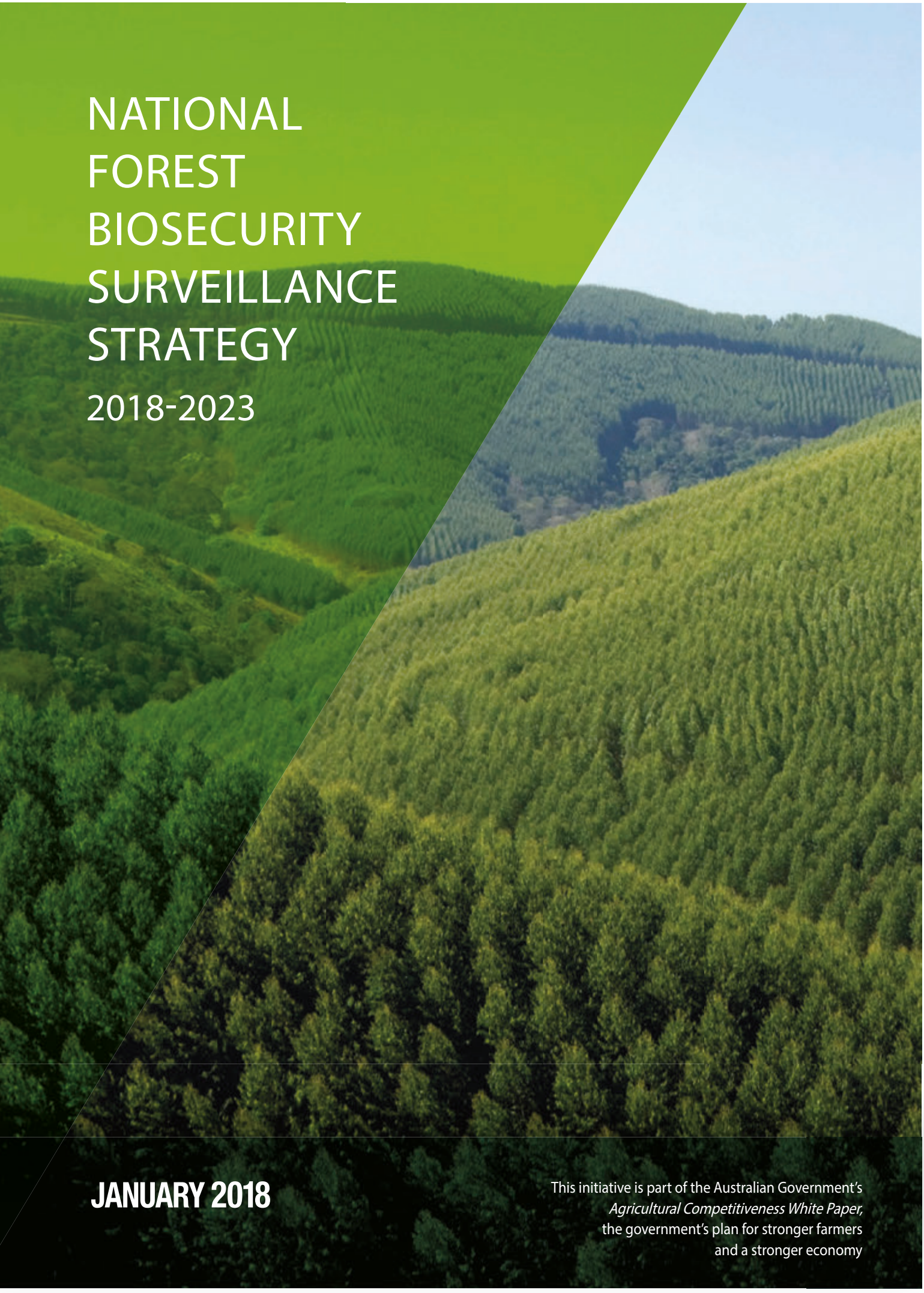

NATIONAL FOREST BIOSECURITY SURVEILLANCE STRATEGY

2018-2023

JANUARY 2018

This initiative is part of the Australian Government's *Agricultural Competitiveness White Paper,* the government's plan for stronger farmers and a stronger economy

Australian Government
Department of Agriculture and Water Resources

Plant Health AUSTRALIA

Acknowledgements

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Courtesy of Australian Plantation Products and Paper Industry Council


Courtesy of Australian Forest Products Association


Courtesy of PF Olsen Australia

Courtesy of Industry Pest Management Group

Background

In August of 2015 the Department of Agriculture and Water Resources (DAWR) funded a forum bringing together forest health and biosecurity experts from around Australia that led to the development of the Framework for National Biosecurity Surveillance of Exotic Forest Pests[1]. The Framework highlighted potential gaps along Australia's biosecurity continuum and made recommendations for improvement.

Following publication of the Framework, a stakeholder consultation workshop was held in August 2016. At the workshop, representatives of the major forest growers, state and Federal government agencies, and forest health and biosecurity experts were brought together to discuss forest biosecurity surveillance. Feedback obtained from the Framework document and the two workshops[1,2] has led to the development of this National Forest Biosecurity Surveillance Strategy (NFBSS) and accompanying Implementation Plan.

The forum, workshop and drafting of the NFBSS and accompanying Implementation Plan were developed as part of the Australian Government's Agricultural Competitiveness White Paper, the Australian government's plan for stronger farmers and a stronger economy.

Courtesy of Cooperative Research Centre for Forestry

Acknowledgements

This National Forest Biosecurity Surveillance Strategy was prepared by the Forest Biosecurity Surveillance Strategy Working Group made up of Francisco Tovar (Industry Plantation Management Group), Angus Carnegie (NSW Department of Primary Industries), Sharyn Taylor (Plant Health Australia), Tim Wardlaw (Forestry Tasmania), Simon Lawson (University of the Sunshine Coast), Geoff Pegg (Queensland Department of Agriculture & Fisheries), David Smith (Agriculture Victoria), Ranjith Subasinghe (Department of Agriculture and Water Resources) and Susie Collins (Department of Agriculture and Water Resources).

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Executive summary

Australia has a robust plant biosecurity system designed to protect plant production systems, including agriculture and forestry, which together are worth an estimated $25 billion dollars annually[3]. Australia's forests represent the seventh largest forest estate in the world encompassing native, planted and urban forests[4].

These forests make a significant contribution to Australia's economy, environment and community[1,4] with over 109 stakeholder groups[5]. Stakeholders range from Federal, state and local government to the forest wood products sector, the forest non-wood products sector, the building industry and the general community.

Increasing levels of trade, movement of people and commodities as well as climate change are all contributing to an upward trend in the number of exotic forest pests establishing in Australia[6]. New pests result in significant economic, environmental and amenity costs[1,7].

Adding to these challenges, reductions in staffing levels and structural changes of infrastructure and financial resources across many forest stakeholders have resulted in capacity and capability gaps in the forest sector and Australia's biosecurity arrangments[1,5,6,8].

As a result of these factors, Australia's plant biosecurity system faces pressure in mitigating the risks posed by exotic forest pests[1,5,6]. Stakeholder feedback has emphasised that nationally coordinated surveillance programs, supported by an effective diagnostic network, are needed to maximise the effectiveness and efficiency of detection of exotic forest pests, mitigate the risk of exotic forest pests establishing in Australia and provide evidence to support claims of area freedom. Ensuring that forest stakeholders and government agencies work together in partnership is critical to achieving these aims.

Confronting these challenges, the National Forest Biosecurity Surveillance Strategy (hereafter referred to as the NFBSS) has been designed to complement and address aspects of the National Plant Biosecurity Strategy, the National Plant Biosecurity Surveillance Strategy and the National Plant Biosecurity Diagnostic Strategy [3,9,10] for the forest biosecurity sector.

The NFBSS provides a vision towards the establishment of a coordinated National Forest Pest Surveillance Program.

The three overarching objectives of the NFBSS are to:

1. Improve forest pest surveillance coordination, capacity and capability across stakeholders.
2. Maximise resource efficiency through stakeholder partnerships.
3. Optimise forest surveillance efforts across the biosecurity continuum using a risk-based approach.

A series of goals and actions with defined outcomes are described to enable stakeholders to successfully establish a National Forest Pest Surveillance Program over 5 years.

Goals	Actions	Outcomes
Goal 1 Provide forest biosecurity leadership and coordination	1.1 Establish national forest biosecurity leadership that includes major forest stakeholders 1.2 Develop sustainable funding mechanisms for surveillance that are equitable for all forest stakeholders	▪ National coordination of forest biosecurity surveillance ▪ Equitable and sustainable funding arrangements for forest biosecurity activities ▪ Partnerships that build capacity and capability
Goal 2 Engage with stakeholders in forest biosecurity	2.1 Implement an engagement plan to broaden the range of forest stakeholders supporting forest biosecurity surveillance	▪ Partnerships that build capacity and capability ▪ Improved awareness of forest biosecurity issues and risks
Goal 3 Improve forest biosecurity capacity and capability	3.1 Update and review forest pest knowledge 3.2 Improve diagnostic capacity and capability to support forest biosecurity surveillance 3.3 Improve surveillance capacity and capability across all forest stakeholders 3.4 Identify, enhance and establish opportunities for integration of surveillance efforts, information and training across forest stakeholders to support forest biosecurity	▪ Improved forest pest knowledge ▪ Improved diagnostics capability and capacity ▪ Improved surveillance capability and capacity ▪ Integrated forest biosecurity surveillance activities, data and training
Goal 4 Reduce the risk of establishment of exotic forest pests in Australia	4.1 Improve risk mitigation of exotic forest pests along the biosecurity continuum 4.2 Establish a National Forest Pest High Risk Site Surveillance Program 4.3 Develop incursion preparedness plans for key forest pests	▪ Risk-based resource optimisation for forest biosecurity surveillance ▪ Improved forest pest detection along the biosecurity continuum ▪ Improved incursion responses to the detection of exotic forest pests

An accompanying National Forest Biosecurity Surveillance Strategy – Implementation Plan 2018-2023 presents a series of actions and tasks necessary to achieve the objectives, goals, and outcomes set out in the NFBSS.

Successful implementation of the NFBSS through stakeholder partnerships will result in an improved plant biosecurity system that provides sustainable protection from pests to Australia's forest products and services, and environment whilst maintaining market access for forest-derived products.

Introduction

Australia's forests

Australia's native, planted and urban forests are large and varied

Australia has approximately 123 million hectares of native forests, 2 million hectares of plantation forests (Figure 1) and a significant yet unquantified area of urban forests. This comprises the seventh largest forest estate in the world[4].

Forests in Australia benefit many stakeholders and contribute significantly to the economy, environment and communities

In 2014-15 turnover (sales and services) of the forest wood, and wood products sector was over $22 billion and its contribution to Australia gross domestic product (GDP) was $7.8 billion. The sector represents the eighth largest manufacturing sector in Australia[4].

Australian non-wood forest products, such as essential oils, honey and native bush foods have an estimated gross value of production of $198 million[4].

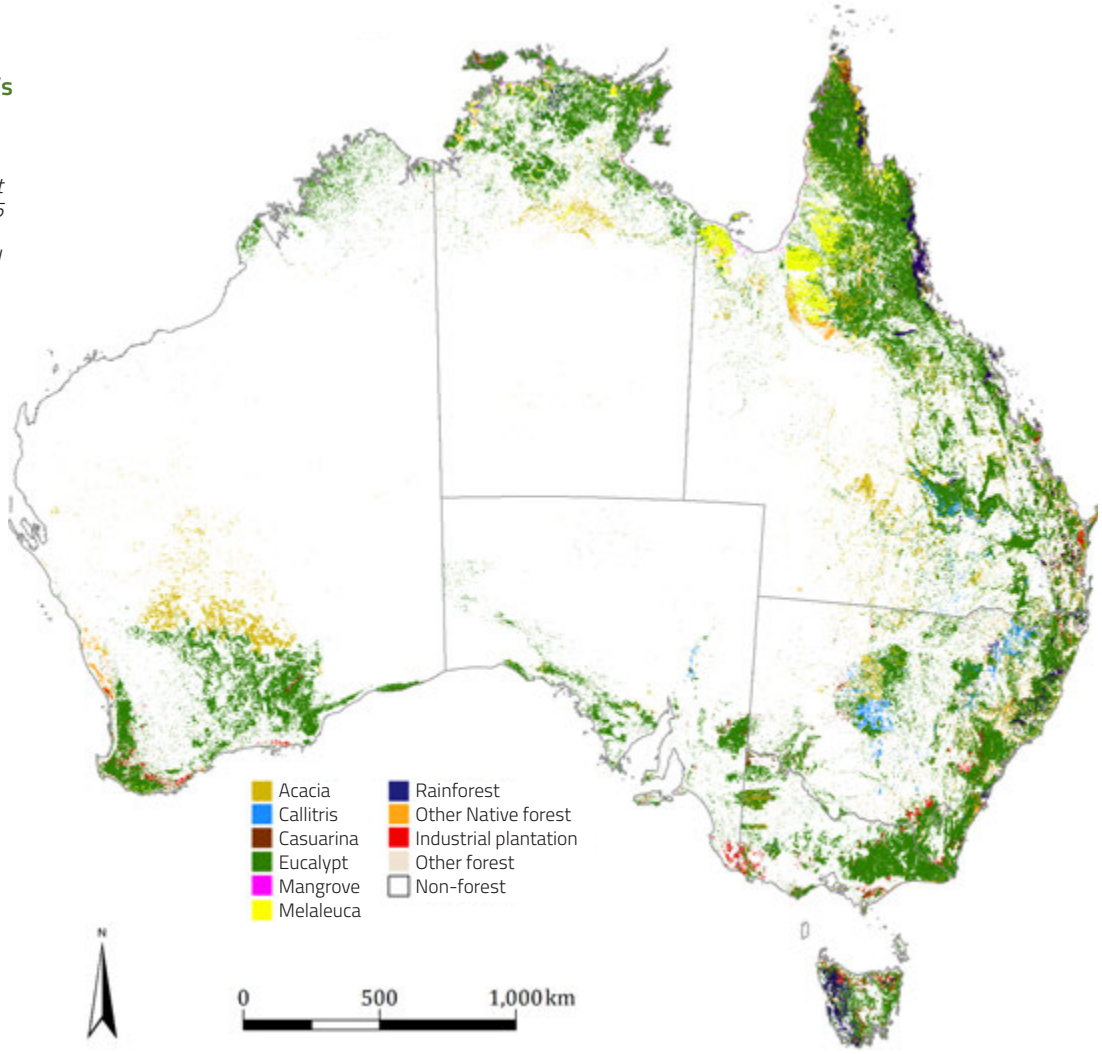
Additionally, forests provide values that are difficult to quantify in economic terms such as: biodiversity, tourism, recreation and amenity. Ecosystem services provided by Australia's forests, such as carbon sequestration, soil conservation and watershed protection are also important.

Australia's urban trees cover an estimated average of 39 per cent of local government urban environments[11]. These urban forests provide a range of services such as amenity, reduction of energy costs, carbon sequestration and improved air and water quality (Case Study 1). Unfortunately, data of the dollar value for these services is limited to case studies and dependent on subjective valuations[12]. Nonetheless, it is widely accepted that forests and trees have a value beyond wood-based products.

Up to 109 stakeholder groups benefiting directly or indirectly from the products and services provided by forests have been identified[5]. Major stakeholders include Federal and state agencies responsible for forests, biodiversity, tourism and water management; the forest sector including growers and the wood products and non-wood products industries; local governments; and community groups.

Distribution of Australia's forest types, 2013

Figure 1: Australia's total forest area equals approximately 125 million hectares. Native forests are dominated by eucalypt and acacia forests. Urban forests are not depicted[4] (ABARES 2016).



Biosecurity for Australia's forests

Forest pest status

Australia has few of the significant pests that affect timber and forests overseas, resulting in relatively low pest management costs

Historically, Australia has been well served by its geographic isolation and robust biosecurity systems[1,6,13] As a result, many of the major forest pests present in other parts of the world are absent from Australia.

Mass deaths of forest stands caused by pests, as is often observed in North America or Europe, are rare events in Australia. Damage caused to native forests by indigenous pests has largely been localised or driven by co-factors such as drought, flood, fire, habitat fragmentation and disturbance[14].

Pest control has therefore not been a significant management burden in Australian native forests with a notable exception being the accidental introduction of *Phytophthora cinnamomi,* the causal agent of phytophthora dieback. In southern Australia, this pest has led to stand deaths in forests and its management has resulted in significant costs.

The absence of exotic forest pests in Australia has contributed to the successful development of a softwood plantation industry. Similarly, many urban forest tree species in streets, parks and recreational areas are free of exotic pests, resulting in low pest management costs.

CASE STUDY 1 - URBAN FOREST VALUES

Brisbane City Council, Queensland

575,000 street trees with 2,000 hectares of canopy coverage, stratified random sample over 80 plots of 16,600 trees, extrapolated across entire tree population.

	ANNUAL	$AUD
Carbon dioxide sequestered:	7,399 tonnes	168,000
Air pollution removal:	87,200 tonnes	44,200
Rainfall interception:	653,733 m^3	1,444,533

NUFA (2014)

Growing pest risk

There is a growing risk of exotic forest pest incursions into Australia

Over the last few decades dramatic increases in tourism and international volumes of trade, reduction of resources in the biosecurity sector and a downward trend in technical and scientific capacity have contributed to an increasing biosecurity risk to Australia's forests[1,3,5,13].

Since 1900, over 125 exotic forestry pests have established in Australia (Figure 2)[1,13].

Currently there are 20 exotic forest pests deemed to be of high risk to Australian forests[15] and likely to cause significant damage if introduced (Appendix 1).

The trend to planting *Eucalyptus* and *Acacia* species around the world over the last century has led to the emergence of new pests not known to occur on these hosts in Australia[16].

Emerging overseas pests of* Eucalyptus *and* Acacia *pose a significant risk to these keystone species

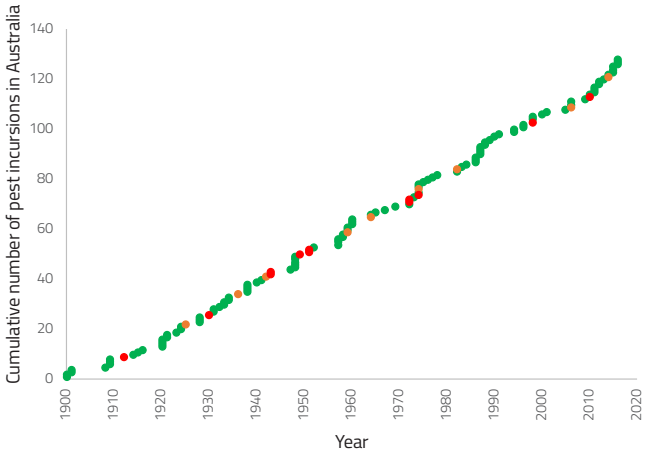


Figure 2: Cumulative establishments of arborescent pests in Australia. Red = significant pests resulting in large damage impacts or ongoing management costs. Orange = Moderate impact. Green = low impact.

Impact of exotic pests

The establishment of exotic forest pests can result in significant economic, amenity and environmental costs

Of the exotic species that have established in Australia, 15 per cent have caused large impacts or require significant expenditure for on-going management (see Figure 2).

In native forests the most notable example is the introduced pathogen *Phytophthora cinnamomi,* the causal agent of phytophthora dieback. With a large host range encompassing over 600 native plant species it has been responsible for changing forest ecosystem dynamics of many forests types across Australia leading to tree deaths, reduced biodiversity and significant management costs[17].

The recent establishment of myrtle rust *(Austropuccinia psidii)* in eastern Australia also seems set to cause huge changes, with over 450 Myrtaceous species in 73 genera susceptible to the disease[7].

In softwood plantations, the exotic pest sirex woodwasp *(Sirex noctilio)* can kill trees (Figure 3). Between 1987-1990, a single large outbreak of sirex woodwasp in the Green Triangle in South Australia and Victoria killed over five million trees costing $17.5m at the time[18–20]. The National Sirex Woodwasp Control Program has been in place for 65 years, and has cost the softwood industry an estimated $16.5 million [ii, iii]. The program now costs approximately $0.60 per hectare per annum to protect pine plantations from unacceptable losses[20].

Exotic pest introductions can also result in significant pest management or tree replacement costs in urban forest settings. Other impacts of exotic pest introductions that are not commonly calculated on a dollar basis include the costs related to the reduction of forest ecosystem services. These may include increased soil erosion, localised flooding, reduced carbon sequestration, reductions in habitat and diversity within ecosystems and impacts on amenity and tourism.

Figure 3: Northern Green Hills State forest near Tumut showing drought deaths that were subject to Sirex noctilio *and* Ips grandicollis *attack*

[ii] *Calculated using the total area of national softwood plantation that existed in the year the expenditure was incurred.*
[iii] *Net present value (NPV) of annual program costs reported in 2015 dollars using a 7.5% discount rate and a 1952 baseline (cost of Sirex outbreak damage not included).*

Plant biosecurity in Australia

The biosecurity system

Australia's biosecurity system involves shared stakeholder responsibility and risk-reducing activities along the biosecurity continuum: pre-border, at the border and post-border

Several reviews of Australia's biosecurity system recommended a national shared approach to biosecurity[21,22]. This has led to significant restructuring to reflect the shared responsibility between governments, stakeholder groups and the wider community. The system is shown in Figure 4. It involves a continuum of activities designed to reduce the risk of new pests establishing.

Formal biosecurity arrangements between the Federal and state and territory governments are set out in the Intergovernmental Agreement on Biosecurity[23].

Responses prompted by the discovery of a serious exotic plant pest incursion are cost-shared between governments and industry bodies. Cost-sharing arrangements and responsibilities of Parties are outlined in the Emergency Plant Pest Response Deed (EPPRD)[24] and PLANTPLAN[25].

Where the exotic pest poses a significant threat to environmental and amenity values, rather than crop production, arrangements are set out in the National Environmental Biosecurity Response Agreement (NEBRA)[26].

Through the Australian Forest Products Association (AFPA), Australian forest growers have been signed up to the cost-sharing arrangements of the EPPRD since 2012. While the EPPRD has a focus on eradication response arrangements, signatories to the EPPRD also have a commitment to an on-going process of risk mitigation and promotion of improvements to biosecurity measures, including improvements to surveillance. Given the number and diversity of stakeholders, a strategy covering how to best fund, coordinate and manage these activities amongst forest stakeholders and biosecurity groups is needed.

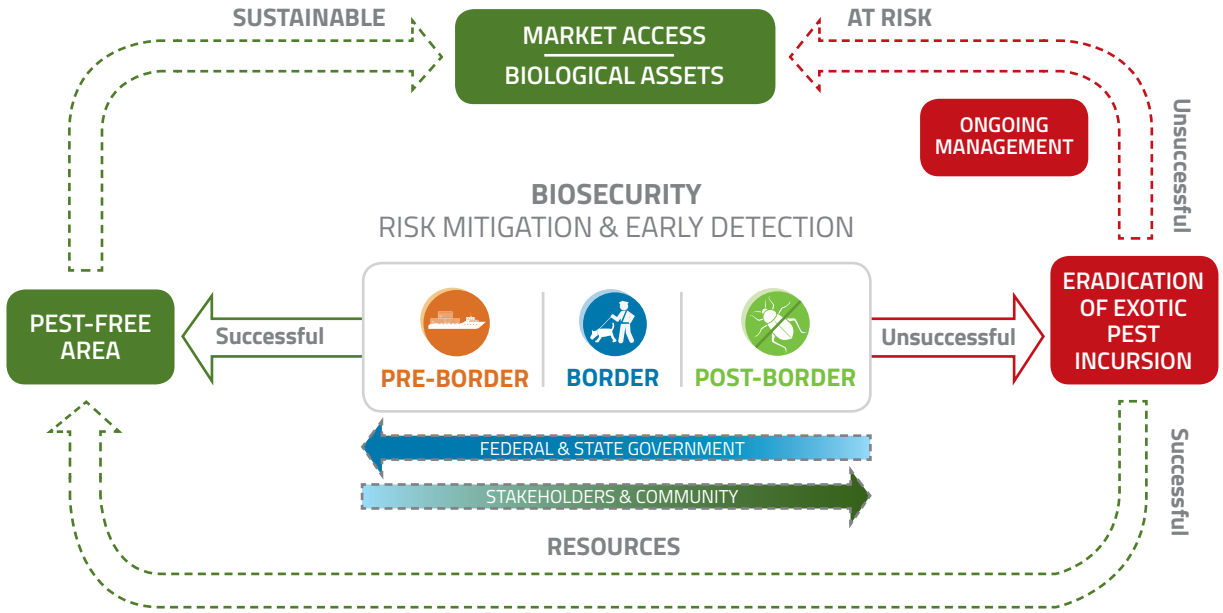


Figure 4: Australia's biosecurity system aims to prevent the establishment of exotic forest pests through activities enabling early detection and risk mitigation along a biosecurity continuum: pre-border, at the border and post border. If successful, Australia's pest free status, market access and biological assets are sustained into the future. If unsuccessful, exotic pest incursions may occur and failure of eradication can lead to loss of biological assets, ongoing management costs and risk access to trading markets. Federal Government resources and responsibilities are concentrated pre-border and at the border, while stakeholders and the community play a more active role post-border (illustrated by shading).

Improving the system

Coordination of contributions by Australian governments to the biosecurity system, including efforts to strengthen it, is the responsibility of the National Biosecurity Committee (NBC). This peak government body is served by the Plant Health Committee and subcommittees (Figure 5). This is being achieved through an agreed framework (Figure 5) whereby the National Biosecurity Committee (NBC) on behalf of governments drives and oversees activities towards improved biosecurity. In turn, the Plant Health Committee (PHC) oversees improvements in plant biosecurity (Figure 5). The main documents guiding this improvement process are the National Plant Biosecurity Strategy (NPBS)[3] and its sub-strategies the National Plant Biosecurity Diagnostic Strategy (NPBDS)[10] and the National Plant Biosecurity Surveillance Strategy (NPBSS)[9].

Forest Health and Biosecurity subcommittee

Forest growers have input into biosecurity policy through Forest Health and Biosecurity (FHaB), a subcommittee of the Australian Forest Products Association's Growers Chamber. They also have a voice in forest biosecurity though AFPA membership of Plant Health Australia, the coordinator of the industry and government partnership for plant biosecurity in Australia.

Other major stakeholders such as state government conservation agencies, local governments and the wood products and non-wood products industries are not formally engaged in this committee structure. Mechanisms to include all these important forest stakeholders need to be developed in order to broaden the partnership approach to surveillance and biosecurity risk mitigation.

NBC Members and observers

- Dept. of Agriculture and Water Resources (DAWR)
- Dept. of Primary Industries (NSW)
- Agriculture Victoria (VIC)
- Dept. of Primary Industry and Fisheries (NT)
- Dept. of Primary Industries, Parks, Water and Environment (TAS)
- Dept. of Primary Industries and Regions (SA)
- Dept. of Agriculture and Food (WA)
- Dept. of Agriculture and Fisheries (QLD)
- Territory and Municipal Services Directorate (ACT)
- Plant Health Australia (PHA)
- Commonwealth Scientific and Industrial Research Organisation (CSIRO)
- Plant Biosecurity Cooperative Research Centre (PBCRC)
- Forest Health and Biosecurity (FHaB)
- Nominated experts

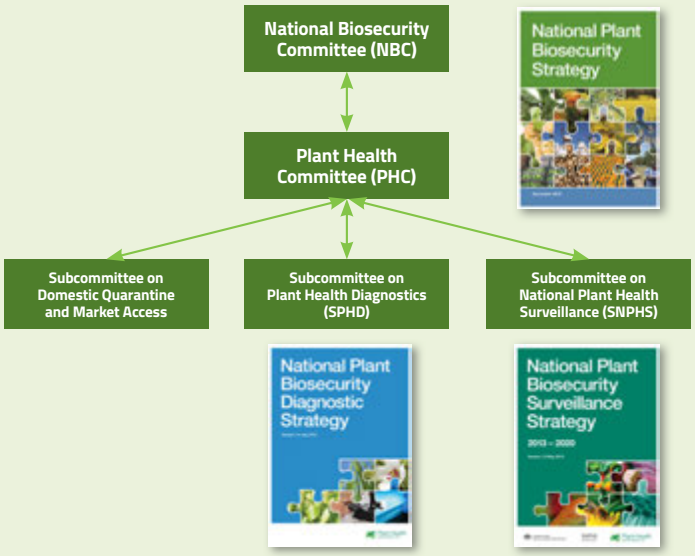


Figure 5: The governance structure for government biosecurity efforts. A number of strategy documents have been prepared to guide improvements to the biosecurity system. The various committees are largely made up of representatives of Federal and state government agencies. Plant industry groups are represented through PHA. Forest growers are additionally represented by members of FHaB. Scientific and policy experts may also be nominated to participate in the committees.

AUSTRALIAN FOREST PRODUCTS ASSOCIATION

Australian Forest Products Association (AFPA) is the peak national industry body representing the resources, processing, and pulp and paper industries covering the forest products value chain.

AFPA represents all elements of the value chain, from the sustainable harvesting of plantations including forest establishment and management, to harvest, haulage and processing of timber resources and the manufacture of pulp and paper.

The AFPA Growers Chamber covers all of the major plantation owners and Government Business Enterprises managing native forests, as well as leading plantation management services companies and environmental services (carbon plantations). Combined, Growers Chamber members own or manage over 80 per cent of the plantation resource, and a similar proportion of the multiple-use public forests.

Forest biosecurity surveillance in Australia – challenges and opportunities

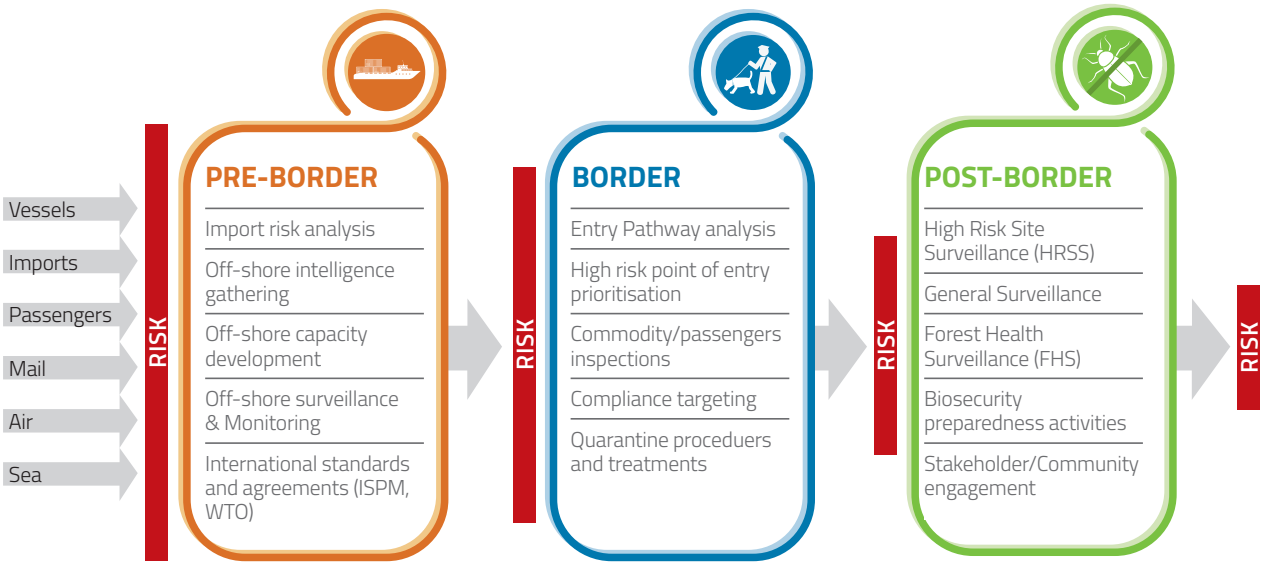


Figure 6: Biosecurity activities that reduce the risk of exotic pest establishment. Note that risks (red boxes) are reduced as risk mitigation activities are undertaken along the biosecurity continuum.

Surveillance maximises opportunities for early detection of exotic forest pests, which in turn, increases the likelihood of their successful eradication

Australia's biosecurity system involves a continuum of activities from pre-border to post-border designed to reduce the risk of exotic pest entry, establishment and spread[1,3,5] (Figure 6).

Surveillance maximises opportunities for early detection of exotic forest pests, which increases the chance of successful eradication. It provides proof of pest area-freedom thereby maintaining market access for Australia's forest products.

National Plant Health Surveillance Program

Improvements to plant pest surveillance efforts will mitigate the risks that exotic pests pose

The Department of Agriculture and Water Resources (DAWR) funds a *National Plant Health Surveillance Program (NPHSP)* in the vicinity of points of entry and high risk sites in each state (e.g. major trade ports), with in-kind contributions made by state-based agencies[27]. Surveillance activities under the NPHSP are conducted by state and territory agencies and have a focus on agricultural and horticultural pests. Pests of forestry or environment/amenity make up 4% and 7%, respectively of all targets under the program[1].

Additional activities are undertaken in selected jurisdictions, but surveillance is not consistent across states and is often related to state-based industry priorities or the availability of expertise. Notably, of the 20 high priority exotic forest pests identified in the *Plantation Forest Biosecurity Plan*[15] (Appendix 1), surveillance is routinely conducted only for exotic gypsy moth at a national level.

State, territory and industry surveillance

Improved coordination and reporting is needed for industry surveillance efforts to support biosecurity

In Australia, forests have a variety of ownership and management models including state government owned, privately owned or a mixture of private and state government ownership. In addition, native forests can be managed for production and/or environment and/or tourism by state or Federal government agencies. Partially because of this mix of ownership models, there is limited national coordination of industry forest surveillance efforts or reporting[1,5,6].

Agreed national minimum data specifications are not implemented in all jurisdictions making it difficult to obtain accurate national data on surveillance activities, pest distribution or pest damage[1,28] and forest surveillance

activities vary in methodology and consistency across regions[6,29]. Notably, current monitoring activities focus primarily on forest health surveillance in plantation forests to facilitate management of impacts of established pests but not to detect exotic forest pests. Nonetheless recent industry surveys indicated that forest growers believe that routine forest operational activities have potential to detect exotic pests[6].

General surveillance

General surveillance programs can augment forest biosecurity surveillance

Activities whose primary purpose is not the detection of pests, but that can potentially provide information regarding the presence, absence, prevalence or impact of a pest, are termed general surveillance. Sources of general surveillance include non-specialists in the general public or forest stakeholders such as foresters, arborists, park and garden staff, nursery staff, pest inspectors and community groups.

While programs educating or promoting general surveillance are still in early development, the potential value of general surveillance is evidenced by the fact that the majority of recent detections of exotic forest pest incursions in Australia have been made through general surveillance[6].

General surveillance is currently supported by a pest reporting hotline promoted across Australia as well as a number of digital apps that aid pest reporting by the general public or horticulture and broadacre groups. However, there are limited general surveillance sources or materials that provide specific support for forest biosecurity. There is significant potential to maximise the opportunities for exotic forest pest detection by improving tools and mechanisms that support general surveillance, especially in areas such as national parks and urban or peri-urban environments.

Why is a forest biosecurity surveillance strategy needed?

Australia has a robust, dynamic and evolving plant biosecurity system[3]. Nonetheless, increasing international trade and travel, capacity and capability shortfalls and an increasing rate of exotic forest pest establishments pose significant challenges to Australia's forest biosecurity.

During development of the Framework for National Biosecurity Surveillance of Exotic Forest Pests, the following deficiencies of the current system were identified:

1. A lack of national coordination of forest biosecurity surveillance activities across stakeholders.
2. Inadequate engagement and communication amongst forest stakeholders and between forest stakeholders and biosecurity agencies at strategic and operational levels.
3. There are gaps in knowledge, capacity and capability in forest biosecurity amongst all stakeholders and along the biosecurity continuum.
4. Risk assessments and risk mitigation activities for exotic forest pests along the biosecurity continuum are not integrated, responsive nor complementary.
5. Surveillance efforts, information collation and reporting are not nationally consistent.

The NFBSS has been designed to address these deficiencies. Recommendations include activities along the biosecurity continuum that are complementary to existing activities. The strategy will safeguard Australia's forests and forest industries and strengthen Australia's plant biosecurity system.

Courtesy of Australian Forest Products Association

National Forest Biosecurity Surveillance Strategy

Scope

The NFBSS aims to strengthen current arrangements for the surveillance of exotic forest pests through: greater engagement and coordination among stakeholders, highlighting opportunities for better integration with the broader plant biosecurity system, and suggesting improvements to fill capacity and capability gaps.

The NFBSS does not specifically consider current arrangements for eradication of new incursions of exotic forest pests covered by the EPPRD[24] and NEBRA[26]. However, some recommendations may result in surveillance improvements that benefit eradication responses.

Vision

To implement a coordinated National Forest Pest Surveillance Program that is integrated with the broader plant biosecurity system, supported by all forest stakeholders, provides evidence of pest status, maintains trade and market access for forest-derived products and mitigates the economic, social and environmental risks posed to Australia's forests by exotic pests.

Objectives

The objectives of the NFBSS are:

OBJECTIVE 1
Improve forest and timber pest surveillance coordination, capacity and capability across stakeholders.

OBJECTIVE 2
Maximise resource efficiency through stakeholder partnerships.

OBJECTIVE 3
Optimise forest surveillance efforts using a risk-based approach.

Goals

The goals of the NFBSS are:

Goal 1
Provide forest biosecurity leadership and coordination.

Goal 2
Engage with stakeholders in forest biosecurity.

Goal 3
Improve forest biosecurity capability and capacity.

Goal 4
Reduce the risk of establishment of exotic forest pests.

Outcomes

The outcomes of the NFBSS are:

- National coordination of forest biosecurity surveillance.
- Equitable and sustainable funding arrangements for forest biosecurity activities.
- Partnerships that build capacity and capability.
- Improved awareness of forest biosecurity issues and risks.
- Improved forest pest knowledge.
- Improved diagnostics capability and capacity.
- Improved surveillance capability and capacity.
- Integrated forest biosecurity surveillance activities, data and training.
- Risk-based resource optimisation for forest biosecurity surveillance.
- Improved forest pest detection along the biosecurity continuum.
- Improved incursion responses to the detection of exotic forest pests.

Strategy components

Goal 1

Provide forest biosecurity leadership and coordination

Coordination, leadership and sustainable governance and funding models will be required to implement and monitor the goals and recommendations of the NFBSS, maximise surveillance efficiencies and support and maintain the partnerships between government, industry and community.

A national forest biosecurity leadership group that includes a broad cross-section of forest stakeholders is needed to enhance engagement.

The group is to be driven by the appointment of a National Forest Biosecurity Coordinator who will assist in identifying, developing and fostering partnerships, facilitate data collection from different stakeholders and monitor the effectiveness of the system over time.

In addition, overarching coordination of the national forest biosecurity surveillance program and its components, such as training and awareness, will ensure that consistent information is delivered within a national program.

ACTIONS	OUTCOMES
1.1 Establish national forest biosecurity leadership that includes major forest stakeholders 1.2 Develop sustainable funding mechanisms for surveillance that are equitable for all forest stakeholders	▪ National coordination of forest biosecurity surveillance ▪ Equitable and sustainable funding arrangements for forest biosecurity activities ▪ Partnerships that build capacity and capability

Goal 2

Engage with stakeholders in forest biosecurity

Current engagement in forest biosecurity is being led by plantation forest growers through AFPA and PHA. Other important stakeholders are not actively engaged including Federal and state conservation agencies, the wood products industry and local governments.

Strong engagement between all forest stakeholders along the biosecurity continuum is essential. Development and implementation of an engagement plan will promote and facilitate partnerships amongst forest stakeholders. This will allow stakeholders to develop consensus around funding issues, coordinate surveillance and diagnostics activities and facilitate information sharing to support early detection or trade and market access pest status issues.

ACTIONS	OUTCOMES
2.1 Implement an engagement plan to broaden the range of forest stakeholders supporting forest biosecurity surveillance	▪ Partnerships that build capacity and capability ▪ Improved awareness of forest biosecurity issues and risks

Goal 3

Improve forest biosecurity capability and capacity

Sufficient capability and capacity in a number of areas are essential for improving forestry surveillance.

Accurate knowledge of the distribution of forest pests is required to support claims of pest area freedom and to assist with modelling the risks and spatial distribution of similar pest species not present in Australia.

To provide a baseline status of forest pests in Australia, improvements in collation and verification of Australian forest pest status records is required. Records come from a variety of sources including collections, surveillance and relevant literature.

Forest pest diagnostics is essential to support surveillance activities and 'triage' samples during an emergency response. A number of digital diagnostic resources, tools and methods exist (e.g. PaDIL[30], PestPoint[31], MyPestGuide[32]) and could be adapted for use by forest stakeholders. This would increase capability and capacity for pest identification and data capture, and support decision making on when to submit samples for confirmatory diagnostics of a pest.

Good diagnostic capability in state agricultural agencies could be enhanced and leveraged to identify forest pests. Improved communication and extension networks between these agencies and non-traditional stakeholders such as forest growers would improve capability and capacity for detection of suspect exotic forest pests.

Development of surveillance resources will need to be identified to address forest biosecurity capacity and capability gaps across all forest stakeholders. Development of specific and general surveillance biosecurity tools, methods and training resources are essential for raising forest biosecurity surveillance capacity and capability. For example, many forest-grower activities such as forest health surveillance have the potential to provide useful biosecurity information that could generate pest area freedom datasets and aid early detection[1,6] or incursion responses.

Similarly, other forest stakeholders such as local government landscapers, arborists, pest inspectors and Landcare groups also conduct activities that could be harnessed for exotic pest surveillance. These stakeholders are particularly important as sources of information from areas not commonly surveyed by forest growers, such as urban and peri-urban regions near major ports where exotic pests are more likely to be found in the early phases of an incursion.

Mechanisms are needed to establish and engage networks to integrate surveillance data obtained through specific or general surveillance activities across forest stakeholders. This is in addition to gathering data from a proposed National Forest Pest High Risk Site Surveillance Program (see Action 4.2).

ACTIONS	OUTCOMES
3.1 Update and review forest pest knowledge to support forest biosecurity 3.2 Improve diagnostic capacity and capability to support forest biosecurity surveillance 3.3 Improve surveillance capacity and capability across all forest stakeholders 3.4 Identify, enhance and establish opportunities for integration of surveillance efforts, information and training across forest stakeholders to support forest biosecurity	▪ Improved forest pest knowledge ▪ Improved diagnostics capability and capacity ▪ Improved surveillance capability and capacity ▪ Integrated forest biosecurity surveillance activities, data and training

Goal 4

Reduce the risk of establishment of exotic forest pests

A more detailed understanding of exotic pest entry pathways is needed to inform a risk-based surveillance program.

A National Forest Pest High Risk Site Surveillance Program that targets High Priority Pests (HPPs) at high risk entry and establishment sites is recommended. Detection of exotic forest pests through such a program could also contribute to assessing the effectiveness of biosecurity activities along the continuum. A number of post-border surveillance programs involving port-environ surveillance, urban tree monitoring and targeted trapping have been piloted along eastern Australia [33–37].

Expansion of these activities into a nationally coordinated program targeting high risk sites and priority pests will maximise the chance of early detection and possible eradication, thereby reducing the likelihood of exotic pests becoming established in Australia's forests.

In addition to surveillance, preparedness for exotic forestry pests can be improved by developing preparedness plans and surveillance and diagnostic protocols for forest HPPs. These will facilitate rapid and effective surveillance and delimitation in the event of a pest incursion. Plans should include basic pest biology, as well as field diagnostics and best surveillance methodology.

ACTIONS	OUTCOMES
4.1 Improve risk mitigation of exotic forest pests along the biosecurity continuum	▪ Risk-based resource optimisation for forest biosecurity surveillance
4.2 Establish a National Forest Pest High Risk Site Surveillance Program	▪ Improved forest pest detection along the biosecurity continuum
4.3 Develop incursion preparedness plans for high priority forest pests	▪ Improved incursion responses to the detection of exotic forest pests

Courtesy of Industry Pest Management Group

Alignment with national plant biosecurity strategies

The NFBSS is designed to support overarching national plant biosecurity strategies. Recommendations from the three relevant strategies are shown in Appendix 2.

Table 1: Alignment of the National Forest Biosecurity Surveillance Strategy with components of the National Plant Biosecurity Strategy (NPBS) and its sub-strategies the National Plant Biosecurity Surveillance Strategy (NPBSS) and the National Plant Biosecurity Diagnostic Strategy (NPBDS).

Strategy	NPBS	NPBSS	NPBDS
Goal 1 Provide forest biosecurity leadership and coordination	2 - Establish a nationally coordinated plant pest surveillance system	1 - Provide mechanisms for coordinating and establishing a nationally integrated and consistent plant biosecurity surveillance system and network that underpins Australia's biosecurity system	1 - Develop a nationally integrated plant biosecurity diagnostic network that underpins Australia's plant biosecurity system
Goal 2 Engage with stakeholders in forest biosecurity	7 - Establish an integrated national approach to plant biosecurity education and awareness 9 - Adopt systems and mechanisms for the distribution, communication and uptake of plant biosecurity information	3 - Establish mechanisms to engage industry and communities to ensure broader recognition of the importance of surveillance and collection of surveillance information	
Goal 3 Improve capability and capacity in forest biosecurity to support surveillance	4 - Expand Australia's plant biosecurity capacity and capability 5 - Create a nationally integrated diagnostic network 9 - Adopt systems and mechanisms for the distribution, communication and uptake of plant biosecurity information	2 - Establish a national surveillance information framework including the development of nationally agreed surveillance standards and protocols in order to optimise the collection, analysis and reporting of surveillance data. 4 - Enhance the national capacity and capability to undertake plant pest surveillance underpinned by targeted research, development and extension.	1 - Develop a nationally integrated plant biosecurity diagnostic network that underpins Australia's plant biosecurity system 2 - Implement and maintain appropriate quality management systems in diagnostic laboratories 3 - Diagnostic capability and capacity for all HPPs be developed and maintained 4 - Establish a national plant biosecurity information management framework to optimise data sharing
Goal 4 Reduce the risk of establishment of exotic forest pests into Australia	2 - Establish a nationally coordinated plant pest surveillance system 3 - Build Australia's ability to prepare for, and respond to, pest incursions	1 - Provide mechanisms for coordinating and establishing a nationally integrated and consistent plant biosecurity surveillance system and network that underpins Australia's biosecurity system.	3 - Diagnostic capability and capacity for all HPPs be developed and maintained

Strategy implementation

The implementation of the Actions presented in the NFBSS will require strong stakeholder partnerships, robust governance and an equitable funding model that is fair to all forest stakeholders. An accompanying NFBSS Implementation Plan 2017-2022 has been prepared that addresses these issues. It provides further details of the actions and tasks necessary to achieve the objectives, goals, and outcomes set out in this document.

Implementation of the NFBSS will result in an improved plant biosecurity system that provides sustainable protection for Australia's forests and its stakeholders while maintaining market access for forest derived products.

Courtesy of Industry Pest Management Group

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Courtesy of Industry Pest Management Group

Acronyms

ACIAR	Australian Centre for International Agricultural Research
AFPA	Australian Forest Products Association
AFG	Australian Forest Growers
ALGA	Australian Local Government Association
ATIF	Australian Timber Importers Federation
CSIRO	Commonwealth Science and Industrial Research Organisation
DAWR	Department of Agriculture and Water Resources
DEE	Department of the Environment and Energy
EPPRD	Emergency Plant Pest Response Deed
FHaB	Forest Health and Biosecurity Subcommittee
FWPA	Forest and Wood Products Australia
HPP	High Priority Pest
HRSS	High Risk Site Surveillance
ISP	International Standards for Phytosanitary Measures
NFBC	National Forest Biosecurity Coordinator
NFBSG	National Forest Biosecurity Surveillance Group
NFPSP	National Forest Pest Surveillance Program
NFBSS	National Forest Biosecurity Surveillance Strategy
NGIA	Nursery and Garden Industry Australia
NPBDS	National Plant Biosecurity Diagnostic Strategy
NPBS	National Plant Biosecurity Strategy
NPBSS	National Plant Biosecurity Surveillance Strategy
NPHSP	National Plant Health Surveillance Program
PaDIL	Pest and Disease Image Library
PBCRC	Plant Biosecurity Cooperative Research Centre
PestPoint	Web-based diagnostics network
PHA	Plant Health Australia
PHC	Plant Health Committee
PLANTPLAN	Australian Emergency Plant Pest Response Plan
RIRDC	Rural Industries Research and Development Corporation
SDQMA	Subcommittee on Domestic Quarantine and Market Access
SNPHS	Subcommittee on National Plant Health Surveillance
SPHD	Subcommittee on Plant Health Diagnostics

Glossary

As defined in the Intergovernmental Agreement on Biosecurity[23]

Term	Meaning
Biosecurity	The management of the risks to the economy, the environment, and the community, of pests entering, emerging, establishing or spreading.
Biosecurity continuum	Describes the range of locations where biosecurity risks may arise and where biosecurity activities take place – pre-border, at the border and post-border.
Biosecurity risks	The potential of pest entering, emerging, establishing or spreading in Australia; and causing harm to the environment, or economic or community activities.
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.
Emergency response	The actions taken in anticipation of, during and immediately after, an outbreak to ensure that its impacts are minimised and may include: a) actions constituting an initial response to an outbreak; and b) actions that form part of a national biosecurity incident response.
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.
Environment	Includes: a) ecosystems and their constituent parts, including people and communities; b) natural and physical resources; c) the qualities and characteristics of locations, places and areas; and d) freshwater, estuarine and marine environments.
Pests	Any species, strain or biotype of the Kingdoms Animalia (excluding human beings), Plantae, Fungi, Monera or Protista that has had an impact (i.e. significant negative consequences), or poses a likely threat of having an impact. Includes pathogens and associated diseases.
Pests - emergency	Pests that are: a) exotic to Australia and it is considered to be in the national interest to be free of the pest; or b) a variant of an endemic pest (that can be distinguished by investigative and diagnostic methods) which if established in Australia, would have a national impact; or c) a serious pest or disease of unknown or uncertain cause; or d) a severe outbreak of a known endemic pest and that is considered to be of national significance with serious social or trade implications.
Pests - endemic	Pests affecting plants or animals (and possibly including humans) that normally occur in a particular country, state or region.
Pest eradication	Activities undertaken to eliminate the presence of an exotic or emergency pest from an area
Pests - established	A pest that is perpetuated, for the foreseeable future, within any area where it does not normally occur and where it is not feasible (in terms of technical feasibility or a cost:benefit analysis) to eradicate the pest.

Term	Meaning
Pests -exotic	Pests affecting plants or animals (and possibly including humans) that do not normally occur in a particular country, state or region.
Pest incursion	The accidental or otherwise entry of an exotic pest into an area
National Biosecurity Committee (NBC)	The committee responsible for biosecurity matters, and tasked with managing a national, strategic approach to emerging and ongoing biosecurity policy issues.
Plant Health Australia (PHA)	The not-for-profit public company established to be the lead national coordinating body for plant biosecurity in Australia. PHA is working in partnership with industry, governments, researchers and others to facilitate improvements in policy, practice and performance of Australia's plant biosecurity system and to build capability to respond to plant pest emergencies.
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	The evaluation of the likelihood and the biological and economic consequences of entry, establishment, or spread of a pest or disease within the territory of an importing country.
Risk management	The process of identifying, selecting and implementing measures that can be applied to reduce the level of risks.
Surveillance	Activities to investigate the presence, prevalence or impact of a pest in a given plant or animal population and its environment.
Surveillance – biosecurity	Activities to investigate the presence, prevalence or impact of an exotic pest in a given plant or animal population and its environment.
Surveillance – forest health	Activities to investigate the presence, prevalence or impact of an endemic or established forest pest in a given plant or animal population and its environment.
Surveillance – general	Activities whose primary purpose is not to detect pests but that can potentially provide information regarding the presence, prevalence or impact of a pest. For example, local government street tree maintenance inspections could detect presence of pests.

Appendix 1 – High priority pests of the plantation forest industry

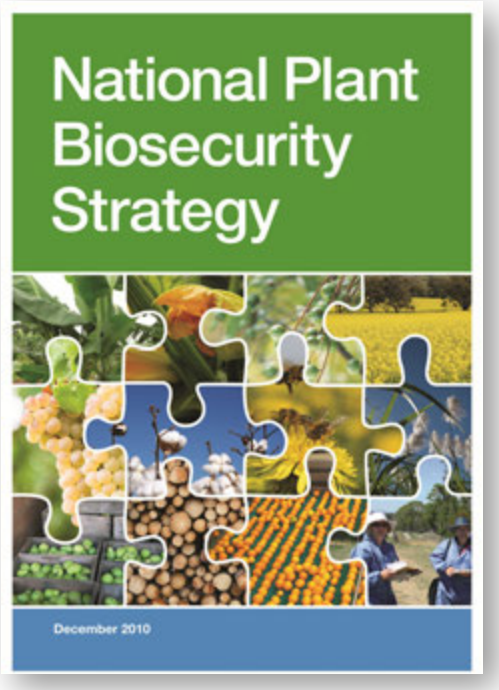
Common name	Scientific name	Primary hosts
Mountain pine beetle	*Dendroctonus ponderosae*	Pine (*Pinus*), spruce (*Picea*)
Red turpentine beetle	*Dendroctonus valens*	Attacks many species of conifers; especially destructive to Radiata pine
Spruce bark beetle	*Ips typographus*	Spruce (*Picea* species), recorded in pine
Japanese pine sawyer, Pine sawyer, Southern pine sawyer, White-spotted sawyer	*Monochamus* spp. incl. *M. alternatus*, *M. galloprovinicialis*, *M. titillator and M. scutellatus*	*Pinus* species, Spruce, Fir (*Abies* species)
Pine shoot beetle	*Tomicus piniperda*	*Pinus* species, Fir, Larch (*Larix* species), Spruce, *Pseudotsuga* species.
Formosan subterranean termite	*Coptotermes formosanus*	Living and dead trees, timber in service, any material containing cellulose. i.e. paper etc.
Asian subterranean termite	*Coptotermes gestroi*	Living and dead trees, timber in service, any material containing cellulose. i.e. paper etc.
Giant wood wasp	*Urocerus gigas*	Pine
Burning moth	*Hylesia nigricans*	*Acacia*, *Eucalyptus* and other species
Gypsy moth complex	*Lymantria dispar* complex	Over 600 species of trees and shrubs including Eucalypt and pine
Nun moth	*Lymantria monacha*	Wide range of hosts including fruit trees and conifers such as *Pinus* species, Spruce, Fir and Larch
White spotted tussock moth	*Orgyia thyellina*	Larvae feed on the foliage of urban trees and plants, horticultural plants, forest trees
Pinewood nematode species complex	*Bursaphelenchus* species incl. *B. xylophilus*	*Pinus* species
Eucalyptus canker disease	*Chrysoporthe austroafricana*	*Tibouchina* species (amenity plants), *Eucalyptus* species, *Corymbia* species, *Syzygium* species.
Western gall rust	*Endocronartium harknessii*	Restricted to pine, the two-needle or three-needle pines (including *Pinus radiata*)
Pitch canker	*Fusarium circinatum*	*Pinus* species and Douglas fir
Daño Foliar del Pino	*Phytophthora pinifolia*	*Pinus radiata*
Sudden oak death	*Phytophthora ramorum*	Wide range of hosts including Eucalypts
Eucalyptus /guava/myrtle rust	*Puccinia psidii* (exotic strains)	Myrtaceae
Coniothyrium eucalyptus canker	*Teratosphaeria zuluensis* and *T. gauchensis*	*Eucalyptus* species

Appendix 2 – National plant biosecurity strategies – summaries

National Plant Biosecurity Strategy

Strategies

1. Adopt nationally consistent plant biosecurity legislation, regulations and approaches
2. Establish a nationally coordinated plant pest surveillance system
3. Build Australia's ability to prepare for, and respond to, pest incursions
4. Expand Australia's plant biosecurity capacity and capability
5. Create a nationally integrated diagnostic network
6. Enhance national management systems for established pests
7. Establish an integrated national approach to plant biosecurity education and awareness
8. Develop a national framework for plant biosecurity research
9. Adopt systems and mechanisms for the distribution, communication and uptake of plant biosecurity information
10. Monitor the integrity of the plant biosecurity system

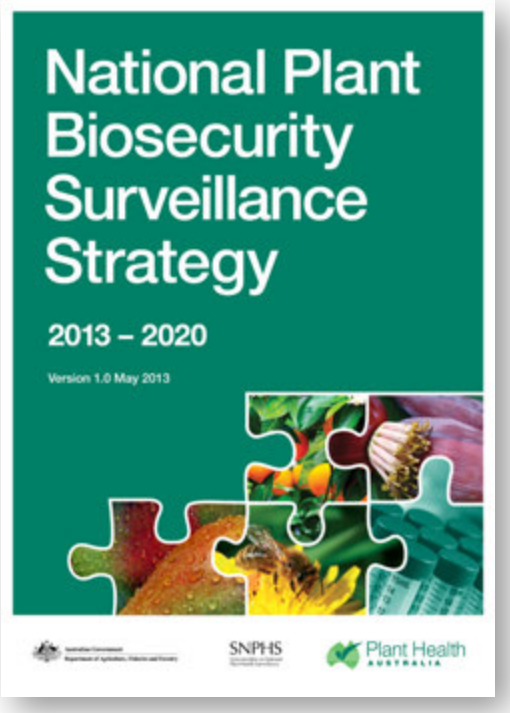


For more detailed information visit:
http://www.planthealthaustralia.com.au/national-programs/national-plant-biosecurity-strategy

National Plant Biosecurity Surveillance Strategy

Recommendations

1. Provide mechanisms for coordinating and establishing a nationally integrated and consistent plant biosecurity surveillance system and network that underpins Australia's biosecurity system.
2. Establish a national surveillance information framework including the development of nationally agreed surveillance standards and protocols in order to optimise the collection, analysis and reporting of surveillance data.
3. Establish mechanisms to engage industry and communities to ensure broader recognition of the importance of surveillance and collection of surveillance information.
4. Enhance the national capacity and capability to undertake plant pest surveillance underpinned by targeted research, development and extension.
5. Enhance the national surveillance system by adopting consistent legislation and regulatory approaches.

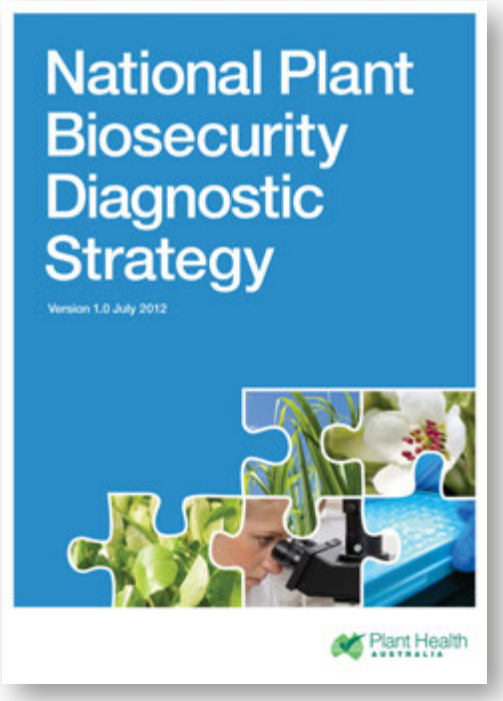


For more detailed information visit:
http://www.planthealthaustralia.com.au/biosecurity/surveillance

National Plant Biosecurity Diagnostic Strategy

Recommendations

1. Develop a nationally integrated plant biosecurity diagnostic network that underpins Australia's plant biosecurity system
2. Implement and maintain appropriate quality management systems in diagnostic laboratories
3. Diagnostic capability and capacity for all HPPs be developed and maintained
4. Establish a national plant biosecurity information management framework to optimise data sharing



For more detailed information visit:
http://www.planthealthaustralia.com.au/biosecurity/diagnostics

Notes

Notes

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