

# WEEDS OF NATIONAL SIGNIFICANCE



## **Brooms**

*(Cytisus scoparius,  
Genista monspessulana and G. linifolia)*

**Strategic Plan  
2012 to 2017**

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This strategy was developed under the leadership of the National Brooms Coordinator – Matt Springall, NSW Office of Environment and Heritage, NSW with full cooperation of all the States, Territories and Commonwealth of Australia.

Comments and constructive criticism are welcomed as an aid to improving the process and future revisions of this strategy.

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*National Brooms Strategic Plan 2012 - 2017*

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## EXECUTIVE SUMMARY

Broom species are serious weeds of Australia's environment and primary production, including pastoral and forestry operations. In 2012, three species, Scotch broom (*Cytisus scoparius*), Montpellier broom (*Genista monspessulana*) and flax-leaf broom (*Genista linifolia*), were listed as Weeds of National Significance due to their invasiveness, potential for spread and severe impacts on Australia's environment and primary industry.

Originating in Europe, brooms were introduced to Australia predominantly as ornamental plants. Brooms have now naturalised in all States and Territories, except the Northern Territory, and have become a major threat to pastoral and forestry operations and a wide range of natural ecosystems, including alpine areas and wetlands. Once established, broom invasions can change fire frequency and intensity, outcompete or inhibit natural regeneration and recruitment of native species, and provide harbour for feral animals.

Effective control measures for brooms are expensive due to their ability to rapidly re-establish from a persistent seed bank, requiring intensive and long term follow-up and site restoration. Mature brooms have the ability to produce thousands of seeds per plant annually and the seeds can remain dormant in the soil for decades. Effective control relies on an integrated approach involving chemical, manual and biological control. Integration of broom control with fire management also has the potential to improve management outcomes.

This National Strategic Plan provides a framework to prevent spread and reduce the impacts of brooms throughout Australia. The Plan aspires to deliver the following Goals and Objectives:

### **Goal 1. New infestations are prevented from establishing:**

1. Invasion vectors, sources and pathways are identified and managed to prevent or reduce spread.
2. Surveillance and response mechanisms are ensuring timely detection of infestations.
3. Priority outlier infestations are contained or eradicated and spread from core infestations is prevented.

### **Goal 2. Established infestations are under strategic management:**

1. Priority assets are benefitting from long term strategic weed control programs.
2. Integrated weed management practices are improving natural resource condition and sustainable production.

### **Goal 3. Greater capability and commitment to manage brooms**

1. Infestations are mapped to national standards and to a level sufficient to inform decision making.
2. Best practice management delivers efficient, effective and long-term control of brooms.
3. Capability and motivation to manage brooms is enhanced by education and awareness.
4. Research priorities for brooms are identified, promoted, addressed and results are informing management.
5. Local to national planning incorporates strategic brooms priorities.
6. Appropriate policies, codes of practice, legislation and enforcement are supporting strategic management objectives.
7. Stakeholders are committed to effective delivery of the National Strategic Plan.
8. The National Strategic Plan is relevant and effective.

This Plan complements the Australian Weeds Strategy. Like the Australian Weeds Strategy, it is aspirational and does not specifically address resourcing. However, the Plan fosters a shared approach, and identifies efficiencies and collaborative actions that help to ensure existing resources can be allocated to achieve improved, strategic management outcomes. The Plan outlines measurable, targeted actions to allow progress towards the objectives over the next five years.

## Vision

Brooms are effectively managed to prevent further spread and to reduce their negative impacts on Australia's natural environment and primary production.

### 1 THE CHALLENGE

Brooms are shrubs in the pea family that are native to Europe and the Mediterranean, including North Africa. They were introduced to Australia predominantly as ornamental plants and have escaped from these plantings to become serious weeds of the environment and primary production. Three species, Scotch or English broom (*Cytisus scoparius*), Montpellier or Cape broom (*Genista monspessulana*) and flax-leaf broom (*G. linifolia*) - collectively referred to as brooms in this document, were listed as Weeds of National Significance (WoNS) because of their invasiveness, high potential for further spread and severe ecological and economic impacts. Brooms have been recorded in all states and territories of Australia, with the exception of Northern Territory (NT), and are widespread across many temperate and alpine regions.

Brooms invade native vegetation, plantation and pastoral systems, where they cause significant impacts. They form dense infestations that damage conservation and production assets. Robust growth allows brooms to dominate understorey and shrub layers, eventually impacting the regeneration of canopy species by simplifying the understorey flora and preventing over-storey regeneration.

Brooms are aggressive invaders of natural vegetation across a wide variety of habitats and are capable of completely transforming ecological communities by excluding other vegetation and altering fire behaviour and regimes. They grow quickly, produce large amounts of highly persistent seed, tolerate a range of environmental conditions, and fix nitrogen in the soil, which in turn provides conditions even more suitable for growth of broom plants. While brooms establish rapidly after disturbance, particularly from fire or vegetation clearing, they are also capable of invading relatively undisturbed areas. Once established, broom invasions can change fire frequency and intensity, and outcompete and inhibit natural regeneration and recruitment of native species.

Brooms are considered serious pests in grazing, orchard and forestry lands. Mature stands are often unpalatable and will outcompete good pasture if left untreated. In addition, they can provide harbour for feral animals such as foxes, pigs and rabbits. Brooms are problematic for reforestation efforts in forestry operations, particularly after harvesting, and are known to reduce timber yields through competition.

Effective control measures for brooms can be costly due to their ability to rapidly re-establish from a persistent seed bank, requiring intensive and long term follow up and site restoration. While there are many effective control methods available for brooms, the often remote and inaccessible nature of the landscape where they occur can make control expensive. Despite this, there are good opportunities to prevent further spread of brooms, including within, and from, core infestations. Integrating broom control programs with fire management may have significant benefits and can be essential for success in many cases. Existing control programs in some parts of the country have demonstrated significant progress and provide good models for further action.

## 2 INTRODUCTION

This Brooms National Strategic Plan 2012 -2017 (the Plan) is broad in scope and incorporates goals for the three broom WoNS; Scotch, Montpellier and flax-leaf broom. It outlines priority actions to prevent further spread, reduce impacts and increase the capability of land managers to manage these three brooms across Australia in a collaborative and effective manner. The Plan builds on and complements existing weed management strategies and initiatives from local to national levels, in order to achieve improved understanding of these species and their management, and provide a basis for strategic on-ground management outcomes.

### 2.1 Principles underpinning the plan

The WoNS Strategic Plans provide a framework for the coordinated management of the 32 WoNS. These Plans represent the shared vision of all stakeholders, including States/Territories and the Australian Government, and form a critical component of the national weed management effort. The WoNS initiative establishes national priorities and facilitates action where there is significant national or cross-jurisdictional benefit to be gained. WoNS strategic plans do not specifically address resourcing; however, they aim to identify efficiencies and ensure existing resources can be allocated to achieve the most strategic management outcomes.

WoNS Strategic Plans are based on recognition and acceptance of seven principles outlined in the Australian Weeds Strategy (AWS; NRMMC 2006):

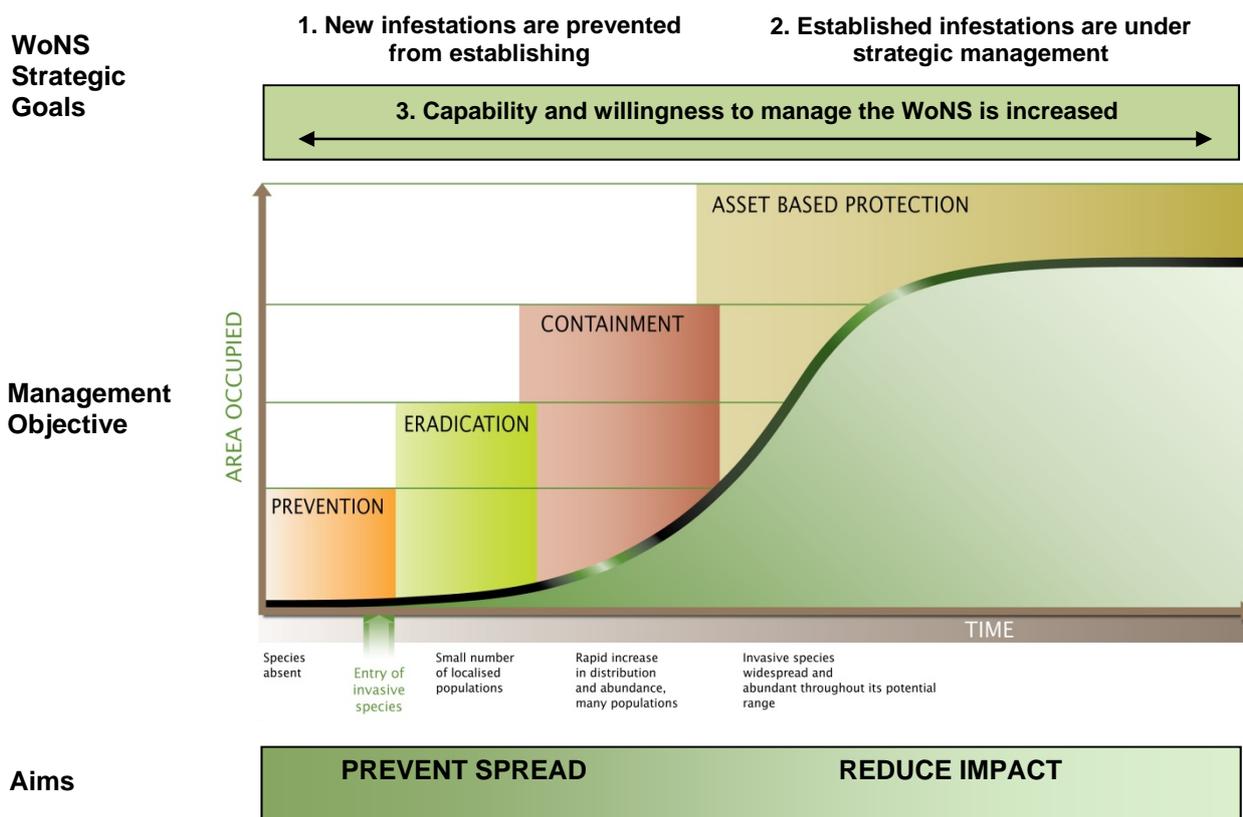
1. Weed management is an essential and integral part of the sustainable management of natural resources for the benefit of the economy, the environment, human health and amenity.
2. Combating weed problems is a shared responsibility that requires all parties to have a clear understanding of their roles.
3. Good science underpins the effective development, monitoring and review of weed management strategies.
4. Prioritisation of and investment in weed management must be informed by a risk management approach.
5. Prevention and early intervention are the most cost-effective techniques for managing weeds.
6. Weed management requires coordination among all levels of government in partnership with industry, land and water managers and the community regardless of tenure.
7. Building capacity across government, industry, land and water managers and the community is fundamental to effective weed management.

In addition to the AWS, WoNS strategic plans are also aligned to the 2012 Intergovernmental Agreement on Biosecurity (IGAB; COAG 2012), which outlines national invasive species management objectives. The IGAB aims to enhance Australia's biosecurity system by fostering a collaborative approach to minimise the impact of pests across the biosecurity continuum, including 'a national management framework to ensure that nationally significant pests and diseases established in Australia are contained, suppressed or otherwise managed.' WoNS can contribute to this aim by facilitating coordinated, strategic management of nationally significant weeds.

The IGAB principles highlight the importance of managing invasive species across the biosecurity continuum. The 'One Biosecurity' report (Beale *et al.* 2008) also recognises that weeds and other invasive species are biosecurity threats that are most effectively managed in a collaborative manner across this continuum. This includes a 'spatial continuum' of pre-border, border and post-border, as well as a 'management continuum' that spans prevention, eradication, containment and asset protection, depending on the scale of weed invasion.

In most instances, complete control (*i.e.* eradication) of long-established weeds and other invasive species is unachievable. However, well researched, strategic and coordinated management approaches can reduce

current and potential impacts and provide a good return on investment. Effective weed management requires an approach that spans the biosecurity continuum (Figure 1).



**Figure 1 : Biosecurity continuum - Stages of weed invasion with corresponding goals, management objectives and actions at each stage.** Modified from Hobbs and Humphries (1995) and DPI (2010).

Effective management includes spread prevention practices and eradication of outlying infestations to protect environments where the weed has not yet taken hold, establishment and defence of containment lines to halt or reduce the rate of spread; and the identification and protection of key environmental, social and economic assets in areas where the weeds are already widespread. Paired with these efforts is the need for strong education, extension and capacity building programs, and support mechanisms to ensure on-ground outcomes are achieved.

## 2.2 The current situation

Infestations of brooms are recorded from all states of Australia, including south-east Queensland and south-west Western Australia (WA). The three species of broom have a wide distribution across Australia (see Figures 2 and 3) and are impacting on a range of ecological communities, including endangered systems such as alpine areas and wetlands. They can be significant weeds of grazing and forestry operations, with the costs of control potentially exceeding the value of the land once large broom infestations have established.

Brooms share similar characteristics that allow them to outcompete desirable plants and dominate native ecosystems. They grow quickly, produce large amounts of seed, tolerate a range of environmental conditions and increase soil nitrogen, which in turn forms ideal conditions for broom regeneration. Brooms establish rapidly after disturbance, such as fire or grazing, but can also invade relatively undisturbed areas. If not controlled, brooms can modify native ecosystems by changing fire frequency and intensity, changing vegetation structure, altering soil chemistry and providing harbour for invasive animals. Invasion by brooms can also impact native animals, contributing to changes in species diversity and density.

There are effective control measures for brooms, however due to their ability to rapidly re-establish from a persistent seed bank, intensive follow-up and site restoration is required. In addition to chemical and

mechanical controls, several invertebrates that feed exclusively on broom plants or their seeds have been introduced to Australia as biological control agents and are showing promise for long term management of broom populations. In large infestations, integrated management using a combination of biological, chemical and mechanical controls can effectively reduce the impact and spread of brooms.

The current priorities for management of brooms vary between jurisdictions and the species concerned. Areas with well established broom populations generally regard broom control as a high priority whereas in areas with low density, scattered populations at early stages of invasion brooms are often considered lower priority weeds within that landscape. This is reflected in the state and territory legislation across Australia. While *C. scoparius* and *G. monspessulana* are declared weeds across most, but not all, states, *G. linifolia* is not currently declared, except in Victoria, Australian Capital Territory (ACT), and small areas of New South Wales (NSW). See section 6.6 for a list of declarations across jurisdictions.

### 2.2.1 Scotch broom

Scotch broom (*C. scoparius*), also known as English broom, was first introduced to New South Wales (NSW) around 1800 by Governor King as a substitute for hops and was subsequently used as a garden or hedge plant, and occasionally for erosion control, through the nineteenth and twentieth centuries. It is now estimated to have infested over 200,000 ha of southern Australia, including 150,000 ha in Victoria (Vic). Recently it was detected as naturalised in Western Australia (WA), where it was previously unrecorded, and has the potential to spread, however early eradication efforts appear to be successful. This weed is also regarded as a serious pest in many other parts of the world, including in North America and New Zealand.

Scotch broom is well-recognized for its deleterious impacts on the environment, agriculture and forestry, having been first identified as a serious weed in the Barrington Tops region of New South Wales in the 1960s. Well documented strategic control programs have been in place for Scotch broom in regions such as Barrington Tops (NSW) and Alpine National Parks (Vic) since the 1980s, and there is a large amount of literature and research available for this species, both from Australia and internationally. Biological control programs for Scotch broom began in the United States of America as early as 1960 and in Australia from 1990. A number of agents have now been released for Scotch broom in Australia, and while initial results are promising for the longer term, further redistribution and monitoring efforts could improve agent impact across larger areas.

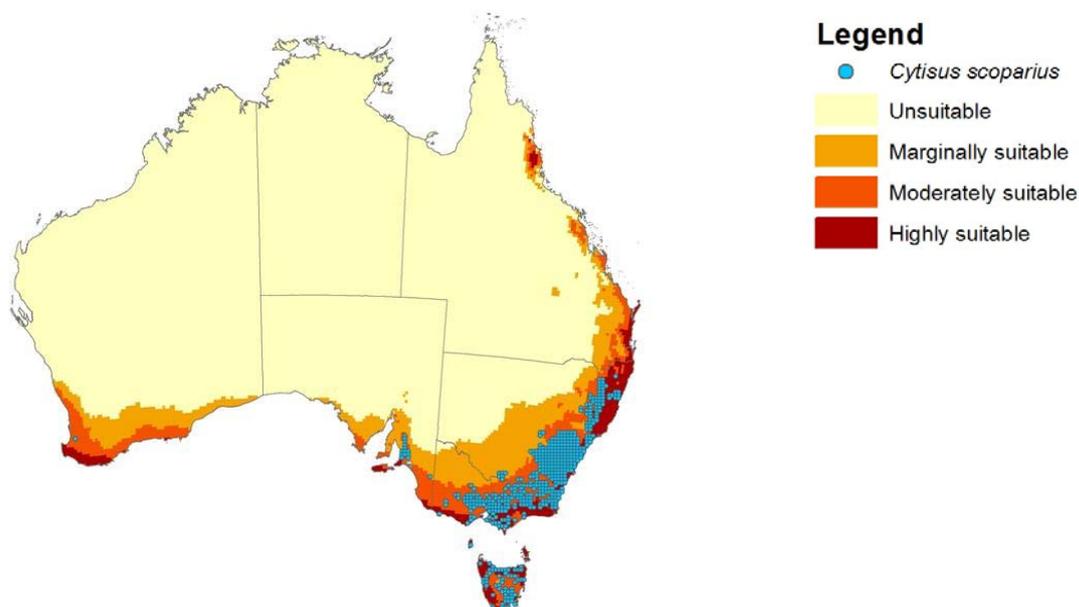
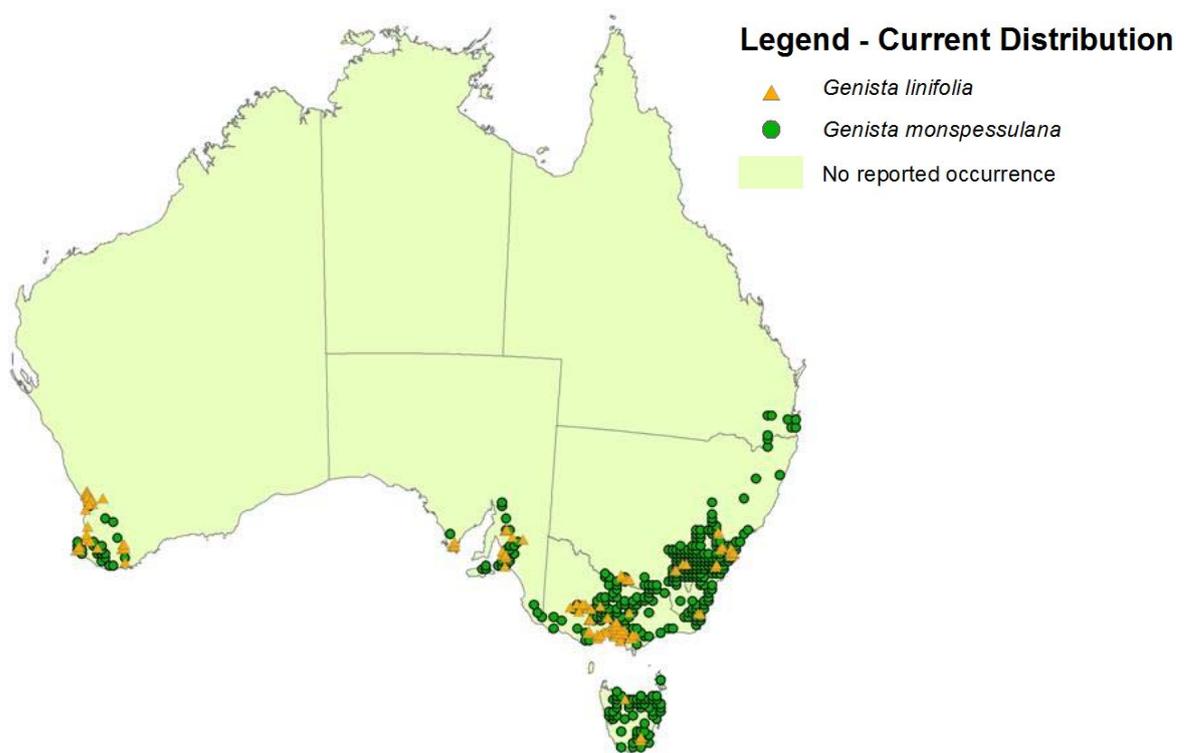


Figure 2 : Current (2012) and potential (Potter *et al.* 2009) distribution of *Cytisus scoparius* in Australia.

### 2.2.2 Montpellier broom

Montpellier broom (*G. monspessulana*), also known as Cape broom, French broom or Canary broom, is the most widespread of the three species in Australia, invading over 600,000 ha. It has the potential to inhabit drier and warmer areas than Scotch broom, and has also been found in wetlands. Montpellier broom has spread primarily as a garden escape to become a major weed in Australia, New Zealand, North America and many other temperate regions globally. In Australia, it has naturalised in all states and territories (except the NT) but its history of introduction to Australia is not well recorded. It may have been recorded growing in NSW as early as 1803, but first appeared in a catalogue of plants in Melbourne Botanic Gardens in 1857 under the name of *G. canariensis*, and was also recorded in the Adelaide Botanic Gardens in 1858 (Parsons and Cuthbertson 1992). It was frequently planted as a hedge plant and now commonly occurs in the south-eastern states in a variety of habitats receiving more than 500 mm in annual rainfall, including: forest margins; neglected areas, particularly poorly managed pastures; roadsides and watercourses. Two biological control agents for Montpellier broom have been identified for use in Australia. One of these, a psyllid, was found to already occur in wild populations in Adelaide, though it is not yet widespread and does not occur in Western Australia. Redistribution efforts in eastern states have shown initial localised impacts to be significant, and the psyllid has the potential to provide substantial benefits to long term broom management.



**Figure 3 : Current distribution (2012) of *Genista monspessulana* and *G. Linifolia* in Australia.**

### 2.2.3 Flax-leaf broom

Flax-leaf broom (*G. linifolia*), while much less widespread in Australia than the other broom weeds, has the potential to colonise the same areas as Montpellier broom and is spreading in a similar manner. It is recorded from dry coastal vegetation, heathland, ephemeral wetland, lowland grassland and grassy woodland, dry and wet sclerophyll forest and riparian vegetation, predominantly in the far south of Australia. Unlike Scotch broom, and even Montpellier broom, there has been relatively little research undertaken on flax-leaf broom. While it has been approved as a target for biological control, there has been no work on agents for this species to date.

#### 2.2.4 Broom hybrids

While the identity of the three WoNS brooms is unambiguous, there are taxonomic issues around other *Cytisus* and *Genista* species. Genetic studies of Scotch broom indicate that a variety of forms were introduced to Australia and hybridisation between these forms is occurring (Smith 2000, Kang *et al.* 2007). Evidence also exists of hybridisation within genera of closely related *Cytisus* and *Genista* species (Kleist and Jasieniuk 2011). Some of these species, forms, cultivars or hybrids of *Cytisus* and *Genista*, may be available for trade, including on the online market. There are also several different coloured forms of *Cytisus* naturalised in NSW, Victoria and Tasmania (Hosking *et al.* 1998). However, uncertainty exists around the correct taxonomic status of many of these entities (Atkinson and Shephard 2000, Malécot *et al.* 2009), and further work is required to determine if any of these pose a weed threat. These issues may have implications for the success of biological control, given the potential for hybridisation of other *Cytisus* and *Genista* forms with the WoNS broom species. Hybridisation may also impact the potential invasiveness of closely-related species that may still be available for trade. Taxonomic and genetic studies of *Cytisus* and *Genista* currently naturalised and commercially available in Australia would be useful for management, including for prevention of spread and future biological control of the WoNS.

#### 2.2.5 Other non WoNS brooms

There are many species of shrubs from the tribe Genisteae which are commonly known as brooms, none of which are native to Australia. Some of these brooms are recorded as naturalised in Australia and/or in other parts of the world. These plants include *Cytisus multiflorus* (white Spanish broom), *Genista stenopetala* (Madeira broom), *G. canariensis* (Canary broom), *Retama raetam* (white weeping broom), *Calicotome spinosa* (spiny broom), *Spartium junceum* (Spanish broom) and *Chamaecytisus palmensis* (tree lucerne or tagasaste). Two of these brooms, *C. multiflorus* and *R. raetam* are on the National Environmental Alert List, and both the *Genista* species can be easily misidentified as *G. monspessulana*. While these other species are not considered in this Plan, their weed potential should be recognised and appropriate risk assessment and risk abatement should be undertaken for these species.

### 2.3 Strategic plan development

This Plan was developed by the national coordinator for brooms assisted by NSW Office of Environment and Heritage (OEH) staff and other WoNS Coordinators, with input from a number of people involved in the management of these invasive species. A range of consultation processes was used, including meetings with individuals, regional weed groups, state agencies (for agriculture and environment), land owners and community groups. Information on the distribution, control methods, species' characteristics, attitudes to management and perceived knowledge gaps collected during this process have informed this Plan.

State wide workshops were held in South Australia (Adelaide), Tasmania (Launceston), Western Australia (Perth) and Queensland (Brisbane) through 2012. Regional workshops were held in New South Wales, Victoria, Western Australia and the ACT. In addition, WoNS coordinators undertook extensive discussions with stakeholders nationally, including with key people such as researchers and weed managers.

In April 2012, a WoNS State/Territory Agency National Strategy Workshop was held in Adelaide with representatives from all jurisdictions. During this workshop, the principles that underpin this Plan (and other new WoNS Plans) were agreed upon. The objectives and strategic actions of this Plan have their basis in the extensive feedback provided during this workshop.

Further public comment and contribution was sought via a 30-day public consultation period in February 2013. Feedback has been considered, and where appropriate, incorporated in this final version of the Plan, which was submitted to and endorsed by the Australian Weeds Committee in 2013.

## 2.4 Relevance to other strategies

The AWS provides national direction on weed management issues. WoNS are a significant component of the AWS, and actions in this Plan are aligned with and support AWS objectives. While this Plan directs national action for one group of WoNS, objectives in this Plan are common to all WoNS and many actions will be common across WoNS Strategic Plans. These actions will be most effectively implemented through collaborative efforts by jurisdictions, national WoNS coordination roles and management groups.

Successful implementation of this Plan relies on alignment of actions and objectives with those of national to local level strategies and plans. As these strategies and plans are developed or reviewed, relevant actions from this and other WoNS Strategic Plans should be considered, and where possible, incorporated.

**Table 1 : Relevance to other strategies and policies to this plan**

<b>Scale</b>	<b>Natural Resource Management</b>	<b>Weed Management</b>
○	National Strategy for the Conservation of Australia's Biological Diversity 2010 Native Vegetation Policy 2001 National Strategy for Ecologically Sustainable Development 1992	Intergovernmental Agreement on Biosecurity Australian Weeds Strategy 2007 Weeds of National Significance Strategic Plans
<b>State</b>	State biodiversity and Natural Resource Management strategies Forest policies National Parks management plans	State agency pest management and invasive species strategies, plans and declared plant policies Biosecurity strategies National Parks weed management plans
<b>Regional or Catchment</b>	Regional NRM and Catchment Management Plans Conservation corridor plans	Regional Pest Management Strategies Regional Weed management plans
<b>Local</b>	Landcare plans Riparian vegetation management plans Bushcare and Coastcare plans	Local Government Pest Management Plans Local and community weed control plans
<b>Property</b>	Property Management Plans	Property Pest Management Plans

## 3 STRATEGIC GOALS AND OBJECTIVES

The Brooms National Strategic Plan is underpinned by seven key principles from the AWS, and the three key common goals of the WoNS initiative (see 2.1 above). The AWS key principles highlight that effective weed control priorities are an essential part of sustainable management of natural resources, should be informed by risk management processes and underpinned by good science, and are a shared responsibility that requires all parties to have a clear understanding of their coordinated roles. The principles also recognise that prevention and early intervention are the most cost-effective techniques, and that building stakeholder capacity and motivation is fundamental.

Collaborative action by all levels of government and land managers can reduce these impacts and prevent further damage from broom weeds. Implementation of the strategic actions detailed in this section will allow the goals and objectives to be realised.

Aspirational objectives in this plan are supported by strategic actions that identify how these objectives can be achieved. Further work will be needed to refine the actions and/or develop methods to implement the actions. This work should be done in a consultative manner with all responsible partners. While national coordination can assist with strategic direction and collaboration, partners will need to ensure actions are relevant to them and determine how to implement those actions at an appropriate scale (e.g. local, regional, catchment, jurisdictional). Thus, it is important that the correct partners be identified and included in the decision making process and, where appropriate, that they identify an appropriate level of participation for implementing actions. Decisions regarding national priority actions should be led by a national management group, in collaboration with responsible partners and other relevant stakeholders. For most actions, these decisions are yet to be made and will rely on further collation of distribution data, risk assessment and due consideration of relevant legislation and policy. Final endorsement of priority actions should occur via the Australian Weeds Committee.

The WoNS initiative shares three major goals that distil the essence of AWS principles. These are listed in the table below (Table 2), along with corresponding objectives that set the direction for effective and enduring management of brooms. Further details of each goal precede each of the three goal tables that follow. Objectives within the goal tables are prioritised as follows:

Priority 1 = Critical to the success of the strategic plan.

Priority 2 = Highly beneficial and will contribute significantly to the success of the strategy.

Priority 3 = Desirable, still beneficial, but not critical to the success of the strategy.

**Table 2 : Strategic goals and objectives**

Strategic Goal	Objectives
<ul style="list-style-type: none"> <li>New infestations are prevented from establishing.</li> </ul>	1.1 Invasion vectors, sources and pathways are identified and managed to prevent or reduce spread
	1.2 Surveillance and response mechanisms are ensuring timely detection of the infestations (both new and previously undetected)
	1.3 Priority outlier infestations are contained or eradicated and spread from core infestations is prevented
<ul style="list-style-type: none"> <li>Established infestations are under strategic management.</li> </ul>	2.1 Priority assets are benefitting from long term strategic weed control programs
	2.2 Integrated weed management practices are improving natural ecosystem condition, sustainable production and community wellbeing
<ul style="list-style-type: none"> <li>Greater capability and commitment to manage brooms.</li> </ul>	3.1 Infestations are mapped to national standards and to a level sufficient to inform decision making
	3.2 Best practice management delivers efficient, effective and long-term control
	3.3 Capability and motivation to manage brooms is enhanced by education and awareness
	3.4 Research priorities for brooms are identified, promoted, addressed and results are informing management
	3.5 Local to national planning incorporates strategic brooms priorities
	3.6 Appropriate policies, codes of practice, legislation and enforcement are supporting strategic management objectives
	3.7 Stakeholders are committed to effective delivery of the national strategic plan
	3.8 The national strategic plan is relevant and effective

### 3.1 GOAL 1: New infestations are prevented from establishing

Prevention and early detection are the most cost-effective ways to manage weeds. While WoNS are, by definition, widespread in Australia, there are significant areas that remain free of brooms. Goal 1 aims to protect these clean areas by preventing further spread of brooms and encouraging rapid response to new incursions. This includes identifying and managing pathways of spread, determining risk of future invasion and implementing targeted hygiene and surveillance programs to prevent spread. Goal 1 also contains actions to address new incursions and outlier infestations, as well as preventing spread from core infestations, by developing scale-appropriate eradication or containment programs.

**Table 3 : Goal 1 Strategic Actions**

Objectives	Strategic Actions	Priority*	Responsible Partners**
<b>1.1 Invasion vectors, sources and pathways are identified and managed to prevent or reduce spread</b>	1.1.1 Review and update risk assessments and assess high-risk spread zones to identify high-risk species and high risk areas for invasion	1	Broom Management Group, State/Territory govt, research organisations
	1.1.2 Ensure brooms are incorporated into hygiene materials/protocols, or where necessary, develop hygiene protocols/tools, including for general public; promote and encourage use of hygiene protocols/tools	2	National coordinator/s, State/Territory govt, NRM regions, local govt, biosecurity/weed authorities, industry
	1.1.3 Identify introduction and spread pathways and vectors; develop (or promote existing) targeted resources to manage spread, as required	2	Broom Management Group, National coordinator/s, State/Territory govt, research organisations
	1.1.4 Engage nursery industry, including online and market trades, to assess risk of broom hybrids and remove invasive brooms from sale, trade and promotion	1	Broom Management Group, State/Territory govt, Nursery Industry, National coordinator/s, research organisations
<b>1.2 Surveillance and response mechanisms are ensuring timely detection of infestations (both new and previously undetected)</b>	1.2.1 Identify priority regions/landscapes for broom surveillance	1	Broom Management Group, State/Territory govt, land managers
	1.2.2 Build capacity of existing weed, NRM and community networks to identify and report broom infestations, including identification tools and training	1	Broom Management Group, State/Territory govt, NRM regions, weed authorities, local govt.
	1.2.3 Implement early detection/surveillance programs, including accessible mapping, reporting systems and identification resources/training. Integrate brooms into existing early detection/surveillance programs (e.g. biosecurity), with a focus on: <ul style="list-style-type: none"> <li>• high priority regions/landscapes</li> <li>• high-risk spread areas</li> </ul>	1	State/Territory govt, NRM regions, weed authorities, land managers, quarantine /biosecurity officers, community and recreational groups

Objectives	Strategic Actions	Priority*	Responsible Partners**
	1.2.4 Encourage collection of broom specimens, especially new incursions; support herbaria to provide timely identification and taxonomic information to allow early detection and response	2	Broom Management Group, National coordinator/s, State/Territory govt, State/Territory and National Herbaria, weed authorities, NRM regions
	1.2.5 Investigate the use of digital and/or communication technologies (e.g. smart phones) and community initiatives to assist with surveillance and early detection	3	National coordinator/s, State/Territory govt, industry, research organisations, NRM regions
<b>1.3 Priority outlier infestations are contained or eradicated, and spread from core infestations is prevented</b>	1.3.1 Delimit the extent of outlier and core infestations and prioritise infestations for control nationally (links to Action 3.1.2)	1	Broom Management Group, State/Territory govt, NRM regions, weed authorities, land managers
	1.3.2 Develop and/or adopt and implement eradication or containment programs for high priority outlier infestations, including preventing or minimising spread from core infestations	1	Broom Management Group, State/Territory govt, NRM regions, weed authorities, land managers
	1.3.3 Develop standardised process for determining feasibility of eradication or containment, and for prioritisation of sites for control, at appropriate scales	2	Broom Management Group, National coordinator/s, research organisations
	1.3.4 Document and share new and/or successful approaches used to eradicate/contain outlier infestations	2	Broom Management Group, State/Territory govt, NRM regions, weed authorities, researchers

\* Priority

1 = critical to the success of the strategic plan

2 = highly beneficial and will contribute significantly to success of the strategy

3 = desirable, still beneficial, but not critical to success of the strategy

\*\*Responsible Partners (also see Section 4)

NRM Regions = Natural Resource Management regions (incl. Catchment Management Authorities)

Weed authorities = statutory agencies/groups responsible for weed management. These vary across jurisdictions (e.g. at local govt level in NSW, at regional NRM level in South Australia (SA), etc)

### 3.2 GOAL 2: Established infestations are under strategic management

Brooms can cause significant impacts to native plant communities and ecosystems and to primary production. This is especially true in long-established infestations, where targeted management is critical for protection of assets. Large, ineradicable infestations, also known as 'core' infestations, are areas where brooms cannot be eradicated and control should be targeted to protect priority assets and to

prevent further spread. This involves directing resources to areas where the weed poses threats to natural (e.g. threatened species or communities), production (e.g. agriculture or forestry), cultural heritage (e.g. indigenous and European), or other assets.

This is a site-led approach, rather than the weed-led approach of containment and eradication programs, with the focus on protecting national, state or regionally significant assets from brooms. Identifying priority assets and developing cross-tenure plans and partnerships to protect these assets are key actions needed to achieve this Goal. These actions should be supported by long-term management techniques, such as restoration and monitoring, and investigation of biological control options.

**Table 4 : Goal 2 Strategic Actions**

Objectives	Strategic Actions	Priority*	Responsible Partners**
<b>2.1. Priority assets are benefitting from long term, strategic weed control programs</b>	2.1.1 Identify and document priority assets (environmental, economic and social) at risk from each of the brooms	1	All stakeholders
	2.1.2 Prioritise assets at risk, and high priority sites for weed control, to guide investment and management of brooms in core infestations	1	Asset managers
	2.1.3 Engage and/or support stakeholders, including community groups, to develop and implement management plans to protect high priority assets from broom and other weeds, in an holistic manner	1	Broom Management Group, State/Territory govt, NRM regions, local govt, land managers, community groups, industry
<b>2.2 2. Integrated weed management practices are improving natural ecosystem condition and sustainable production</b>	2.2.1 Build capability of land managers to implement landscape restoration in areas impacted by brooms, including through provision of best practice tools and advice	1	State/Territory govt, NRM regions, local govt, community groups, land managers, research organisations
	2.2.2 Establish baseline data and undertake monitoring programs to determine effectiveness of control programs in improving/protecting asset condition	1	State/Territory govt, NRM regions, weed authorities, community groups, land managers
	2.2.3 Coordinate and/or implement long-term, collaborative management and control programs for brooms and other weeds	1	State/Territory govt, NRM regions, local govt, community groups, land managers, Broom Management Group
	2.2.4 Continue to distribute biological control agents to new sites or where redistributions are necessary	1	Australian govt, State/Territory govt, NRM regions, local govt, community groups, land managers, Broom Management Group
	2.2.5 Support the adoption of best practice and integrated weed management for brooms, including biological control, monitoring and restoration	2	Broom Management Group, Australian Govt, State/Territory govt, NRM regions, local govt, community groups, land managers, community groups

\* Priority

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3 = desirable, still beneficial, but not critical to success of the strategy

\*\*Responsible Partners (also see Section 4)

NRM Regions = Natural Resource Management regions (incl. Catchment Management Authorities)

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### 3.3 GOAL 3: Greater capability and commitment to manage brooms

The third goal includes actions to assist land managers by providing best practice tools and advice, as well as a support framework to enable better management of brooms and other weeds in an effective and holistic manner. Tools include robust management maps, education and awareness materials and training, and resources for best practice management. To complement these tools, a national Broom Management Group should oversee implementation of strategic plan actions. The actions in Goal 3 aim to provide targeted brooms research and development, appropriate legislation, integration of Plan actions into other relevant plans and policies, and strong program governance to help build commitment to long-term management of brooms in Australia.

While *C. scoparius* has had an extensive amount of research and documented strategic control programs, particularly in NSW and Victoria, the *Genista* species have had less so, and in particular for *G. linifolia* there is a relative paucity of literature. There are promising biological control agents available for both *C. scoparius* and *G. monspessulana*, however there are currently none available for *G. linifolia*. An increased, targeted research effort will greatly improve our understanding of brooms in Australia, in turn raising the efficiency and effectiveness of our management efforts.

**Table 5 : Goal 3 Strategic Actions**

Objectives	Strategic Actions	Priority*	Responsible Partners**
<b>3.1. Infestations are mapped to national standards and to a level sufficient to inform decision making</b>	3.1.1. Collate and maintain centralised distribution and information database of brooms nationally	1	State/Territory govt, weed authorities, Broom Management Group
	3.1.2. Produce, maintain and promote national brooms distribution maps that include strategic management actions, including accompanying list of strategic priorities for each NRM region	1	Broom Management Group, Australian govt, State/Territory govt., NRM regions
	3.1.3. Support development and promote use of national weed information and mapping systems; provide training where necessary	2	Broom Management Group, all stakeholders
<b>3.2. Best practice management delivers efficient, effective and long-term control</b>	3.2.1. Collate and refine current broom control options, identify gaps and develop improved tools and resources: deliver and promote best practice resources	1	Broom Management Group, research organisations, State/Territory govt., weed authorities, NRM regions

Objectives	Strategic Actions	Priority*	Responsible Partners**
	3.2.2 Investigate barriers to effective herbicide control and develop improved herbicide options	2	Broom Management Group, weed authorities, State/Territory govt., research organisations
	3.2.3 Promote the adoption and implementation of best practice management, including integration with fire management	1	Broom Management Group, weed authorities, local govt, State/Territory govt., NRM regions, industry
	3.2.4 Assess adoption of best practice tools and techniques and identify barriers to uptake	2	Broom Management Group, research organisations, NRM regions, State/Territory govt, industry
<b>3.3. Capability and motivation to manage brooms is enhanced by education and awareness</b>	3.3.1. Develop a communication plan to deliver information and tools for brooms; implement in conjunction with whole-of-WoNS communications plan	1	Broom Management Group, National coordinator/s, in collaboration with all stakeholders
	3.3.2 Develop and deliver education and awareness resources for brooms, including identification tools and resources	1	State/Territory govt., weed authorities, NRM regions, local govt Broom Management Group
	3.3.3 Ensure brooms education and awareness materials, mapping information and other management resources are available on weed websites	1	State/Territory govt., NRM Regions, local govt. Broom Management Group
	3.3.4 Encourage the inclusion of all <i>Cytisus</i> and <i>Genista</i> species, including hybrids and cultivars, in weed risk assessments	1	Broom Management Group, Nursery Industry, Australian, State, Territory and local govts.
	3.3.5 Promote awareness initiatives, such as Grow-Me-Instead, and encourage removal of brooms from plantings/gardens, including garden waste disposal protocols and use of alternative non-weedy replacements	2	Broom Management Group, Nursery Industry, State, Territory and local govt, gardening interest groups

Objectives	Strategic Actions	Priority*	Responsible Partners**
	3.3.6 Develop or enhance school education resources to integrate weed science/impacts into national curriculum	3	State/Territory govt., educators, research organisations
<b>3.4. Research priorities for brooms are identified, promoted, addressed and results are informing management</b>	3.4.1 Identify knowledge gaps, determine research needs and develop and maintain a 5-year Broom Research Framework	1	Research organisations, National coordinator/s, State/Territory govt, industry, Broom Management Group
	3.4.2 Encourage and/or undertake necessary biological and ecological research for brooms, especially <i>Genista linifolia</i> , and soil seed bank ecology for all species	1	Research organisations, State/Territory govt.
	3.4.3 Investigate further biological control options for brooms, undertake research and implement findings	1	Research organisations, relevant govt agencies
	3.4.4 Undertake ongoing monitoring and assessment of all current broom biological control agents to guide investment in broom management	2	Research organisations, relevant govt agencies
	3.4.5 Undertake taxonomic analysis and review of broom species in Australia	1	Research organisations
	3.4.6 Refine potential distribution models for brooms	1	Research organisations, State/Territory govt.
	3.4.7 Develop and maintain partnerships with research organisations, and promote research needs: facilitate a two-way flow of information on research needs/solutions between researchers and land managers	2	Broom Management Group, National coordinator/s, State/Territory govt., research organisations
	3.4.8 Undertake social and/or behavioural research to provide foundational understanding of public perceptions and better target education, awareness and best practice application	2	Research organisations, National coordinator/s
	3.4.9 Quantify control costs and economic/environmental costs of brooms, including cost-benefit analyses: promote results to encourage best practice management	3	Research organisations, National coordinator/s
	<b>3.5. Local to national planning incorporates strategic brooms priorities</b>	3.5.1 Identify local to national plans relevant to broom management: provide information and advice to owners of these plans to encourage participation in brooms/WoNS strategic plans	1

Objectives	Strategic Actions	Priority*	Responsible Partners**
	3.5.2 Encourage all stakeholders to integrate broom/WoNS strategic plan objectives into local to national plans, and provide networks to support implementation of plans	1	Broom Management Group, Australian Govt. State/Territory govt, NRM regions, local govt
<b>3.6. Appropriate policies, codes of practice, legislation and enforcement are supporting strategic management objectives</b>	3.6.1 Ensure appropriate legislation and declarations are in place, from national to local levels, to support broom management objectives, with a minimum of ban from sale and movement of the WoNS broom species	1	Australian Govt, State/Territory Govt, weed authorities
	3.6.2 Enforce national ban on importation of WoNS broom species and compliance with jurisdictional legislation prohibiting sale, use or movement of brooms	1	Australian Govt State/Territory Govt, weed authorities
	3.6.3 Encourage and promote nursery/garden industry codes of practice that support broom/WoNS objectives (e.g. plant labelling guidelines)	1	State/Territory Govt, Nursery, garden and landscaping industries and other relevant groups
<b>3.7 Stakeholders are committed to effective delivery of the strategic plan</b>	3.7.1 Establish a national committee to provide advice and oversee implementation of the national plan	1	National coordinator/s, State/Territory govt
	3.7.2 Develop and maintain brooms management networks, from local to national level, to engage stakeholders and promote implementation of strategic actions	1	National coordinator/s, State/Territory govt., all stakeholders
	3.7.3 Recognise and promote 'local weed champions' (groups and/or individuals) and their success stories	3	Broom Management Group, State/Territory govt, weed societies
<b>3.8 The national strategic plan is relevant and effective</b>	3.8.1. Coordinate implementation of strategic plan actions: develop and implement an annual Monitoring, Evaluation, Reporting and Improvement (MERI) strategy for the Plan	1	Broom Management Group, National coordinator/s, State/Territory govt.
	3.8.2 Report on progress towards actions in strategic plan to the Australian Weeds Committee and communicate progress to all key stakeholders on an annual basis	1	National coordinator/s, Broom Management Group, with contributions from all stakeholders
	3.8.3 Undertake comprehensive review of progress towards actions and objectives of the strategic plan in 2017	2	Australian Weeds Committee

\* Priority

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\*\*Responsible Partners (also see Section 4)

NRM Regions = Natural Resource Management regions (incl. Catchment Management Authorities)

Weed authorities = statutory agencies/groups responsible for weed management. These vary across jurisdictions (e.g. at local govt level in NSW, at regional NRM level in SA, etc)

## 4 STAKEHOLDER ROLES AND RESPONSIBILITIES

While land owners and managers are ultimately responsible for the control of brooms on their land, the effective implementation of this Plan requires the involvement of all stakeholders affected by brooms. Stakeholder responsibilities may vary between jurisdictions: some actions may be optional while others are prescribed by legislation. The successful achievement of strategic objectives relies on the development and maintenance of partnerships between community, industry and government, and recognition of the roles of each stakeholder. Suggested responsibilities to assist in achieving these are:

### **Australian Weeds Committee**

- Provide a mechanism for identifying and resolving weed issues at a national level
- Provide advice to the National Biosecurity Committee on weeds issues
- Provide planning, coordination and monitoring of the implementation of the Australian Weeds Strategy
- Facilitate coordination between the Australian, State and Territory governments on weed management policy and programs
- Provide governance processes for the effective delivery of the WoNS initiative
- Oversee the implementation of WoNS strategic plan actions and monitor progress
- Promote the importance and benefits of the WoNS initiative to all levels of government

### **Australian Government**

- Ensure quarantine controls to prevent importation of brooms (DAFF Biosecurity)
- Promote the status of brooms as WoNS, including their impacts and the importance of strategic management
- Undertake strategic broom control on all Australian Government managed lands

### **State and territory agencies**

- Maintain appropriate legislation and policies to achieve State and Territory objectives for managing brooms
- Administer and enforce legislation where applicable
- Coordinate brooms control and management at a jurisdictional level to foster management and delivery of the Broom National Strategic Plan
- Manage and control brooms on public lands in accordance with State/Territory or local government legislation and policy

- Work with regional bodies, local governments, communities and other stakeholders to prevent and minimise brooms impacts
- Identify strategic management areas and associated objectives
- Promote consistency with this Strategic Plan in jurisdictional pest management plans
- Facilitate the inclusion of strategic broom management actions in pest management planning processes
- Contribute to priority weed research initiatives
- Source funding for strategic weed management programs and research
- Implement monitoring and reporting in line with the MERI plan and provide relevant information to the national taskforce and/or Australian Weeds Committee
- Develop and implement communication plans and extension tools, where appropriate
- Undertake any necessary planning and mapping and contribute to national mapping initiatives
- Ensure, where appropriate, participation on the National Management Group or similar national WoNS taskforce
- Improve knowledge of the identification, impacts and best practice impacts of brooms
- Identify brooms and other weeds threatening public lands
- Implement weed hygiene and other best practice management to minimise spread of brooms

#### **National Broom Management Group (or similar taskforce/national management group)**

- Ensure a diversity of community and government views is represented and contribute to effective Strategic Plan implementation
- Provide guidance, direction and policy advice for broom management through the delivery of the Strategic Plan
- Monitor, evaluate, report and improve Strategic Plan implementation
- Assist in the development and implementation of programs and initiatives that support strategic actions
- Maintain and build partnerships with key stakeholders to improve strategic broom management
- Support and recognise achievements in broom management
- Identify funding sources and provide independent advice on development of projects that support WoNS strategic actions

#### **Research institutions (e.g. CSIRO, Universities, government agencies)**

- Undertake appropriate research to address priority national strategic requirements
- Identify research gaps and seek innovative solutions for the management of brooms
- Seek new and on-going funding and support for research requirements

#### **Local governments**

- Incorporate brooms objectives in relevant pest management plans and monitor implementation
- Administer and enforce legislation where applicable
- Undertake surveying and mapping particularly in relation to outlying broom infestations
- Establish local management policies to contribute to strategic control, containment and/or asset protection objectives
- Improve community awareness of impacts and identification, and promote early detection

- Strategically control brooms on local government managed or owned land
- Facilitate the removal of urban plantings of brooms
- Source funding for and/or contribute to strategic control programs

#### **Natural resource management regions (catchment management authorities)**

- Administer and enforce legislation where applicable
- Source funding and/or contribute to strategic control programs
- Improve regional awareness of impacts and identification; and promote early detection
- Contribute local and regional perspectives to broom management
- Contribute to the development, implementation and/or review of local and regional pest management plans
- Incorporate broom actions in relevant pest/weed management plans and monitor implementation
- Promote and contribute to local and regional containment and/or management programs in partnership with relevant stakeholders
- Support and/or develop broom projects consistent with national priorities, and seek funding to implement projects
- Participate in local and regional mapping initiatives and contribute to state, territory and national map production
- Promote awareness and best practice management through event coordination and product distribution

#### **Community, conservation and other interest groups**

- Contribute local and regional perspectives to broom management
- Contribute to the development, implementation and/or review of local pest management plans
- Support and/or develop broom projects that support national priorities
- Participate in local and regional mapping initiatives and contribute to state, territory and national map production
- Improve community awareness of impacts and identification, and promote early detection, hygiene and discourage use of broom weeds

#### **Industry**

- Promote and adopt best practice management of brooms
- Contribute to research and development of management practices to support industry members
- Ensure awareness of sale and movement restrictions of brooms within industry members
- Improve community awareness of impacts and identification, and promote early detection, hygiene and discourage use of brooms

#### **Private land owners**

- Manage and control brooms on private lands in accordance with State/Territory or local government legislation and policy
- Improve knowledge of the identification, impacts and best practice management of brooms
- Identify brooms and other weeds threatening their property
- Undertake any necessary planning and mapping
- Implement best practice management
- Implement weed hygiene and other management practices to minimise spread of brooms

## 5 MONITORING EVALUATION REPORTING AND IMPROVEMENT

This monitoring, evaluation, reporting and improvement (MERI) framework below (Table 6) lists the **minimum** reporting information that should be collected for the life of a WoNS strategic plan – including during Phase 3 delivery (see section 7.1). This will ensure that sufficient data is collected to identify successes and failures and provide the opportunity for improvement where outcomes are not being achieved. In addition to these minimum requirements that apply to all WoNS, an **additional** annual MERI plan should be developed to measure progress against actions and objectives specifically for this Broom Strategic Plan.

### 5.1 Targets and Measures

*Table 6 : MERI Targets and Measures*

Strategic Plan Goals	Key Evaluation Questions	Data/Evidence Required	Consider
1. New infestations are prevented from establishing.	To what extent have new infestations been prevented from establishing?	<u>1.1 National distribution data</u> <ul style="list-style-type: none"> <li>Has the national distribution map been reviewed and/or updated?</li> <li>Has the Priority Management Action spreadsheet been updated?</li> </ul>	<ul style="list-style-type: none"> <li>Are these documents publicly available?</li> <li>Have stakeholders been advised of any changes?</li> <li>Where is this data/info stored?</li> <li>Do they capture national priorities?</li> </ul>
		<u>1.2 New infestations</u> <ul style="list-style-type: none"> <li>Number of new outlier infestations<sup>1</sup> recorded.</li> <li>Percentage of known infestations actively controlled.</li> </ul> <p><sup>1</sup> New infestations should be an outlier, outside existing distribution of WoNS</p>	<ul style="list-style-type: none"> <li>Are any new outlier infestations occurring in areas identified as a high priority in the national strategy?</li> <li>How were infestations detected (passive or active surveillance, community reporting etc)?</li> <li>Have high risk pathways been adequately identified? And threats minimised?</li> </ul>
		<u>1.3 Eradication &amp; containment programs</u>	<ul style="list-style-type: none"> <li>What percentage of programs identified in the</li> </ul>

		<ul style="list-style-type: none"> <li>Percentage of eradication and/or containment programs being maintained</li> </ul>	<p>national strategy are being actively managed?</p> <ul style="list-style-type: none"> <li>Is there a plan in place for ongoing management?</li> <li>How is progress being monitored and reported to stakeholders?</li> <li>Can include examples using case studies.</li> </ul>
		<p><u>1.4 Legislation</u></p> <ul style="list-style-type: none"> <li>Have there been any legislation or policy changes for this species?</li> <li>Has a need for legislative change been identified by stakeholders?</li> </ul>	<ul style="list-style-type: none"> <li>Are minimum requirements being maintained (e.g. ban on sale, trade, movement)?</li> <li>Is control required throughout or in part of jurisdiction?</li> <li>Is compliance actively enforced?</li> </ul>
		Overall progress rating	
<b>2. 2. Established infestations are under strategic management.</b>	To what extent is integrated weed management effectively managing core infestations?	<p><u>2.1 Integrated Weed Management (IWM)</u></p> <ul style="list-style-type: none"> <li>How effective are IWM programs?</li> </ul>	<ul style="list-style-type: none"> <li>Are existing tools providing adequate control of WoNS?</li> <li>Have new advances/technologies been developed and are they incorporated into best practice management information?</li> <li>Are there barriers to adoption of best practice management?</li> <li>Are research programs addressing any observed gaps (e.g. herbicide trials, biocontrol, restoration requirements post control)?</li> </ul>
	To what extent are assets being protected through strategic management?	<p><u>2.2 Asset protection</u></p> <ul style="list-style-type: none"> <li>Number of priority assets identified as 'at risk' from WoNS?</li> <li>Percentage of priority assets being</li> </ul>	<ul style="list-style-type: none"> <li>Response should include status report on progress towards asset protection programs.</li> <li>Methods by which assets are being protected (e.g. targeted annual spray programs, high risk</li> </ul>

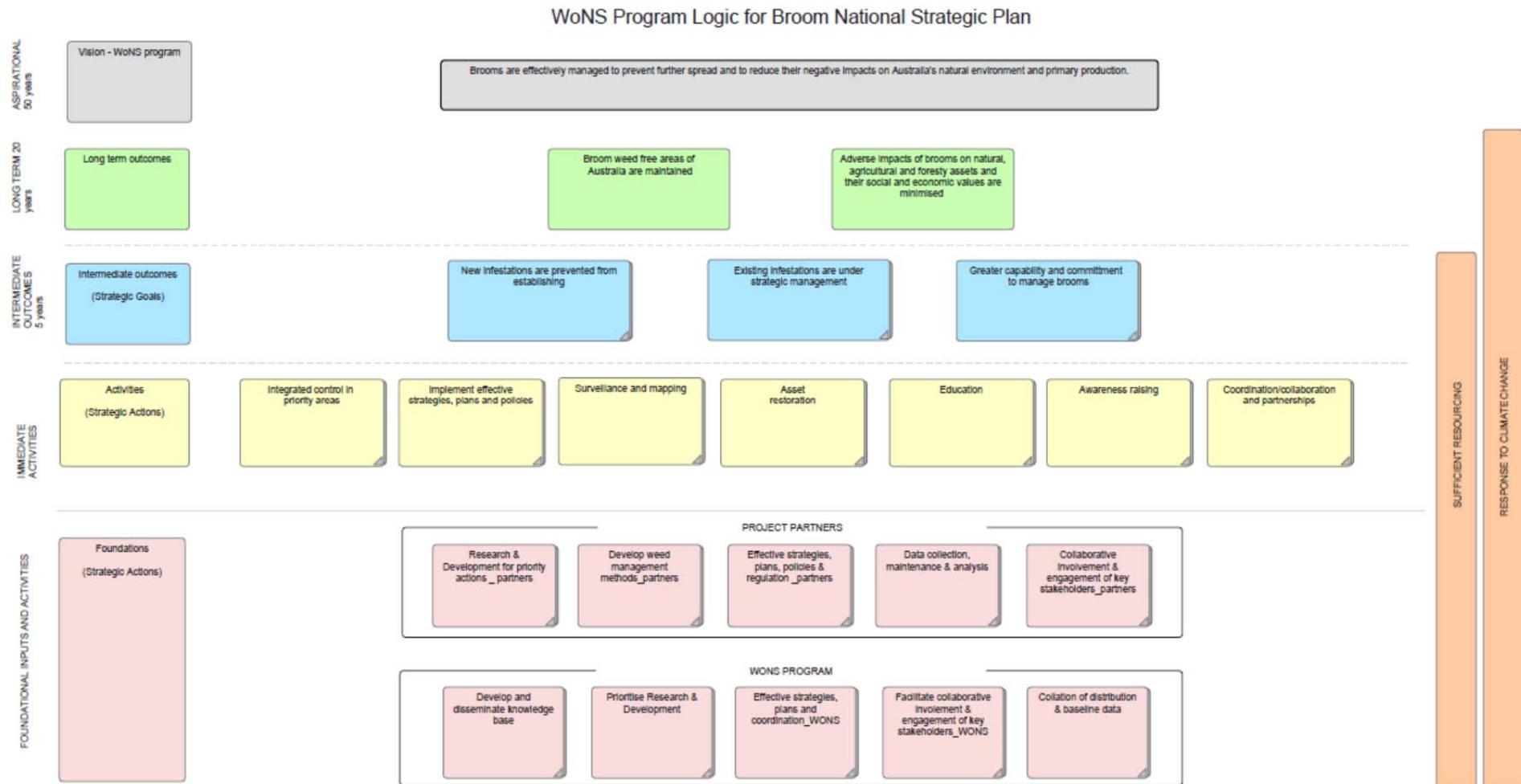
		<p>protected (e.g. assessed against relevant Threat Abatement Plans)?</p> <ul style="list-style-type: none"> <li>Percentage of state/regional invasive species plans that identify priority assets at risk from WoNS?</li> </ul>	<p>pathway surveillance, strategic plans).</p> <ul style="list-style-type: none"> <li>Are long term monitoring programs in place to detect change?</li> <li>To what extent is management leading to an improvement in asset condition?</li> </ul>
		Overall progress rating	
<b>3. 3. Greater capability and commitment to manage brooms.</b>	To what extent has the capability and commitment to manage WoNS increased?	<p><u>3.1 Community engagement &amp; awareness</u></p> <ul style="list-style-type: none"> <li>What is the status of best practice information?</li> <li>Are partnerships being maintained to ensure collaboration on WoNS?</li> <li>Number and type of media activities.</li> </ul>	<ul style="list-style-type: none"> <li>Is best practice information up-to-date and readily available?</li> <li>Is this information and/or advice being targeted to priority regions.</li> <li>Is training being delivered to meet the needs of weed managers (including the community)?</li> <li>Are networks/groups being supported (e.g. through dissemination of research outcomes, funding opportunities, control options etc)?</li> <li>Has awareness and engagement in WoNS management been raised effectively?</li> </ul>
		<p><u>3.2 Resourcing</u></p> <ul style="list-style-type: none"> <li>From what sources are programs being funded?</li> </ul>	<ul style="list-style-type: none"> <li>Number of projects funded by Commonwealth, jurisdictions, industry, etc</li> </ul>
		<p><u>3.3 Policy &amp; Planning</u></p> <ul style="list-style-type: none"> <li>Are the objectives of the strategy being integrated into Commonwealth/state/regional plans, policies and programs?</li> <li>Has cross border collaboration occurred?</li> </ul>	<ul style="list-style-type: none"> <li>How are priorities reflected in planning and policy approaches? E.g. invasive species plans, asset protection plans, district plans, weed spread prevention activities, management programs, incentive programs, state working groups.</li> <li>How are national priorities being maintained? E.g. containment lines, eradication targets, training &amp; awareness raising, research projects.</li> </ul>

		Overall progress rating	
<b>Continuous improvement</b>	Are there any unexpected outcomes that have been identified through implementation of strategy?	<u>4.1 Barriers</u> <ul style="list-style-type: none"> <li>• Have any other management issues or impediments been identified?</li> </ul>	

#### How to score progress rating

- 1- Insufficient evidence to score
- 2- No progress against goal
- 3- Limited progress is being made against this goal
- 4- Reasonable progress is being made against this goal
- 5- Excellent progress is being made against this goal

## 5.2 Program Logic Model for Brooms National Strategic Plan



**Figure 4 : Program logic for Brooms National Strategic Plan**

## 6 Technical Background

### 6.1 Broom identification

Brooms are leguminous shrubs in the tribe Genisteae of the family Fabaceae. In general, brooms have numerous, flexible broom-like young branches that give rise to their common name. The species described here are woody shrubs that lack thorns, have pea-like pods, trifoliate compound leaves and bright yellow flowers.

Scotch broom grows to 4 m high and can be distinguished from the other brooms in Australia by five-sided, green stems with few, deciduous leaves; large flowers (to 2 cm); and 2-7 cm long pods that have obvious hairs along the edges. Mature plants have erect, sparsely-branched stems that can collapse and become prostrate in older infestations. Red (to pink) and yellow flowered varieties of Scotch broom are naturalised in NSW, Victoria, South Australia and Tasmania.

Montpellier broom grows to 3 m high and has erect, ridged - but not five-sided - green branches that are hairy when young. The persistent leaves are on short stalks and consist of three, rounded leaflets. Small yellow flowers are borne in clusters along the main stems. The pods are relatively small and covered in dense hairs.

Flax-leaf broom is similar to Montpellier broom, also growing to 3 m high, but its leaves consist of three narrow, pointed leaflets. Leaf undersides and young stems have woolly, grey hairs, which can give plants a silvery look from a distance. Flowers grow in dense clusters at branch ends.

There are native Australian plants that can be confused with brooms, thus accurate identification is essential. Several species in the Fabaceae, including *Viminaria juncea*, *Goodia lotifolia*, *Pultenaea daphnoides* and *Gompholobium* species, can resemble one or more of the brooms. Cherry ballart (*Exocarpus cupressiformis*) can be mistaken for Scotch broom if it is not in flower.

### 6.2 Broom biology and ecology

While the introduced brooms discussed here vary in their biology and ecology, they share characteristics that contribute to their invasive ability, and which must be considered when planning broom management. Brooms fix nitrogen in the soil, which may inhibit the growth of native species that are adapted to nutrient poor soils and, conversely, establish soil conditions that are beneficial to brooms and other weeds. Brooms grow quickly and outcompete native and plantation species, establishing rapidly or re-sprouting after forests are harvested or after other disturbances, such as fire.

Brooms produce masses of long-lived seeds (over 15,000 seeds per plant per year in Scotch broom), and establish large seed banks (over 60,000 seeds/m<sup>2</sup> in Scotch broom), that contribute to mass germination events following disturbance. Seeds can survive in the seed bank for more than 20 years, with up to 80 years reported for Scotch broom. Seedlings have high germination and survival success when conditions are favourable, and plants can tolerate a range of habitats. Broom plants contain alkaloids which may be toxic to livestock and other animals, especially when grazed intensively.

Scotch broom plants prefer cool temperate climates in Australia. They first flower two to five years after emergence, and can live for up to 30 years. Flowering occurs mainly in spring and early summer (October to December) but may continue all year round in ideal conditions. Seeds ripen and shed in summer to early autumn (January to March), and germinate in the warmer, wetter months. Some seeds remain dormant and can survive in the soil seed bank for decades if buried. Scotch broom often loses its leaves in summer, or when stressed, but green stems enable continued photosynthesis.

Montpellier broom prefers more Mediterranean climates. It flowers in its second year and can live for about 10 years. Flowers appear in late winter-spring, and under good growing conditions a second flowering can occur in late summer. Pods ripen in summer and seed mainly germinates in autumn, but can germinate anytime given sufficient soil moisture and temperature. Populations are persistent and can reproduce from a long-lived seed bank without disturbance.

Flax-leaf broom also flowers at two years of age. Flowers are mainly produced from winter through to spring, with fruits present in summer and seeds germinating in autumn and spring. Both Montpellier and flax-leaf broom retain their leaves year-round and, like Scotch broom, retain long-lived seeds in the soil seed bank.

Brooms also have the ability to hybridise within genera. Genetic studies (Kang *et al.* 2007) of Scotch broom indicate that a variety of forms were introduced to Australia and hybridisation between these forms is occurring here.

### **6.3 Broom distribution and spread**

Scotch broom is native to temperate western Europe. Montpellier broom and flax-leaf broom are native to the Mediterranean, including south eastern Europe and northern Africa. These brooms have naturalised in many parts of the world, including North and South America, Asia, and New Zealand, and have invaded over one million hectares in Australia. Brooms occur in all southern states and south-east Queensland, where they generally grow in regions with a Mediterranean or temperate climate. Brooms can tolerate annual rainfall of 500 to 600 mm or more, and grow in infertile soils.

Scotch broom has invaded a number of ecosystems, including sub-alpine grasslands and woodlands, pasture, forestry plantations, open forest and riparian areas. Montpellier broom infests similar habitats, but can also invade drier, warmer areas, and has been found in swamps. Significant infestations of Montpellier broom impact on the Australian Alps and south-west Western Australia. Flax-leaf broom is recorded from dry coastal vegetation, heathland, lowland grassland and grassy woodland, dry and wet sclerophyll forest and riparian vegetation. It is spreading in a similar fashion to Montpellier broom, but is less widespread in Australia.

Brooms grow from seed. Mature plants can produce massive amounts of seed in favourable seasons. Mature Scotch, Montpellier and flax-leaf broom pods burst open in warm weather, ejecting seeds several metres. These seeds are often further dispersed through ant burial. Seed is also spread long distances by water and in the droppings of a variety of animals, such as horses and sheep. Cattle were identified as the main animal vector of Scotch broom spread in the Victorian Alps and Barrington Tops National Park in New South Wales.

Brooms were commonly planted in gardens, as hedges, and for soil erosion or medicinal purposes, and have spread from these plantings. Seeds are moved along transport corridors by road graders and other equipment, and through dumping of garden waste. Seed is also spread in soil by humans, animals and vehicles, and as a result outliers may establish long distances from parent plants. Disturbance, such as soil movement or fire, assists broom invasion by stimulating germination. Damaged broom plants can re-sprout readily if not uprooted, depending on the age and the species.

### **6.4 Summary of impacts**

Brooms invade native vegetation, plantation and pastoral systems in Australia, where they cause significant environmental and economic impacts. They are now widespread across parts of southern Australia, where they form dense infestations that damage conservation and production assets. Robust growth allows brooms to dominate understory and shrub layers, eventually impacting the regeneration of canopy species by simplifying the understory flora and preventing over-story regeneration.

The three broom species grow quickly, produce large amounts of highly persistent seed and tolerate a range of environmental conditions. Brooms fix nitrogen in the soil, which in turn forms ideal conditions for broom regeneration and other weed growth, and may inhibit the growth of native species that are adapted to nutrient poor soils. Brooms establish rapidly after disturbance, such as fire, grazing or forestry harvesting, but can also invade relatively undisturbed areas. If not controlled, brooms can modify native ecosystems by increasing fire frequency and intensity, changing vegetation structure, altering soil chemistry and providing harbour for invasive animals. Broom invasion can also impact native animals, contributing to changes in species diversity and density. Scotch broom is recorded as directly threatening several nationally listed threatened species.

Brooms grow quickly and outcompete native and plantation species, establishing rapidly or re-sprouting after forests are harvested or after other disturbances, such as fire. Scotch broom can significantly reduce yield in forestry plantations, particularly at the beginning of the rotation where it interferes with reforestation through competition for resources.

## 6.5 Control options

Brooms are difficult to manage because they grow rapidly, form dense stands, re-sprout from the plant base and produce a large seed bank. Mass seed germination can occur after disturbance from mechanical or chemical control, or fire. Once brooms are well established in native vegetation, restoration through natural regeneration will be difficult, particularly in older brooms stands, where the native seed bank may be depleted. The key to successful broom management is to integrate a range of treatments suited to the situation. Over the longer term, integration of broom control with fire management can have significant benefits. Different methods will be appropriate for controlling sparse broom plants in native vegetation, compared with dense, established infestations, or broom incursions in forestry plantations or pastures. With all control methods, follow-up is essential.

Large Scotch broom infestations have a tendency to collapse with age, once plants are over 20 years old. Regeneration of aged stands is not as intense if disturbance is minimised, thus undertaking large scale control after natural stand senescence occurs may reduce control costs.

### 6.5.1 Chemical control

Herbicide can be highly effective on brooms, provided the correct application methods and chemicals are used. Young plants can be controlled relatively easily because they have a low tolerance to herbicides. In young broom stands, control plants before they set seed. For established stands that already have a seed bank, this is less critical, but can help to prevent further spread. The main herbicide treatments for brooms are foliar spray, cut-stump, basal bark application or stem injection. These methods are only effective if plants are actively growing at the time of application. While more labour intensive than foliar spray, stem treatment of larger plants is reliable and minimises off target damage.

### 6.5.2 Physical control

Hand pulling can be efficient when removing small or isolated broom plants, or when working in high value native vegetation. Small plants can be hand pulled or dug out of loose or moist soil. The resulting soil disturbance and increased light will promote germination of soil-stored broom seeds, thus follow up control of seedlings will be necessary.

In accessible areas, such as plantations or pastures, equipment can be used to mulch large, non-seeding broom infestations. The layer of mulch may suppress seedlings and regrowth temporarily, assisting with follow up work. Bulldozing or mulching, followed by repeated disc cultivation over several years, has been used to effectively control large infestations. When using machinery in broom infested areas operators should adhere to strict hygiene protocols as movement of seed on earth moving machinery can be a major cause of spread.

### 6.5.3 Biological control

All three broom species are approved targets for biological control in Australia. Three insects and a mite for Scotch broom (Hosking *et al* 2012), and a psyllid for Montpellier broom (Sheppard and Henry 2012), have established in Australia. Some of these agents are causing major damage to broom plants in areas of southern New South Wales, South Australia, Victoria and Tasmania. The most effective agents appear to be the gall mite on Scotch broom and the psyllid on Montpellier broom. Research suggests that these agents are able to cause significant impacts on broom populations, and biological control efforts, such as redistribution and raising stakeholder awareness, should be continued with expectation of future, long term success. While still a target, no biocontrol program has yet been initiated for flax-leaf broom.

### 6.5.4 Fire

Burning can be an effective first step in managing broom. Fire can remove the above-ground biomass and reduce seed banks, depending on the duration and intensity of the burn. Fire triggers mass seed germination, which helps deplete the soil seed bank and provides a good window of opportunity for control, however seeds can still remain dormant in the soil after fire. Well established and dense broom infestations can increase fire risk and intensity in extreme bushfire conditions, especially in open woodland and grassland communities not normally associated with a dense mid storey shrub layer. However, due to the generally low ground fuels present under stands of dense broom, it can also be fire retardant in the low to

medium fire conditions preferred for hazard reduction burn operations. In these cases some prior preparation of core broom infestations may be required to attain a fuel structure capable of burning during a management burn. Using fire as a management tool for controlling broom should always be undertaken in consultation with the relevant fire authorities with appropriately trained and resourced personnel.

Long term, follow up control is required each year to kill re-sprouting plants and new seedlings before they reproduce. Post-fire herbicide applications should occur as soon as ecologically feasible, however care is required to minimise impacts on regenerating native species. If post-fire treatment commences too late, high seedling densities can prevent herbicides reaching all broom seedlings. If not controlled rapidly after fire, broom can dominate vegetation and become a more significant problem. Thus, any fire, planned or unplanned, must be followed by comprehensive weed control. In broom infested areas, wildfire contingency plans should include broom management.

## 6.6 Quarantine and legislation

**Table 7 : State and territory legislative status**

	SA	VIC	TAS	NSW	ACT	QLD	WA	NT
Legislation	<i>Natural Resources Management Act 2004</i>	<i>Catchment and Land Protection Act 1994</i>	<i>Weed Management Act 1999</i>	<i>Noxious Weeds Act 1993</i>	<i>Pest Plants and Animals Act 2005</i>	<i>Land Protection (Pest and Stock Route Management) Act 2002</i>	<i>Biosecurity &amp; Agriculture Management Act 2007</i>	<i>Weeds Management Act 2001</i>
<b><i>Cytisus scoparius</i></b>	Declared – Category 3. Movement and sale prohibited in whole of State. Control required in areas at risk.	Declared - Regionally prohibited in 2 CMAs. Regionally controlled in 5 CMAs. Restricted in 3 CMAs.	Importation, movement and sale prohibited. Landholders may be required to control. Zone A municipalities required to eradicate.	Class 4 noxious weed in 66 LGAs : “The growth of the plant must be managed in a manner that reduces its numbers spread and incidence and continuously inhibits its reproduction.”	Must be suppressed/ Prohibited	<b>Not declared</b>	Prohibited	<b>Not declared</b>
<b><i>Genista monspessulana</i></b>	Declared – Category 3. Movement and sale prohibited in whole of State. Control required in areas at risk.	Declared - Regionally controlled in 7 CMAs. Restricted in 3 CMAs.	Importation, movement and sale prohibited. Landholders may be required to control. Zone A municipalities required to eradicate.	Class 2 noxious weed in 41 LGAs : “The plant must be eradicated from the land and the land must be kept free of the plant.”  Class 3 noxious weed in 9 LGAs : “The plant must be fully and continuously suppressed and destroyed.”  Class 4 noxious weed in 2 LGAs : “The growth of the plant must be managed in a manner that reduces its numbers spread and incidence and continuously inhibits its reproduction.”	Must be suppressed/ Prohibited	<b>Not declared</b>	Unassessed	<b>Not declared</b>

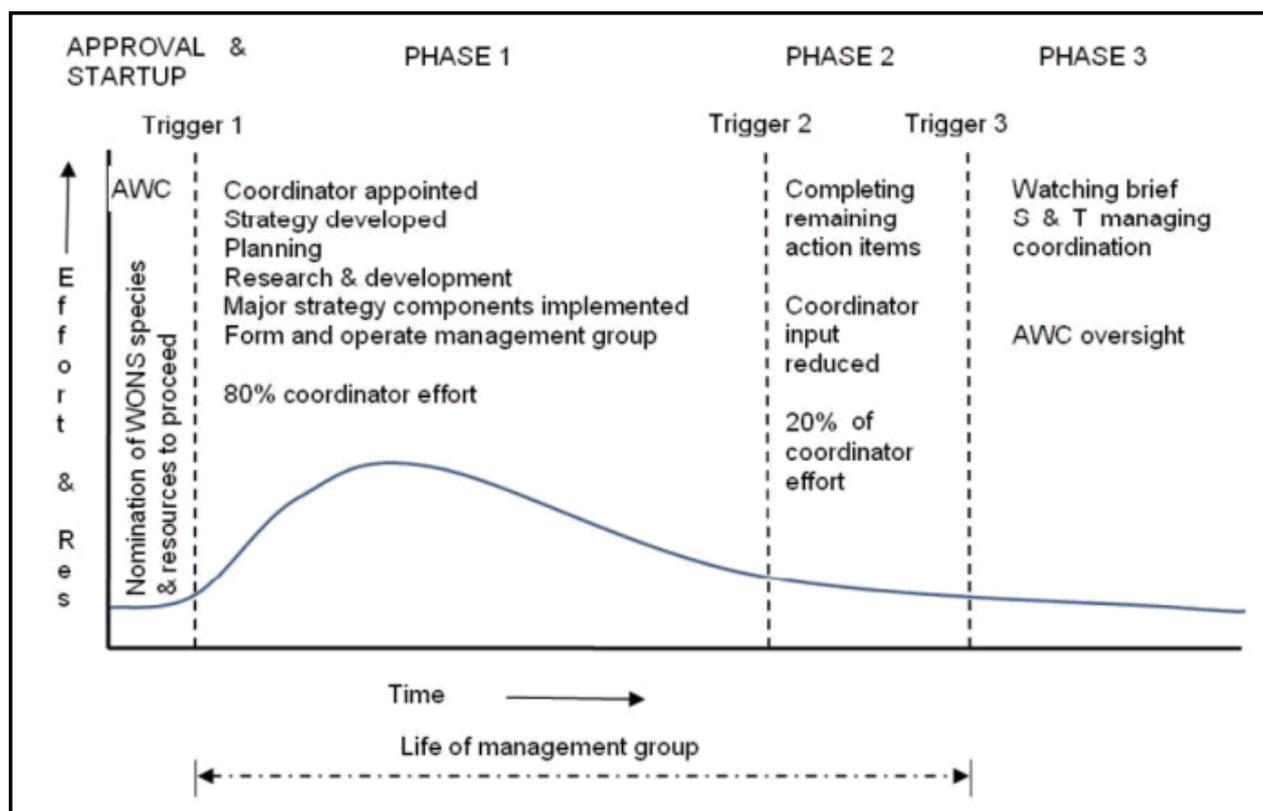
	SA	VIC	TAS	NSW	ACT	QLD	WA	NT
<b><i>Genista linifolia</i></b>	<b>Under review</b>	Declared - Regionally prohibited in 2 CMAs. Regionally controlled in 4 CMAs. Restricted in 4 CMAs.	<b>Not declared</b>	<b>Not declared</b> , except Class 4 in 1 LGA : "The growth of the plant must be managed in a manner that reduces its numbers spread and incidence and continuously inhibits its reproduction."	Must be suppressed/ Prohibited	<b>Not declared</b>	Permitted	<b>Not declared</b>

## 7 Appendices

### 7.1 The WoNS Program and its phases<sup>1</sup>

In 2007, an independent review of the WoNS program concluded that the nationally strategic approach of WoNS was highly successful in leveraging consistent multi-jurisdictional activity on high priority weed species. This initial review was followed by a detailed review of the inaugural WoNS species by the Australian Weeds Committee (AWC) in 2009-10. The AWC reviewed the implementation of the 20 WoNS national strategies and, in light of achievements for these 20 species, considered the capacity for national coordination of additional WoNS species.

Following the reviews, the Natural Resource Management Ministerial Council (Resolution 15.7, 21 May 2009) endorsed a three-phased approach to national management of WoNS species (Figure 4). This 'phased approach' aims to provide the most cost-effective use of limited 'national coordination' resources.



**Figure 5 : Australian Weed Committee diagrammatic representation of Phased approach to implementing a Weed of National Significance strategy**

The phased approach recognises the need for reduced national coordination ('phasing down') of WoNS species that are under effective national management, and allows for further weed species to be nominated for consideration as additional WoNS. The AWC is implementing these reforms, and national coordination of the inaugural 20 WoNS species has already transitioned to Phase 2 or 3, depending on the species. No species have yet been removed from the WoNS list. The AWC is developing a protocol to guide future decisions about when this should occur on a case by case basis.

In 2010, jurisdictions nominated additional candidate WoNS species. These species were independently assessed and the AWC endorsed twelve additional 'species' to be listed as WoNS. The AWC Chairman, Dr

<sup>1</sup> From Thorp 2012 "Additional List of Weeds of National Significance – April 2012"  
[www.weeds.org.au/WoNS](http://www.weeds.org.au/WoNS).

Jim Thompson, announced these additional plant species as WoNS on 20 April 2012. Additional information on the selection of these species and the phased approach is available on [www.weeds.org.au/WONS](http://www.weeds.org.au/WONS)

## 7.2 Glossary

**Asset protection** – A weed management approach to reduce impact or threat to an asset

**AWC** – Australian Weeds Committee

**Biosecurity / Weed Authorities** - statutory agencies/groups responsible for weed management. These vary across jurisdictions (e.g. at state government level in QLD, local government level in NSW and regional NRM level in South Australia, etc.)

**Containment** – A weed management approach that aims to prevent an increase in the distribution of a weed, by using weed control procedures to reduce the density of existing infestations and limit the dispersal of propagules.

**Coordinated control** – Strategic weed management that takes into consideration all occurrences of a weed and involves the collaborative application of weed control procedures towards a specific end (e.g., eradication or containment)

**Core infestation** – A weed infestation that is large and non-eradicable, for a defined scale; management actions include asset protection and biological control, where applicable

**Eradication** -The elimination of every single individual of a species from an area to which recolonisation is unlikely to occur, including propagules (Myers *et al.* 1998).

**NRM Groups** – Natural Resource Management groups (including Catchment Management Authorities)

**Outlier** – An infestation separate from core infestations, which may be eradicable or feasible to control to prevent further spread of the weed

**Partner** – Person, group or organisation actively supporting/participating/investing in weed management/WoNS strategy implementation/responsibility/contribution

**Priority assets** – high value (environmental, primary production, cultural and social) assets determined to be at risk – can be applied at varying scales

**Priority outliers** – outliers that are feasible to eradicate or contain/prevent spread; for WoNS, these are selected based on weed risk principles and where control can lead to national benefit

**Stakeholder** – person, group or organisation interested in or concerned about weeds and or their management

**WoNS** – Weeds of National Significance

### 7.3 References

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