

Section 2

Planning



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Make a plan before you manage brooms

Broom management is a long-term exercise. The most systematic and effective way to deal with brooms is to create and implement a plan. Developing and following a broom management plan is important because it will:

- be an essential information and communication tool,
- help you know what data to gather to inform decision making and adapt your management over time,
- help prioritise the use of limited resources,
- help identify the best means of control and, in turn,
- increase your chances of successfully managing broom in the most effective way.

This section discusses some of the main issues that should be considered when planning your broom management, including a check list of things to consider when developing your plan. These guidelines are based on the 'Introductory Weed Management Manual' (CRC 2004, available at nrmonline.nrm.gov.au/catalog/mql:582). Section 3 then provides more specific pre-control considerations, including hygiene protocols to prevent spread and management considerations in different habitats.

Please note that this manual will not necessarily provide you with all of the information you require for planning. Other texts should be referred to where appropriate.

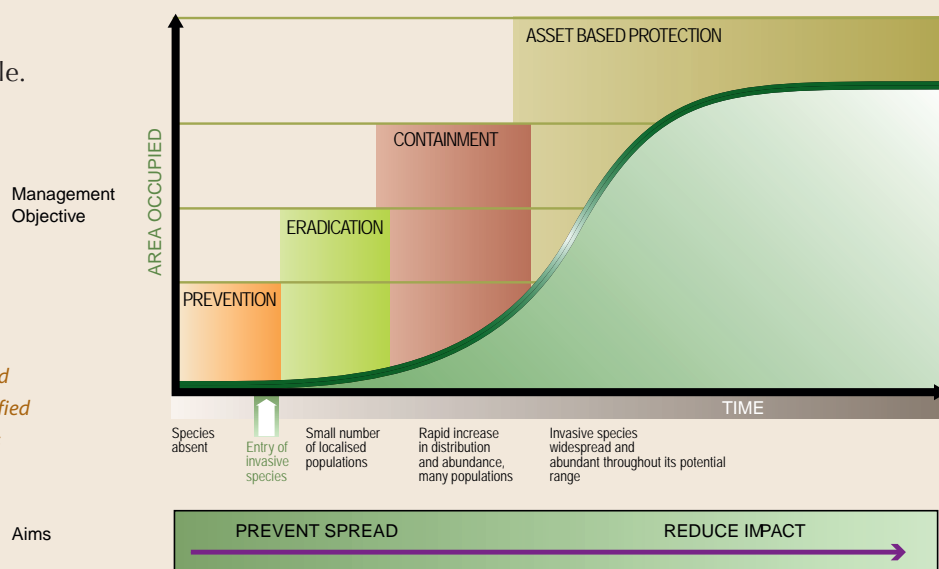
What to aim for? Prevention, eradication, containment or asset-based protection

Setting realistic and attainable goals is important in directing how you go about control and how you communicate your management program to others. There are four possible management aims that will depend on factors such as:

- the size of the infestation,
- age of infestation (and approximate extent of seed bank),
- proximity to other infestations,
- site access, and
- resources available.

The goal you choose will shape the management plan you develop.

Stages of weed invasion with corresponding goals, management objectives and actions at each stage. Modified from Hobbs and Humphries (1995) and DEPI (2013).



PREVENTION: Aims to prevent new weeds from arriving at your site.

At the site level, prevention of broom establishment is achieved through:

- ✓ raising awareness – educate the community on how to identify broom and, if found, consult an authorised officer for assistance with control options and mapping the infestation,
- ✓ assessing areas on a regular basis that are free from infestation but at a high risk of broom invasion (e.g. transport or stock corridors, vehicle tracks),
- ✓ controlling or monitoring potential vectors such as feral animals or stock,
- ✓ treating isolated plants, if found, before they set seed, and
- ✓ thoroughly inspecting machinery and vehicles if they have been used near known infestations.



Mobile washdown unit in the field

Prevention and early intervention provide a high return on investment. To achieve this, you will need to first understand how broom spreads (see 'How do brooms spread' in Section 1 on page 10 and 'Good hygiene can prevent broom spread' in Section 3 on page 47). Preventing spread and establishment of new infestations is the most cost effective way of managing broom.

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ERADICATION: *Aims to eliminate all plants and seeds from an area with limited or no potential for re-invasion.*

Eradication of a broom infestation should only be attempted after due consideration of whether the outcome is achievable. Generally, eradication is only possible when:

- ✓ the weed is in the very early stages of establishment,
- ✓ distribution and abundance is low across the general area,
- ✓ all infested areas are known,
- ✓ the chance of re-invasion from adjacent areas is unlikely,
- ✓ newly emerged plants are easily detected and controlled before seeds are released,
- ✓ there is low potential for a persistent soil-stored seed bank (a key issue with brooms), and
- ✓ resources are sufficient for regular survey, control and ongoing management.

Broom eradication is very difficult due to the highly persistent soil seed bank. High seed production and long seed viability can establish large soil-stored seed banks within a short time of broom establishment. Early detection of newly emerging broom plants is as important as post-control site monitoring. Once a mature broom population is established and has set seed, eradication may not be possible or will involve an extremely long-term commitment.

'Because we hit it so hard as soon as we knew about it, we only got about 12 seedlings coming up last spring. But don't give up. You have to keep watching and pull them out as soon as they germinate', says Christina Gilbert, Operations Officer, Nature Conservation Wellington District, Department of Parks and Wildlife, WA.

Read Case Study 1 on page 116 to discover more about how the Department of Parks and Wildlife in Western Australia are attempting to eradicate the only known infestations of Scotch broom from the State.



H. Cherry

Montpellier broom seedling

CONTAINMENT: *Aims to prevent the further spread of a high-risk weed that cannot be eradicated.*

Containment involves controlling outlying or satellite infestations and preventing broom spread beyond core infestations that are too large and well established to eradicate. To successfully contain broom populations:

- ✓ Determine where to best focus your surveillance efforts by developing an accurate knowledge of the boundaries of current infestations and understanding the vectors and pathways of spread relevant to your site.
- ✓ Prevent broom spread by regularly controlling it along corridors such as roads, walking tracks, animal tracks, riparian areas and drainage lines.
- ✓ Where core infestations of broom occur, work from the edges of the infestation toward the middle, treating all outlier plants and allowing native plant establishment to determine the rate of weed removal.
- ✓ Work together with other land managers to maintain containment zones – collaboration is critical because broom seed disperses long distances via machinery, vehicles and water, and all partners must ensure good hygiene practices are adopted.
- ✓ Encourage regeneration of native plants in adjacent bushland – this is an integral part of containment efforts, as brooms thrive in more open sites and tend not to establish in areas with dense canopy and shrub cover.
- ✓ Plan for a very long-term investment of resources, as unlike eradication, the costs of containment will continue indefinitely.

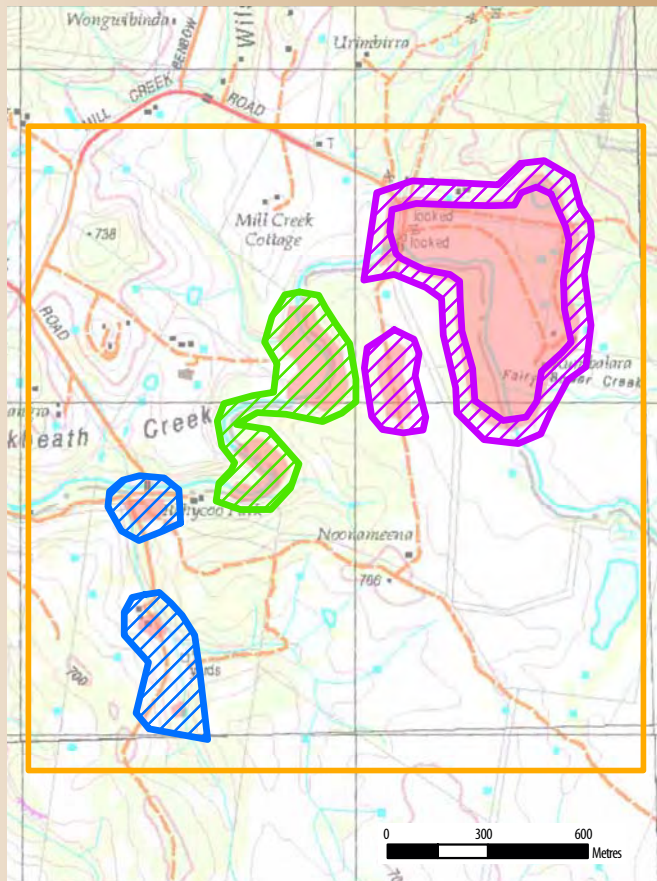


T. Inkson

Montpellier broom along a road corridor

CONTAINMENT – continued on page 36

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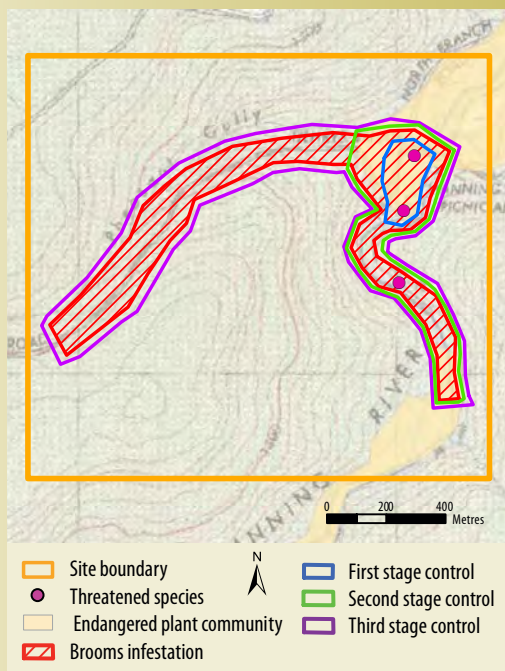
Site management map for containment-based control

Containment should focus on controlling small outlier populations of broom, and stopping its spread from the edges of large, core populations. Remember, a broom infestation may appear to not spread for many years, but a fire or other disturbance can promote mass seedling germination that will allow large populations to establish if not rapidly controlled.

Read Case Study 2 on page 118 to discover how a highly driven group of environmental professionals and community members have teamed up to contain Montpellier broom in the Shire of Manjimup, Western Australia. The Manjimup Weed Action Group have prioritised control of outlying or isolated infestations, where the size of the infestations is manageable and sufficient resources are available for the long-term follow-up needed for successful control.

ASSET-BASED PROTECTION: Aims to reduce the adverse impacts of widespread weeds on highly value assets by protecting and restoring those assets.

Asset-based management should be the focus when broom has become so widespread that eradication or containment is not feasible. Assets may be defined as biophysical or physical elements of the area you are trying to protect (i.e. environment, primary production, human health or cultural). Assets can be prioritised at the state, regional or sub-regional level (e.g. threatened species populations, endangered ecological communities) or on a site or property level. To successfully protect assets:



For more information on site planning and monitoring for asset protection approaches, see the *Monitoring Manual for bitou bush control and native plant recovery* at www.environment.nsw.gov.au/bitouTAP/monitoring.htm.

- ✓ focus control in areas of highest conservation value (those that contain threatened species) or other important assets at immediate risk, and where success is most likely to be achieved,
- ✓ select control techniques with a low risk of off-target damage,
- ✓ use a staged approach to control, guided by site-specific plans, where you work from the asset outwards (as opposed to working from outliers inwards),
- ✓ obtain a high degree of support from all affected stakeholders, and
- ✓ consult experts as needed.

In some situations, a two-pronged approach is required where aspects of both asset protection and containment strategies may be used. This is necessary when trying to contain large infestations to a particular area, while still protecting assets from broom impacts.

Obtaining a high degree of support from all affected stakeholders is a prerequisite to the success of any long-term eradication, containment or asset-based protection program.



Prevention, eradication, containment or asset

protection can be in response to a specific or local situation, or used to implement strategic weed management at a regional, state or national scale. Different weed management strategies and legislation can be applied to each of these approaches, depending upon the situation. For example, see the WoNS strategic plan for brooms that is endorsed by all states and territories (available at www.weeds.org.au/WoNS/brooms).

Developing a management plan

Broom management plans should be:

- ✓ targeted to achieve both long- and short-term objectives,
- ✓ able to respond to changes in the environment (e.g. fires and other disturbance events, other weeds),
- ✓ based on site conditions in the context of the broader landscape (e.g. neighbouring weed and native plant populations and how they may affect your program),
- ✓ consistent with existing strategies,
- ✓ aware of work already occurring in the community or region, and
- ✓ equipped with monitoring actions.

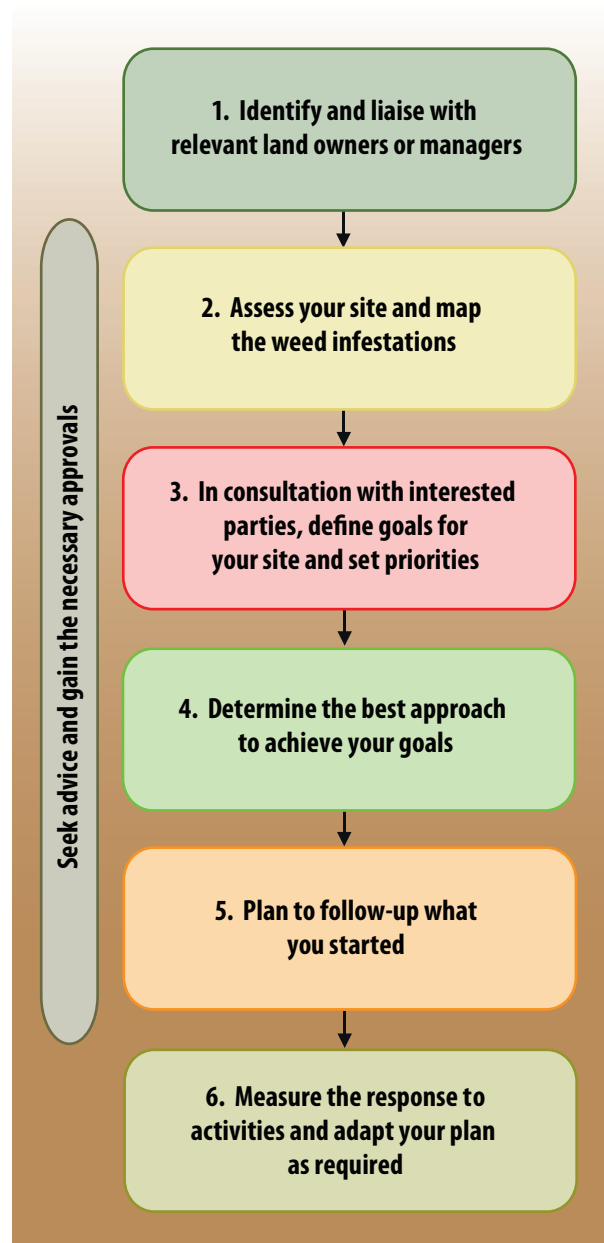
Where to start

- **If you are concerned about broom on public land in your area**, contact the local council or parks office and discuss with them how to become involved. They may already be doing valuable work in your area, or there may be an active community group you can join. If not, and you obtain an agreement to start work at a new site on public land, your planning process should follow the flow chart and checklist of steps below to develop a weed management plan.
- **If you are a private landholder or custodian of public lands and want to start work on broom**, you should also use the flow chart and checklist of steps below. In addition, it is important to talk with other landholders, custodians or groups working on brooms or other weeds in your area to see what they have done and if you can complement existing programs.
- **If you become involved with an existing broom control program**, there should already be a plan in place, so the planning process outlined here is only for information purposes. If there is not

a plan in place, then you should discuss with the program leader the need for a plan using the flow chart and steps shown.


- **If your site contains threatened species**, you should contact the relevant threatened species officer in your state or territory. Please refer to Section 7 page 136 for contact details.

Planning flow chart



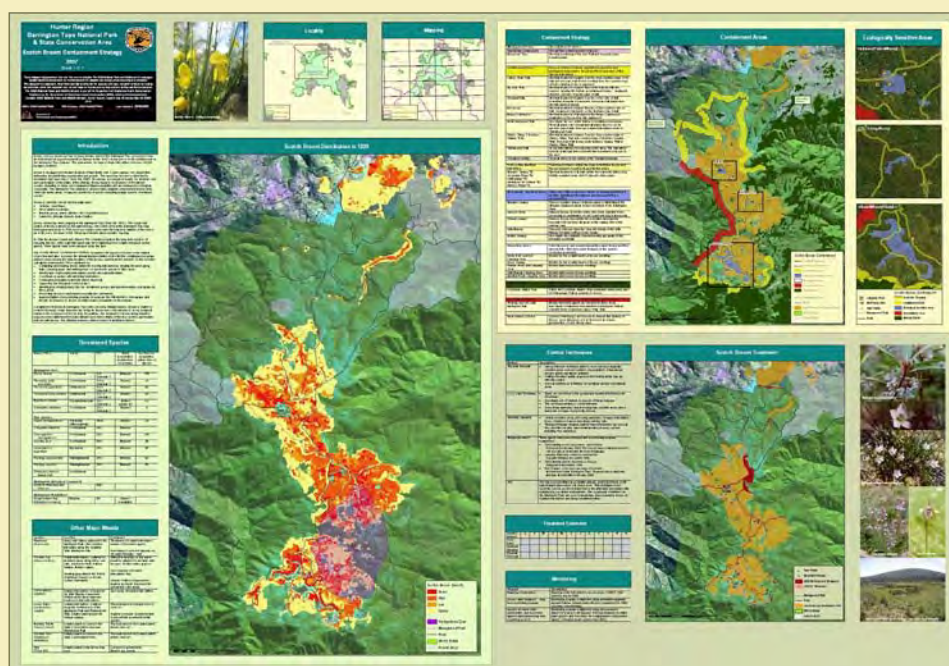
Management plan checklist

The stages outlined in the planning flow chart on page 38 are expanded here to help guide you in the planning process and prepare a site management plan.

Steps in the planning process (as per flow chart page 38)	Short explanation about each step
1. Identify and liaise with relevant land owners or managers  <p><i>Liaise with the relevant landowners and community during the planning process and throughout your program</i></p>	<p>Permission is required to undertake activities on other people's land, and with brooms it is likely that management across multiple tenures will be required. You should develop partnerships and cooperation across all areas needing management before commencing control efforts. This may be conducted in tandem with the next step, 'Assess your site'.</p>

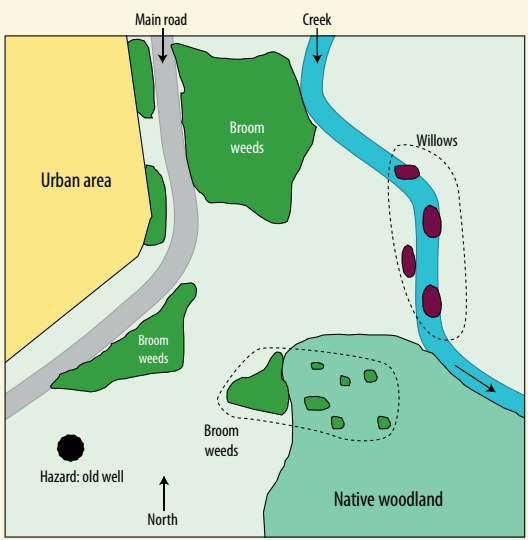


2. Assess your site and map the weed infestations



A primary step in any weed control project is to map infestations, identify areas for control and prioritise areas that require treatment first. To simplify this task, prepare a site information sheet (see the Appendix 'Site plan template'; Winkler *et al.* 2008) and weed management map.



Your whole plan can be as simple as a map with key areas outlined (e.g. this map shows strategic management actions for large broom infestations in Barrington Tops NP)

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Steps in the planning process (as per flow chart page 38)	Short explanation about each step
<p><i>[2. Assess your site... continued]</i></p> <p>☑ Prepare a site map</p> 	<p>A local map of your site is a critical component of your plan. It forms the basis for recording information for your site assessment, and planning your control activities. It should:</p> <ol style="list-style-type: none"> 1. set the boundaries for your site, 2. show location and extent of weed infestations, 3. show where significant environmental and cultural sites occur, 4. show where control areas are located, and 5. be able to demonstrate changes in weed location and density over time. <p>Topographic maps or aerial photographs are useful for creating basic weed management maps. There are many mapping tools freely available on the Web. For example, the Atlas of Living Australia (www.ala.org.au) provides a free platform for interactive map making. Alternatively, for small sites, you can develop a mud map. Mapping broom in the spring while in flower makes plants easier to spot amongst vegetation.</p>
<p>☑ Identify and prioritise weeds on site</p>	<p>Often there are multiple weeds to deal with and it is important to assess their likely levels of impact and risk. Some weeds may not warrant control in the short-term, while others may require urgent attention.</p>
<p>☑ Determine the extent of weed invasion</p>	<p>This will help assess whether you can eradicate, contain or reduce impacts.</p>
<p>☑ Identify risks – deal with geomorphology for long-term site stability</p> <div style="display: flex; align-items: center;">  <div style="margin-left: 10px; writing-mode: vertical-rl; transform: rotate(180deg);">J. Cohen</div> </div> <div style="display: flex; align-items: center; margin-top: 10px;"> <div style="margin-right: 10px;"> <p>Scotch broom commonly invades steep and inaccessible areas</p> </div>  <div style="margin-left: 10px; writing-mode: vertical-rl; transform: rotate(180deg);">P. Vale</div> </div>	<p>This extends to dealing with risks associated with safety and access (steep or uneven terrain). Consider risks around waterways, such as difficulty of access and control limitations in aquatic situations. Perform a safety assessment for your group and neighbouring residents.</p>  <div style="text-align: right; writing-mode: vertical-rl; transform: rotate(180deg);">S. Bower</div>

Steps in the planning process (as per flow chart page 38)	Short explanation about each step
<p><input checked="" type="checkbox"/> Identify and record assets</p> 	<p>For example, the presence of animals and threatened plant species, sites consisting of geological and biological features that are highly sensitive to change (e.g. wetlands) and/or cultural heritage sites. A valuable resource to consider is <i>Ask First: a guide to respecting Indigenous heritage places and values</i> (available at www.environment.gov.au/resource/ask-first-guide-respecting-indigenous-heritage-places-and-values). Also see the table on page 137 in Section 7 – Further information.</p>
<p><input checked="" type="checkbox"/> Determine land-use and/or management history</p>	<p>Who are the stakeholders involved? How long have weeds been present on the site? Are there historical factors that may influence management (e.g. recent fire, disturbance events, any recent revegetation or restoration works)? Mark these sites on your maps.</p>
<p><input checked="" type="checkbox"/> Consider future fire events</p>	<p>Fire plays an integral role in the functioning of many natural ecosystems in Australia. Bushfires and planned prescribed burns should be considered when formulating a broom management plan. Prescribed burns are carried out for either hazard (fuel) reduction purposes or for ecological purposes to trigger the regeneration of native vegetation, or both (see Section 3). They can also trigger mass germination of broom seedlings.</p>
<p><input checked="" type="checkbox"/> Research the target weed/s</p>	<p>...to understand why weeds are present, when they flower and set seed in your particular area, and what other weeds may become problematic.</p>
<p><input checked="" type="checkbox"/> Allocate time and funds</p>	<p>...extending to and including follow-up management. If it is unlikely that there will be sufficient funds in future to conduct follow-up work, your initial investment could be completely wasted.</p>
<p><input checked="" type="checkbox"/> Monitor the effectiveness of control outcomes</p> 	<p>In your initial site assessment, ensure that you have considered what factors you want to measure to demonstrate the success of your control program. This ensures that you have adequate baseline information to compare with future changes, which allows you to easily communicate your successes and adapt your program in response to any changes that occur.</p> 

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Steps in the planning process (as per flow chart page 38)	Short explanation about each step
3. In consultation with interested parties, define goals for your site and set priorities	<p>Using your site assessment, you can now determine your priorities and develop objectives and actions to address them. For example, what do you want to achieve? Do you want to restore the vegetation to its original condition, eradicate a weed, contain a weed infestation or determine whether a site is worth investing in? Refer to page 32 'What to aim for?' for further information on setting realistic goals.</p>
	<p>Who should I talk to? People that you can consult or talk to about your site include:</p> <ul style="list-style-type: none"> • Community Support or Regional Landcare Officers (CMA / LLS / NRM). • Local council officers (weeds, bushland, biodiversity or environmental). • Local Aboriginal communities. • Local and regional community groups including Landcare groups. • Local weed authority or biosecurity officers. • National Parks rangers. <p>For your reference, a collection of relevant contacts is provided in Section 7— Further information.</p>
4. Determine the best approach to achieve your goals To determine the best weed control methods for your site, you should consider:	
<p>✓ The need to integrate control methods</p>  <p style="text-align: right; font-size: small;">A. Shackleton</p>	<p>Often the most successful and cost-effective approach to controlling weeds is to combine or integrate several control methods over time (integrated management). A variety of methods can be used to target vulnerable aspects of a weed, its life cycle, or its environment. For example, mature plants may be treated with herbicide while subsequent seedling germination may be controlled by hand pulling. By using several techniques to control weeds, you can reduce the chance of that weed species developing resistance to a particular herbicide. Also, some control methods will apply to multiple weeds, allowing you to control a range of weed threats together. It is important to note that biological control takes many years and must be integrated with other management techniques to control infestations.</p>
<p>✓ What 'assets' are found at your site?</p>	<p>To protect important assets, you should choose a control method that will have minimal adverse impacts on that asset (e.g. minimal off-target damage).</p>
<p>✓ The impact of weed removal</p>	<p>Is native plant regeneration likely or is there a possibility of invasion by other high impact weeds, or both? If revegetation is required, planning at the outset is essential to ensure resources will be available to meet long-term objectives.</p>
<p>✓ The need for cooperation from adjoining landholders</p>	<p>Weeds do not recognise property boundaries. There may be socio-economic factors that affect the ability of land owners to manage weeds. Communication with adjacent landholders will help align landscape priorities and garner commitment.</p>

Steps in the planning process (as per flow chart page 38)	Short explanation about each step
<input checked="" type="checkbox"/> What is causing the problem and can you manage this cause?	For example, broom can be spread by humans using machinery or dumping garden material, in water flowing from broom infestations, or by seeds sticking in the fur or feet of animals. How can these pathways be managed to reduce spread? See 'Preventing broom spread' on page 46 for further information on this.
<input checked="" type="checkbox"/> What resources do you have?	Do you have skilled personnel, funds or a financial plan and equipment available to complete the work? Making contact with local government or regional groups may allow you to access additional resources or combine your efforts with others who are managing brooms and other weeds (see Section 7 – Further information for a list of relevant contacts).
<input checked="" type="checkbox"/> Establishing a long-term plan	Schedule a control plan that is ongoing and includes follow-up control and monitoring activities at appropriate times (see Section 4 – Control methods and Section 5 – Follow-up, restoration and monitoring).

5. Plan to follow-up what you started



M. Sheehan

Montpellier broom resprouting from the base

The key to successful control is commitment to an appropriate ongoing control program. Often initial control is done across too large an area for follow-up control to occur, or initial efforts are not maintained over time to allow a successful outcome. Exhausting the broom seed bank will take many years, thus ongoing monitoring and control activities will need to be conducted.

Because broom seed is very long-lived, it is essential to prevent further seed set and not allow replenishment of the soil seed bank. Broom control activities can be reduced in frequency once all mature (reproductive) plants are controlled and are no longer producing seed (i.e. contributing to the seed bank). The rate of germination observed at your site should be used to inform the frequency of follow-up treatments.



P. Watton

Montpellier broom regenerating after a prescribed burn

Steps in the planning process (as per flow chart page 38)	Short explanation about each step
<p data-bbox="229 501 703 528"><i>[5. Plan to follow-up what you started... continued]</i></p> <p data-bbox="263 577 775 611">Brooms ‘fight back’ swiftly after control, so...</p> <p data-bbox="263 633 1265 663">Plan to manage regrowth and seedlings – or you may end up with a bigger problem than you started with!</p> <p data-bbox="263 669 1345 730">After initial control of mature broom, plants that do not die will resprout and/or seedlings will emerge. Your follow-up control plan should consider the differences between regrowth and seedlings, because they are each managed in different ways.</p> <p data-bbox="263 761 1206 792"> <input checked="" type="checkbox"/> Plan to follow-up monitor and control any <u>regrowth</u> within 3–6 months following initial control </p> <p data-bbox="263 799 1342 925">Mature and actively growing broom plants will resprout from well-established root systems if burnt, ineffectively sprayed or cleared without using herbicides. Regrowth will usually be multi-stemmed and vigorous and is capable of producing seed within 6–12 months after initial control, due an already well established and robust root system. You should therefore plan to control any regrowth within 3–6 months after control.</p> <p data-bbox="263 960 756 1023"> <input checked="" type="checkbox"/> Plan to follow-up monitor and control <u>seedlings</u> approximately 12 months following initial control </p> <p data-bbox="263 1030 791 1252">Seedlings germinate from seeds in the soil. New seedlings are soft, single stemmed and have three leaflets. In contrast to regrowth, seedlings are spindly and weak in the first year or two and are vulnerable to competition and to hot and dry weather, so follow-up control of seedlings can easily be delayed until 12 months following initial control. This will allow natural mortality to take place and new seedlings to emerge.</p> <p data-bbox="263 1283 786 1346"> <input checked="" type="checkbox"/> Plan to continue to follow-up and control regrowth and seedlings at regular intervals for many years! </p> <p data-bbox="263 1352 1361 1413">Due to the enormous seed bank and ability of seeds to remain dormant in the soil for a long time, long-term follow-up management will be needed. Only a very small percentage of seedlings need to survive to then become a dense stand of mature plants.</p>	
<p data-bbox="201 1498 786 1570">6. Measure the response to activities and adapt your plan as required</p>  <p data-bbox="791 1957 810 2051" style="writing-mode: vertical-rl; transform: rotate(180deg);">Parks Victoria</p>	<p data-bbox="839 1498 1420 1655">Are your management actions achieving your priorities and goals? Some simple monitoring and evaluation will help you answer this question. Monitoring is an essential component of any weed management program and sufficient resources should be allocated to monitoring.</p> <p data-bbox="839 1666 1053 1695">Monitoring allows you to:</p> <ul data-bbox="839 1702 1414 2004" style="list-style-type: none"> • assess the effectiveness of your control program, • adapt your control program if it is not achieving desired outcomes, • assess the rate of establishment of native regeneration, if applicable, • identify any new weed infestations or issues that may affect the success of your control program, • demonstrate progress to your group or funding body, and • raise awareness for group momentum and general public education. <p data-bbox="839 2022 1259 2051">See Section 5 for more information on monitoring.</p>



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