information, especially between border security and jurisdictions |
| **2.3 Review and Enhance Surveillance Systems** | | | | | |
| 2.3.1<br>Develop processes and capacity for taxonomic identification | Timely scientific identification of new species detections to enable rapid response | NBC NSDG[3] | M$$$<br>S, R | Long | Memorandum of Understanding (or equivalent) with government agencies, museums, and institutions<br>Succession and/or institutional collaboration plan/s developed with scientific organisations to address key gaps<br>Implement DNA typing identification processes to identify species, hybrids and origin of illegal seizures<br>DNA libraries built for incursions risk management<br>Online diagnostic capability |

| 2.3 Review and Enhance Surveillance Systems | | | | | |
|---|---|---|---|---|---|
| 2.3.2<br>Develop and implement surveillance tools and techniques for new incursions | Priority species, pathways and activities for surveillance identified | IPAC R&D[4] Group<br>Research Groups<br>Jurisdictions<br>Industry<br>Community | H$$<br>S | Medium | Nationally agreed surveillance guidelines and protocols developed |
| | Technologies and tools developed and adopted for rapid detection and identification of animals in the 'field' | | H$$$<br>S | Medium then Ongoing | Toolkit developed by collating existing early detection/IA tools for routine use by jurisdictions<br>Incorporate new technologies and tools into the toolkit |
| | Active and passive surveillance are routine practiced by government, industry and the community for high-risk pathways/activities | IPAC<br>Jurisdictions<br>Industry<br>Community | H$$S<br>S | Medium | Business case developed for a national passive surveillance program<br>Agreed national protocols for searching, information sharing and reporting |
| | A centralised community of practice for web surveillance of illegal animals established | IPAC R&D[4] Group<br>Jurisdictions | M$$$<br>S | Long | Feasibility study into nationally coordinated web surveillance of illegal trade in non-native animals |
| | Monitor and improve current information technology, mapping and information systems | | M$$<br>S | Long | Ensure quality, availability, analysis and reporting of data |

| 2.4 Improve Response Proficiency and Capacity | | | | | |
|---|---|---|---|---|---|
| 2.4.1<br>Develop NIPR preparedness material | • Preparedness plans, SOPs and manuals in use by all governments for high risk species, pathways and/or activities | IPAC<br>Research Groups<br>NIPR Facilitator<br>Jurisdictions | M$$<br>P, S, R | Medium | Preparedness material developed for high risk species, pathways and/or activities<br>Common approaches in incursion response across Australia, including cross-border support in emergencies where needed<br>Review of uptake and implementation of plans by government, industry, and community |
| 2.4.2<br>Maintain and enhance response capability through existing structures | • Critical gaps in national incursion planning and response identified and being addressed | IPAC<br>Jurisdictions<br>Research Groups | M$$<br>P, S, R | Medium | • NBC informed of weaknesses to be addressed in national capacity to respond to non-native animal incursions |
| | • Incursion planning toolkit in broad use for applying to NEBRA and non-NEBRA eradications | | M$$$<br>P, S, R | Long | • Incursion response planning toolkit, including start-stop rules, developed and available on web |
| | • Continuous improvement in monitoring and data collection and dissemination in responses | | M$$<br>P, S, R | Ongoing | • Procedure for biodiversity data collection during responses to measure invasive animal impacts and benefits of eradication |

| 2.5 Develop and Conduct Training | | | | | |
|---|---|---|---|---|---|
| 2.5.1<br>Assess NIPR capabilities and training needs | • Analyse need to determine the desired outcomes of the project and target audience, particularly in the areas of animal risk assessment, prevention and rapid response | NIPR Facilitator<br>Jurisdictions<br>IPAC | H$<br>P, S, R | Short | • Scoping document that assesses need, priorities, budget, gaps, and target audience |
| 2.5.2<br>Create and implement accredited NIPR training and education modules | • Design and prepare a training program | IPAC<br>Jurisdictions<br>NIPR Facilitator | H$$<br>P, S, R | Medium | • Nationally endorsed training program that incorporates content, materials, delivery and media style, timelines and prioritization of content.<br>• SOP or similar that documents evaluation methods, progress, efficiency and uptake |
| | • Deliver training program/s | | M$$<br>P, S, R | Ongoing | • Preparation training in addition to response training<br>• In person and online training programs delivered |
| | • Evaluate training program efficacy | | H$$<br>P, S, R | Ongoing | • Annual report on training program<br>• Evaluation conducted at regular intervals |



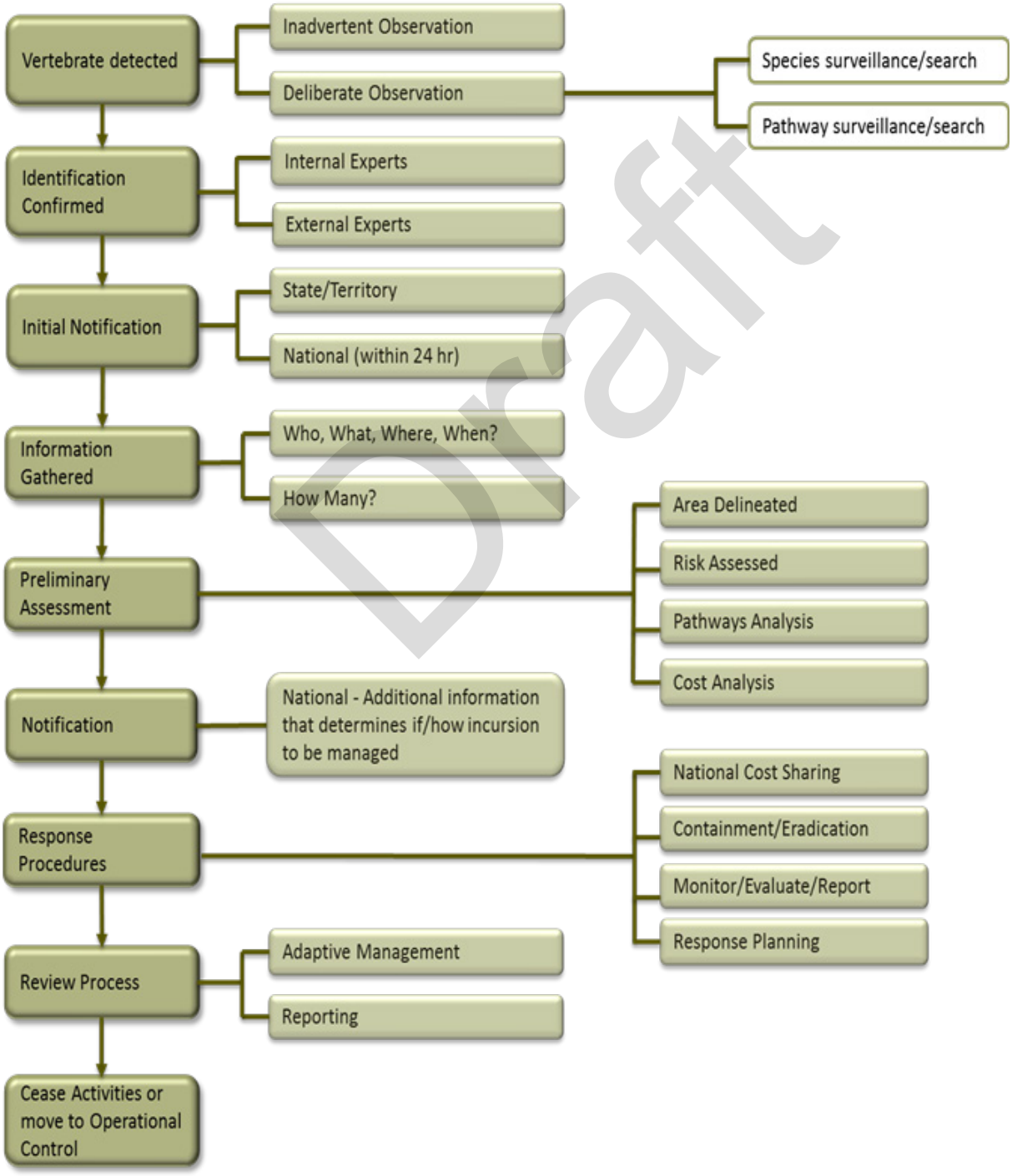


| | | | | | |
|---|---|---|---|---|---|
| **3 Improve Stakeholder/Community Support and Engagement** | | | | | |
| **3.1 Develop Partnerships** | | | | | |
| 3.1.1<br>Identify and promote effective prevention and emergency management relationships with community and industry stakeholders | • Industry and community organisations that manage pathways of high incursion risk take greater ownership in partnership with government in prevention practices<br>• Can be achieved through existing structures | IPAC<br>Jurisdictions<br>Research Groups | M$$<br>P, S, R | Ongoing | • MOU established between relevant governments and stakeholders to implement incursion prevention and assisting with responses<br>• Animal industries minimise risk of escapes from captivity in Australia<br>• Maintenance and jurisdictional application of the import, movement and keeping of non-native vertebrate Guidelines (VPC 2014) |
| 3.1.2<br>Assist industries to mitigate incursion risk | • Priority industries selected for engagement, based on activity/ pathway risks | NIPR Facilitator<br>Industry Stakeholders | H$$$<br>P, S, R | Long | Report into existing BMPs and ICPs that can be used for incursion prevention and response activities |
| | • Processes established where new or revised national BMPs and ICPs developed, reviewed and shared for managing common risks | | M$$<br>P, S, R | Long | • Feasibility/ proof of concept studies undertaken<br>• New/revised BMPs and ICPs available to relevant stakeholders |

| | | | | | |
|---|---|---|---|---|---|
| **3.2 Enhance Communication** | | | | | |
| 3.2.1<br>Develop NIPR awareness extension materials and tools<br>3.1.2<br>Assist industries to mitigate incursion risk | • Education materials available to enable the industry and community to recognize new animals as quarantine/ biosecurity pest risks, engage in passive surveillance and report unusual sightings | IPAC<br>NBC NECG[5]<br>NIPR Facilitator<br>Community Groups<br>Industry | H$<br>P, S, R | Medium then Ongoing | • National factsheets for high risk species endorsed and published<br>• Extension materials available on list of 10 iconic species (national surveillance targets)<br>• Web extension and reporting tools<br>• Key government, industry and community stakeholders are engaged in the implementation of the NIPR Strategy, at both the policy and operational level<br>• Strategic insights gained into stakeholder behaviour and engagement for the improvement of incursion control outcomes<br>• NIPR plan implementation report |
| | • Communicate that effective incursion management requires capacity, resources, and broad understanding and a shared responsibility approach | IPAC<br>Jurisdictions | H$<br>P, S, R | Short | • Guidance document for government authorities in how to engage high risk stakeholders to achieve behavioural change |
| | • Operational and decision tools are centrally located for adoption | NBC NECG[5] | H$<br>P, S, R | Medium | • NIPR toolkit is available on web |
| **3.3 Facilitate Involvement** | | | | | |
| 3.3.1 Generate and streamline reporting protocols and applications | • Government, stakeholders and the community can readily access, even in the field, reporting systems for suspected new animal incursions | IPAC<br>NBC NECG[5]<br>Jurisdictions | M$$<br>P, S, R | Medium | • Review into the effectiveness of the 1800 pest alert hotline<br>• A national reporting procedure for the general public |

# Appendix B

A generalised flowchart of the typical stages or steps in an incursion incident based on various state/territory/regional biosecurity programs.



# Appendix C

## Glossary of Terms

**Adaptive Management** A systematic process for continually improving management policies and practices by learning from the outcomes of operational programs.

**Alien species** (non-native, non-indigenous, foreign, exotic) A species, subspecies, or lower taxon occurring outside of its natural range (past or present) and dispersal potential (i.e. outside the range it occupies naturally or could not occupy without direct or indirect introduction or care by humans) and includes any part, gametes or propagule of such species that might survive and subsequently reproduce

**Animal Health Australia** Also known as Australian Animal Health Council Ltd. A not-for-profit public company established by the Commonwealth, state and territory governments and major national livestock industry organisations. Aims to manage national programs to assist the Australian animal health service system in maintaining acceptable national animal health standards at home and overseas, and aids the improvement in the quality of animal health infrastructure and services.

**Beneficiary** Those individuals, organisations, industry groups etc. that benefit from risk mitigation measures in response to a biosecurity measure or activity.

**Best practice guidelines** Control protocols which seek to balance cost-effectiveness, non-target damage and humaneness

**biocontrol or biological control** Controlling an invasive species by introducing a natural enemy, such as an insect or fungus, that specifically attacks the target species and does not attack other native or economically important species.

**Biodiversity** The variety of life forms, the different plants, animals, micro-organisms, the genes they contain and the ecosystems they form.

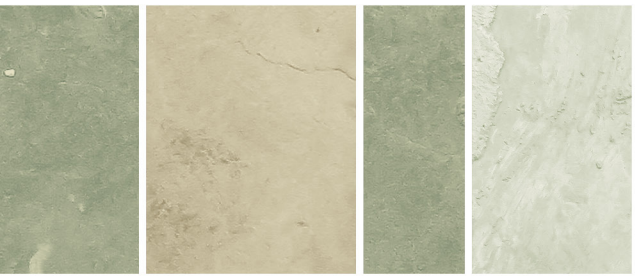
**Biological diversity** (biodiversity) The variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are a part; this includes diversity within species, between species and of ecosystems.

**Biological Invasion** A broad term that refers to both human-assisted introductions and natural range expansions. Also known as bioinvasion.

**Biosecurity** The management (through exclusion, mitigation, adaptation, control and eradication) of risks posed to the economy, environment and people's health by organisms entering, emerging, establishing or spreading

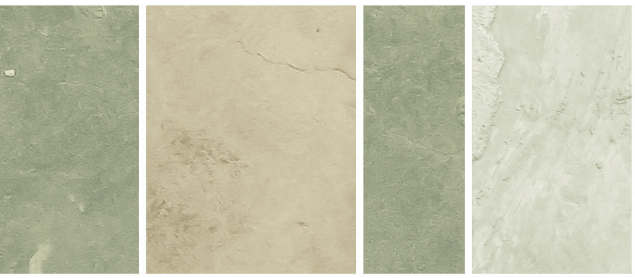
**Biosecurity continuum** Describes the range of locations where biosecurity risks may arise and where biosecurity activities take place – offshore (pre-border), at the border and onshore (within Australia).

**Biosecurity Emergency** Circumstances in which a pest or disease poses a significant and immediate threat to part or parts of Australia's economy, environment or community.



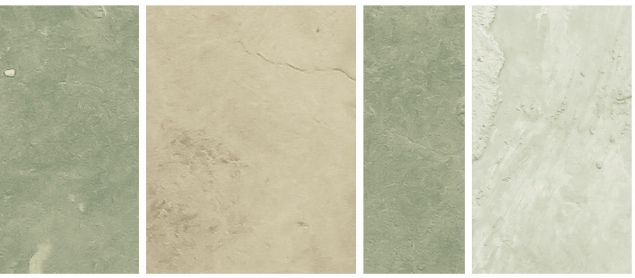
| | |
|---|---|
| **Biosecurity Incident** | An event which increases the likelihood of biosecurity risk being realised. |
| **Biosecurity Measures** | Activities undertaken to manage biosecurity risks. |
| **Biosecurity Risks** | The potential of a disease or pest entering, emerging, establishing or spreading in Australia; and the disease or pest causing harm to the environment, or economic or community activities. |
| **Biosecurity Threats** | Those matters or activities which, individually or collectively, may constitute a biological risk to the ecological welfare or to the well-being of humans, animals or plants of a country. |
| **Category (invasive** assign **species)** | The four agreed Australian national categories for invasive species taxa used to candidate taxa to these categories. The four are:<br>Category 1: National surveillance<br>Category 2: National eradication<br>Category 3: Established invasive species of national significance<br>Category 4: National restriction on keeping, sale and trade |
| **Commonwealth** | The Commonwealth of Australia, including its external territories. |
| **Community** | Includes human health and social amenity. |
| **Community of practice** | Groups of people who share a concern or a passion for something they do and learn how to do it better as they interact regularly. |
| **Containment** | Keeping an invasive species within a defined area thereby restricting its spread. |
| **Control** | To eliminate or prevent the flourishing or spread of potential or known invasive species |
| **Early Detection and Rapid Response** | A method used to quickly detect and respond to new invasive species and noxious weeds before they can become established, through control or eradication where possible. |
| **eDNA** | Environmental DNA (eDNA) is nuclear or mitochondrial DNA that originates from cellular material shed by organisms (usually via skin, excrement, and gametes) into aquatic or terrestrial environments. |
| **Emergency Pests and Diseases (as they of the pest/disease; or** | Pests and diseases that are:<br>(a) exotic to Australia and it is considered to be in the national interest to be free<br>(b) a variant of an endemic pest or disease (that can be distinguished by investigative and diagnostic methods) which if established in Australia, would have a national impact; or<br>(c) a serious pest or disease of unknown or uncertain cause; or<br>relate to emergency response arrangements in Australia)<br>(d) a severe outbreak of a known endemic pest or disease, and that is considered to be of national significance with serious social or trade implications. |

| | |
|---|---|
| **Emergency Preparedness** | The ability to respond to an emergency allowing for the efficient mobilisation and deployment of resources and services needed to address the outbreak. |
| **Emergency Response** | The actions taken in anticipation of, during and immediately after, an outbreak to ensure that its impacts are minimised and may include:<br>(a) actions constituting an initial response to an outbreak; and<br>(b) actions that form part of a national biosecurity incident response. |
| **Emerging species** | A newly established species whose distribution and abundance is expanding. |
| Environment | Includes:<br>(a) ecosystems and their constituent parts, including people and communities;<br>(b) natural and physical resources;<br>(c) the qualities and characteristics of locations, places and areas; and<br>(d) terrestrial, freshwater, estuarine and marine environments. |
| **Eradication** | Complete removal of the species from an area such that natural reproduction or recolonization cannot occur. |
| **Established pests and diseases** | 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. |
| **Establishment** | The point at which a species can reproduce at a sufficient level ensuring survival in a new habitat without new genetic input from outside the system. |
| **Evaluation** | The process or results of an assessment or appraisal in relation to stated objectives, standards, or criteria. |
| **Exotic pest and disease** | Pests and diseases affecting plants or animals (and possibly including humans)that do not normally occur in a particular country. |
| **Freshwater Pest Fish** | Any freshwater fish that has, or has the potential to have, significant environmental, economic or social impacts. Freshwater fish are any freshwater member of the agnathan or teleost taxa of vertebrate animals. |
| **Governments** | Refers collectively to the Commonwealth of Australia and state and territory governments and includes regional co-operating groupings of governments for matters falling within their areas of competence. |
| **Impacts** | The (usually negative) economic, environmental and/or social effects of invasive species. |
| **Incursion** | An isolated individual or population of a non-native species recently detected in an area, not known to be established, but expected to survive for the immediate future. |
| **Incursion Management** | Includes both incursion prevention and response. |
| **Incursion Prevention** | To inhibit or stop the introduction of non-native species to an area. Prevention requires the ability to identify pathways and prepare for risks in order to stop the incursion. |
| **Incursion Response** | To eliminate or prevent the invasion or spread of non-native species not known to be established in an area, but expected to survive for the immediate future. |



| | |
|---|---|
| **Incursion System** | An approach that encompasses and fully integrates import and export activities, services and functions—into, within, and from Australia—and covers the spectrum of animal threats to Australia's environment, production and people. |
| **Intentional Introduction** | An introduction made deliberately by humans, involving the purposeful movement of a species outside of its natural range and dispersal potential. (Such introductions may be authorised or unauthorised.) |
| **Interception** | The detection of a pest or disease during inspection of an imported good, vessel, passengers or mail at the border or in imported goods that are not under biosecurity control but the pest or disease remains within the imported good. |
| **Introduction** | The movement, by human agency, of a species, subspecies, or lower taxon (including any part, gametes or propagule that might survive and subsequently reproduce) outside its natural range (past or present). This movement can be either within a country or between countries. |
| **Invasive Species** | Plants, animals or other organisms which are invading, or may invade the natural environment in Australia. This definition includes Australian species which have been introduced outside their pre-1750 range in Australia. It does not include indigenous species which may have increased their range incrementally during that time.<br><br>These species are highly competitive and spread aggressively into environments where they are not normally found and whose introduction does, or is likely to, cause environmental or economic harm, or harm to human health. |
| **Invasive Vertebrates** | Vertebrates (animals with backbones) that spread aggressively into environments where they are not normally found and whose introduction does, or is likely to, cause environmental or economic harm, or harm to human health. |
| **Jurisdictions** | Refers collectively to the Commonwealth of Australia and state and territory governments. |
| **Monitor** | To conduct a planned sequence of observations or measurements to assess whether a CCP is under control and to produce an accurate record for future use in verification. |
| **National Biosecurity Committee** | The committee established, independently of this Agreement, responsible for biosecurity matters, and tasked with managing a national, strategic approach to emerging and ongoing biosecurity policy issues. |
| **National Biosecurity System** | Encompasses the full range of activities undertaken by governments, organisations and individuals across the biosecurity continuum, including prevention, emergency preparedness, detection, response, recovery and on-going management of pests and diseases. |
| **Nationally significant** | Pest or disease that would likely have far reaching and/or national impacts to Australia. These include impacts to international trade, economic health, human health, natural environment, infrastructure, amenity of resources, and culture. |
| **Native species** | (indigenous) A species, subspecies, or lower taxon, occurring within its natural range (past or present) and dispersal potential (i.e. within the range it occupies naturally or could occupy without direct or indirect introduction or care by humans). |

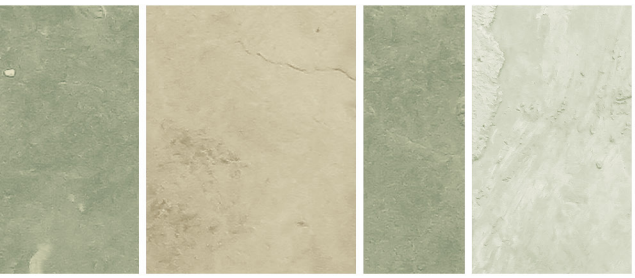
| | |
|---|---|
| **Natural range** | The area which a species can reach and occupy by its own legs, wings, wind/water-borne or other dispersal systems, even if it is seldom found there. |
| **New invasive species** | Any introduced species that has not been recorded in Australia previously and whose impacts are likely to be significant or a species previously recorded in Australia that has since exhibited invasiveness. |
| **Non-native** | Species introduced into an area/ecosystem outside of its historic native geographic range (also referred to as non-indigenous, exotic, alien, introduced). Non-natives do not always become invasive. |
| **Pathways** | An activity or process through which a species may be moved into a new location where it could become invasive. |
| **Pest** | Any plant or animal having, or with potential to have an adverse economic, environmental or social impact. |
| **Protocol** | A procedure or set of rules. |
| **Public authority** | - a Minister of the Crown; or<br>- local authority constituted by or under an Act; or<br>- a government department or administrative office; or<br>- a statutory body representing the Crown; or<br>- the trustee or trustees of land reserved or dedicated for any public use or purpose; or<br>- a member of staff or other person who exercises functions on behalf of any of the above. |
| **Public good** | The community receives significant benefit regardless of whether that benefit is economic, non-economic, environmental, or intangible. |
| **Re-introduction** | An attempt to establish a species in an area which was once part of its historical range, but from which it has been extirpated or become extinct. |
| **Risk** | An estimate of the likely occurrence of a hazard. |
| **Risk analysis** | Assessment of the level of biosecurity risk associated with the entry, emergence, establishment and spread of pests and diseases and the identification of options to limit the level of biosecurity risk. Includes risk assessment, risk management and risk communication. |
| **Risk assessment** | Process of identifying a hazard (source of potential danger or harm), estimating (in quantitative, semi-quantitative or qualitative terms) the likelihood of conversion of a hazard into actual harm and identifying potential damage and other undesirable outcomes. |
| **Risk beneficiaries** | Individuals, organisations, and/or industry groups that benefit from risk mitigation measures in response to a biosecurity activity or response; but who may not necessarily contribute financially to these activities. |



| | |
|---|---|
| **Risk creator** | Those individuals, organisations, industry groups etc that create risks that may result in a disease or pest entering, emerging, establishing or spreading in Australia; and the disease or pest causing harm to the environment, or economic or community activities. It does not include governments undertaking biosecurity activities as part of their regulatory responsibilities. |
| **Risk management** | The process of identifying, selecting and implementing measures that can be applied to reduce the level of risks. The culture, processes and structures that are directed towards realising potential opportunities whilst managing adverse effects. |
| **Risk-based decision making** | Risk-based decision making is a process by which decisions can be made regarding safety, durability, serviceability, and compatibility that allows uncertainties to be characterized and integrated into planning, crisis prevention and management. |
| **Shared responsibility** | A core concept underpinning Australia's national biosecurity system whereby all stakeholders—including Australian governments, industry and the broader community—have important roles and responsibilities in the management of biosecurity risks in Australia. |
| **Social amenity** | Any tangible or intangible resources developed or provided by humans or nature such as dwellings and parks, or views and outlooks. |
| **Stakeholders** | Those people and organisations who may affect, be affected by, or perceive themselves to be affected by a decision, activity or risk. |
| **State/Territory** | State and Territory Governments of Australia. |
| **Surveillance** | Surveillance in which extra measures are taken to increase detection, collect data and confirm incursions. |
| **Surveillance - active** | Active surveillance also includes formal and informal communications. |
| **Surveillance - passive** | The reporting of an incident or incursion to relevant authorities with no special effort made to do so. |
| **Terms of reference** | The scope allowed to persons conducting an enquiry of any kind. This term has come to be used in almost a generic sense to be a guide for a wide range of activities including investigations, reviews, projects, implementation and the development of plans. |
| **Toolkit** | A set of easily accessible resources, tools or information to support special communities. |
| **Unintentional introduction** | Unintended introduction made as a result of a species utilizing humans or human delivery systems as vectors for dispersal outside its natural range. |

## Acronyms

| | |
|---|---|
| **APAS** | Australian Pest Animal Strategy |
| **AusBIOSEC** | Australian Biosecurity System for Primary Production and the Environment |
| **AusVETPLAN** | Australian Veterinary Emergency Plan |
| **BEPWG** | Biosecurity Emergency Preparedness Working Group |
| **BMP** | Best Management Practice |
| **CCVPI** | Consultative Committee on Vertebrate Pest Incursions |
| **CEBRA** | Centre of Excellence for Biosecurity Risk Analysis |
| **CITES** | Convention on International Trade in Endangered Species of Wild Fauna and Flora |
| **COAG** | Council of Australian Governments |
| **COP** | Community of practice |
| **CRC** | Cooperative Research Centres |
| **CSIRO** | Commonwealth Scientific and Industrial Research Organisation |
| **DAF** | Department of Agriculture and Fisheries, Queensland |
| **DAFWA** | Department of Agriculture and Food Western Australia |
| **DAWR** | Department of Agriculture and Water Resources |
| **DEDJTR** | Department of Economic Development, Jobs, Transport and Resources (DEDJTR), Victoria |
| **DoE** | Department of Environment |
| **DPI** | Department of Primary Industries, NSW |
| **DPIPWE** | Department of Primary Industries, Parks, Water and Environment |
| **EDRR** | Early Detection and Rapid Response |
| **EPBC Act** | Environment Protection and Biodiversity Conservation Act 1999 |
| **FFEG** | Freshwater Fish Expert Group, convened under the Invasive Plants and Animals Committee |
| **IA CRC** | Invasive Animals Cooperative Research Centre |
| **ICPM** | Interim Commission on Phytosanitary Measures |
| **IEG** | Incursion Expert Group, convened under the Invasive Plants and Animals Committee |
| **IGAB** | Intergovernmental Agreement on Biosecurity |
| **IPAC** | Invasive Plants and Animals Committee (merger of Australian Weeds Committee and Vertebrate Pest Committee) |
| **IS** | Invasive Species |
| **MAFBNZ** | Ministry of Agriculture and Forestry Biosecurity New Zealand |



| | |
|---|---|
| **MoU** | Memorandum of Understanding |
| **NBC** | National Biosecurity Committee |
| **NDMIG** | National Decision-Making and Investment Group of National Biosecurity Committee |
| **NEBRA** | National Environmental Biosecurity Response Agreement |
| **NECG** | National Engagement and Communication Group of National Biosecurity Committee |
| **NSDG** | National Surveillance and Diagnostics Group of National Biosecurity Committee |
| **PIRSA** | Department of Primary Industries and Regions, South Australia |
| **POC** | Point of Contact |
| **R&D** | Research and Development |
| **RD&E** | Research, development and extension |
| **SOP** | Standard Operating Procedure |
| **TOR** | Terms of Reference |
| **VPC** | Vertebrate Pest Committee (now merged with Australian Weeds Committee to become Invasive Plants and Animals Committee (merger of and Vertebrate Pest Committee) |

# References


ABRS, (Australian Biological Resources Study). 2007. Survey of Australian Taxonomic Capacity 2003/2006. Department of Environment and Water Resources. Canberra, ACT. http://www.environment.gov.au/node/13880.

Beale R, Fairbrother J, Inglis A, Trebeck D. 2009. One Biosecurity: A working partnership, The Independent Review of Australia's Quarantine and Biosecurity Arrangements', Report to the Australian Government. Department of the Environment, Water, Heritage and the Arts Canberra, ACT. 18 pp.

Buhle ER, Margolis M, Ruesink JL. 2005. Bang for buck: cost-effective control of invasive species with different life histories. Ecological Economics 52:355-366.

Cacho OJ, Spring D, Hester S, Mac Nally R. 2010. Allocating surveillance effort in the management of invasive species: a spatially-explicit model. Environmental Modelling & Software 25:444-454.

Carlton J. 2003. Invasive species: vectors and management strategies: Island Press. Washington, DC.

Chippendale JF. 1991. Potential returns to research on rubber vine (Cryptostegia grandiflora) Masters: The University of Queensland Brisbane, Qld. 93 pp.

Clout M, Veitch C. 2002. Turning the tide of biological invasion: the potential for eradicating invasive species. In: Veitch C, Clout M, editors. Turning the tide: the eradication of invasive species. IUCN SSC Invasive Species Specialist Group Gland, Switzerland and Cambridge, UK. pp 1-3.

COAG, (Council of Australian Governments). 2012a. Intergovernmental Agreement on Biosecurity. Council of Australian Governments. Canberra, ACT. http://www.coag.gov.au/intergov_agreements/docs/intergovernmental_agreement_biosecurity.pdf.

COAG, (Council of Australian Governments). 2012b. National Environmental Biosecurity Response Agreement. Council of Australian Governments. Canberra, ACT. www.coag.gov.au/intergov_agreements/docs/national_environmental_biosecurity_response_agreement.pdf.

Commonwealth of Australia. 2015. The Senate Environment and Communication References Committee - Environmental Biosecurity.Senate Printing Unit. Parliament House, Canberra. http://www.aph.gov.au/Parliamentary_Business/Committees/Senate/Environment_and_Communications.

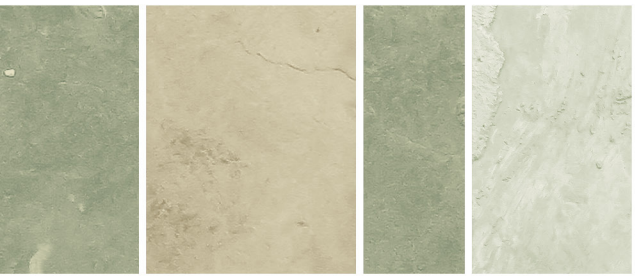
Cook G, Setterfield S, Maddison J. 1996. Shrub invasion of a tropical wetland: implications for weed management. Ecological Applications 6:531-537.

CSIRO, (Commonwealth Scientific and Industrial Research Organisation). 2014. Australia's Biosecurity Future: Preparing for future biological challenges. Commonwealth Scientific and Industrial Research Organisation. Canberra, ACT.

DAFF, (Department of Agriculture, Fisheries and Forestry). 2007. A strategic approach to the management of ornamental fish in Australia. Natural Resource Management Ministerial Council. Canberra, ACT. 48 pp.

DAFF, (Department of Agriculture, Fisheries and Forestry). 2012a. Biosecurity Emergency Management: Biosecurity Incident Management System. Canberra, ACT. 59 pp.

DAFF, (Department of Agriculture, Fisheries and Forestry). 2012b. Reform of Australia's biosecurity system. An update since the publication of One Biosecurity: a working partnership. Australian Government Department of Agriculture, Fisheries and Forestry. Canberra, ACT.



DAWR, (Department of Agriculture and Water Resources). 2016. Intergovernmental Agreement on Biosecurity Review. Canberra, ACT. http://www.agriculture.gov.au/biosecurity/partnerships/nbc/intergovernmental-agreement-on-biosecurity/igabreview.

DPI, (Department of Primary Industries, Biosecurity Victoria). 2009. Biosecurity Strategy for Victoria. Department of Primary Industries, Biosecurity Victoria. Melbourne, Vic.

Epanchin-Niell RS, Haight RG, Berec L, Kean JM, Liebhold AM. 2012. Optimal surveillance and eradication of invasive species in heterogeneous landscapes. Ecology letters 15:803-812.

Epanchin-Niell RS, Hastings A. 2010. Controlling established invaders: integrating economics and spread dynamics to determine optimal management. Ecology letters 13:528-541.

FFEG, (Freshwater Fish Expert Group). 2013. The Freshwater Pest Fish Strategy 2013-2020: A National Strategy for the Management of Freshwater Pest Fish in Australia. Draft. Freshwater Fish Expert Group. Canberra, ACT.

Fredberg J, McNeil D. 2010. Review of non-native ornamental fish species grey listed in Australia. Report to the Ornamental Fish Management Implementation Group (OFMIG). South Australian Research and Development Institute (Aquatic Sciences). 44 pp.

Genovesi P. 2005. Eradications of invasive alien species in Europe: a review. Biological Invasions 7:127-133.

Henderson W, Bomford M. 2011. Detecting and preventing new incursions of exotic animals in Australia. Invasive Animals Cooperative Research Centre. Report nr 1921777168. Canberra, ACT.

Herkenrath P, Harrison J. 2011. The 10th meeting of the Conference of the Parties to the Convention on Biological Diversity—a breakthrough for biodiversity? Oryx 45:1-2.

Hine D, Please P, McLeod L, Driver A. 2014. Behaviourally Effective Communications for Invasive Animals Management: A Practical Guide. Invasive Animals Cooperative Research Centre. Canberra, ACT.

Hobbs RJ, Humphries SE. 1995. An integrated approach to the ecology and management of plant invasions. Conservation Biology:761-770.

Hulme PE. 2009. Trade, transport and trouble: managing invasive species pathways in an era of globalization. Journal of Applied Ecology 46:10-18.

ICPM, (Interim Commission on Phytosanitary Measures). Report of the 5th meeting of the Interim Commission on Phytosanitary Measures; 2003; Rome, IT. FAO.

Invasive Species Council. 2015. A strategy for dealing with invasive species in Australia.Invasive Species Council. Melbourne, Vic. http://invasives.org.au/strategy-invasive-species-australia.

IPAC, (Invasive Plants and Animals Committee). 2015. Australian List of Threat Categories of Non-indigenous Vertebrates. Draft. Commonwealth of Australia Adelaide, SA. 45 pp.

IPAC, (Invasive Plants and Animals Committee). 2017. Australian Pest Animal Strategy 2017 to 2027. Consultation Draft. Australian Government Department of Agriculture and Water Resources. Canberra, ACT. 48 pp.

Kaiser BA, Burnett KM. 2010. Spatial economic analysis of early detection and rapid response strategies for an invasive species. Resource and Energy Economics 32:566-585.

Kean J, Phillips C, McNeill M. 2008. Surveillance for early detection: lottery or investment. In: Froud K, Popay

A, Zydenbos S, editors. Surveillance for biosecurity: Pre-border to pest management New Zealand Plant Protection Society Incorporated. Hastings, NZ. pp 11-18.

Lodge DM, Williams S, MacIsaac HJ, Hayes KR, Leung B, Reichard S, Mack RN, Moyle PB, Smith M, Andow DA. 2006. Biological invasions: recommendations for US policy and management. Ecological Applications 16:2035-2054.

MAFBNZ, (Ministry of Agriculture and Forestry Biosecurity New Zealand). 2008. Biosecurity Surveillance Strategy: Review of the Current State of the Biosecurity Surveillance System.Ministry of Agriculture and Forestry Biosecurity New Zealand. Aukland, NZ.at www.biosecurity.govt.nz/files/pests/surv-mgmt/surv/mafbnz-surv-strategy-current-state.pdf 18 February 2015.

McLeod R. 2004. Counting the cost: impact of invasive animals in Australia. . Cooperative Research Centre for Pest Animal Control. Canberra, ACT.

Minister for Agriculture FaF. 2013. Senate question No 2671. Question upon notice 14 January 2013. Canberra, ACT.

Moody ME, Mack RN. 1988. Controlling the spread of plant invasions: the importance of nascent foci. Journal of Applied Ecology 24:1009-1021.

Nairn M, Allen P, Inglis A, Tanner C. 1996. Australian Quarantine: a shared responsibility. Department of Primary Industries and Energy. Canberra, ACT.

National Landcare Programme. 2015. Pest animal and weed management.National Landcare Programme. Canberra, ACT.http://www.nrm.gov.au/national/pest-animal-weed-management 15 May 2015.

NBC, (National Biosecurity Committee). 2013. Guide to the National Environmental Biosecurity Response Agreement (NEBRA). National Biosecurity Committee Secretariat and Australian Government Department of Agriculture, Fisheries and Forestry. Canberra, ACT.

NBC, (National Biosecurity Committee). 2014. National Surveillance and Diagnostics Framework. National Biosecurity Committee Secretariat and Australian Government Department of Agriculture, Fisheries and Forestry. Canberra, ACT.

NECWG, (National Engagement and Communication Working Group). 2013. National Biosecurity Engagement and Communication Framework Canberra, ACT. 11 pp.

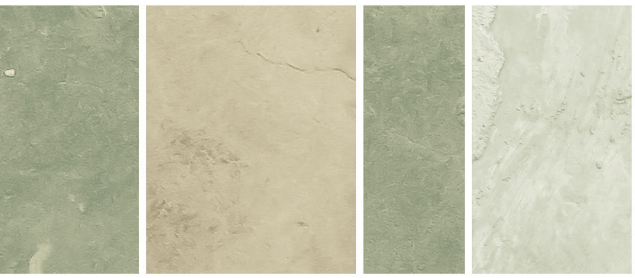
NISC, (National Invasive Species Council). 2003. General guidelines for the establishment and evaluation of invasive species early detection and rapid response systems. Washington, DC. 16 pp.

NRMMC, (Natural Resource Management Ministerial Council) 2007. Australian Pest Animal Strategy – A national strategy for the management of vertebrate pest animals in Australia. Department of the Environment and Water Resources. Canberra, ACT.

Ovenden J, Macbeth G, Pope L, Thuesen P, Street R, Broderick D. 2015. Translocation between freshwater catchments has facilitated the spread of tilapia in eastern Australia. Biological Invasions 17:637-650.

Pereira F, Carneiro J, Amorim A. 2008. Identification of species with DNA-based technology: current progress and challenges. Recent patents on DNA & gene sequences 2:187-200.

Pereira HM, Navarro LM, Martins IS. 2012. Global biodiversity change: the bad, the good, and the unknown. Annual Review of Environment and Resources 37:25-50.



Pimentel D, Zuniga R, Morrison D. 2005. Update on the environmental and economic costs associated with alien-invasive species in the United States. Ecological Economics 52:273-288.

Roberts PD, Diaz-Soltero H, Hemming DJ, Parr MJ, Wakefield NH, Wright HJ. 2013. What is the evidence that invasive species are a significant contributor to the decline or loss of threatened species? A systematic review map. Environmental Evidence 2:7.

Rowland D, Adams L. 2014. Animal biosecurity RD&E strategy: National primary industries research, development and extension framework. Animal Health Australia Deakin, ACT. 36 pp.

Ruiz GM, Carlton JT. 2003. Invasion vectors: a conceptual framework for management. In: Ruiz GM, Carlton JT, editors. Invasive species: vectors and management strategies.Island Press. Washington, DC. pp 459-504.

Sheehan M. 2013. National Invasive Plant Surveillance Framework. Melbourne, Vic.

Simberloff D, Martin J-L, Genovesi P, Maris V, Wardle DA, Aronson J, Courchamp F, Galil B, García-Berthou E, Pascal M. 2013. Impacts of biological invasions: what's what and the way forward. Trends in Ecology & Evolution 28:58-66.

Simberloff D, Parker IM, Windle PN. 2005. Introduced species policy, management, and future research needs. Frontiers in Ecology and the Environment 3:12-20.

Stanford J, Rodda G. The brown treesnake rapid response team. In: Witmer G, Pitt W, Fagerstone K, editors; 2007; Fort Collins, CO. USDA/APHIS Wildlife Services, National Wildlife Research Center. pp 175-217.

Vander Zanden MJ, Olden JD. 2008. A management framework for preventing the secondary spread of aquatic invasive species. Canadian Journal of Fisheries and Aquatic Sciences 65:1512-1522.

VPC, (Vertebrate Pests Committee) 2013. Vertebrate Pest Incursions. National Environmental Biosecurity Response Agreement (NEBRA) Interpretive Guide: A guide for the use of the NEBRA when responding to a vertebrate pest incursion. Vertebrate Pests Committee. Canberra, ACT.

VPC VPC. 2014. Guidelines for the Import, Movement and Keeping of Non-indigenous Vertebrates in Australia. Commonwealth of Australia. Canberra, ACT. 66 pp.

PESTSMART

www.pestsmart.org.au