

Section Six

Monitoring your progress



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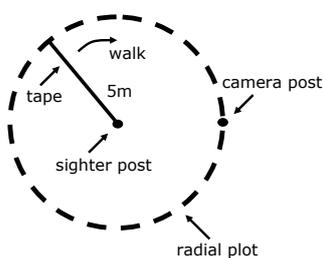
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Monitoring your progress

To evaluate how effective your control activities or programs have been in achieving your goal or proposed outcome, some kind of monitoring is needed. Thus monitoring is an essential part of your weed control program, as highlighted in Section 2.

Unfortunately, monitoring has not always received appropriate emphasis in the planning and assessment stages of weed control programs, where monitoring is most critical. Work is often put into collecting monitoring data that may not be useful for measuring success towards project goals. For instance, insufficient data or the wrong type of data may be gathered, data may be collected in a manner that is not robust enough to analyse, or data may be collected and never analysed. A recent survey of bitou bush control programs in New South Wales reported that, of the people who collected regular monitoring data, few analysed it.

Impediments to good monitoring can be due to many reasons, including:

- Lack of resources,
- Limited understanding about monitoring techniques,
- Absence of guidelines or professional guidance,
- Apprehension that monitoring may be too difficult or may take resources away from control efforts, and
- Lack of commitment.

But monitoring can be inexpensive and easy. Good monitoring techniques can be readily adapted to any situation and efficient monitoring can be achieved at many levels, from simple, straightforward data collection to rigorous scientific studies.

Monitoring can be easy

For many people monitoring is a daunting task – what to do, when to do it, how often, etc.? And then, what do you do with the data once you've collected it? This leads some

practitioners to avoid monitoring altogether. However, monitoring may be easier than you think. In fact, most of us do some form of monitoring every time we go to a site simply by observing changes over time or as a result of some event like weed control. The important thing is to convert these observations into something which can be objectively measured and analysed. If you can capture data which reflects your observations in a simple manner, these records can be analysed to inform on your progress towards the goals or objectives of your control program.

Keeping a diary

One of the easiest monitoring efforts involves keeping a diary. A site diary can be useful for documenting activities undertaken, as well as observations before and after such activities. For the site diary to be most effective, you need to make an entry every time you visit the site and record all activities and observations, as well as the date. Try to be as consistent as possible in your descriptions so they can be compared over time. Things to consider include: making observations from a standard location; describing the same patch (e.g. the south side of the headland); thinking about a measure of change, like percentage cover of bitou bush, and using it each time. The longer you can keep records of what is occurring at your site, the more robust your information will be.



Hilary Cherry

Tips for good monitoring

When monitoring always:

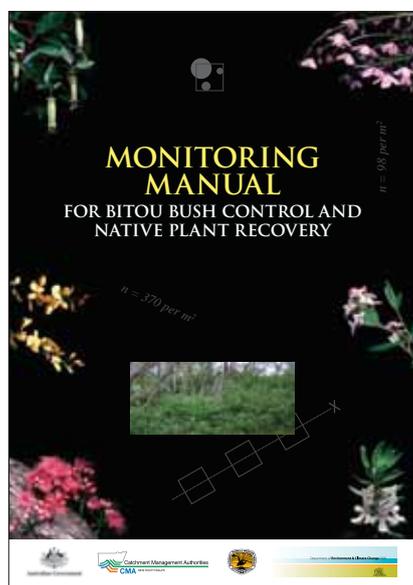
- Use the same methods (e.g. collect the data in a consistent manner),
- Undertake monitoring at the same or similar time every year,
- Monitor before and after control,
- Collect data from a non-invaded site for comparison/reference,
- Write down your methods,
- Make copies of your data,
- Use the same standard datasheets every time,
- Double check that you have collected all the necessary information before you leave the site,
- Avoid shortcuts,
- Try to have the same person/s collect the data each time,
- Incorporate monitoring into your yearly activity timetable,
- Collect data as you go (e.g. you can record the number of plants as you remove them during handweeding), and
- Enter your data into an electronic spread sheet (and make backup copies).

Monitoring guidelines

To help overcome monitoring challenges and encourage standardised data collection, monitoring protocols were developed in New South Wales as part of the *NSW Bitou Bush Threat Abatement Plan*. These protocols provide guidance on monitoring methods that assess the:

- Effectiveness of bitou bush control programs,
- Response of native species to control programs,
- Response of other weeds to control programs, and
- Cost of control activities.

Copies of the *Bitou Bush Monitoring Manual* can be obtained from www.environment.nsw.gov.au/bitoutap/monitoring.htm.



The *Bitou Bush Monitoring Manual* is also applicable to a wide range of users in terms of their skills and resources. This is achieved using a three-tiered monitoring system in which the standard monitoring methods are designed for all user levels, while the advanced methods are intended for those with previous monitoring experience or who wish to gain a better understanding of their site and efforts. Finally, the guidelines include a research tier that is aimed at high level monitoring to determine causality (i.e. if the control event was directly responsible for native species recovery), in a scientifically robust manner. The manual contains detailed descriptions of each monitoring method, as well as standardised data sheets and information on analysing data. The guidelines can be used by anyone, however if the data is collected from a priority bitou bush threat abatement site (TAP site) then the data should be submitted to the TAP coordinator, who will collate and analyse the data collectively.

Monitoring guidelines – standard monitoring

A brief overview of the standard monitoring protocols is presented here, outlining four basic monitoring components:

1. A map,
2. Photopoints,
3. Observational data (to support the photopoints), and
4. An economic assessment of the cost of the control effort.

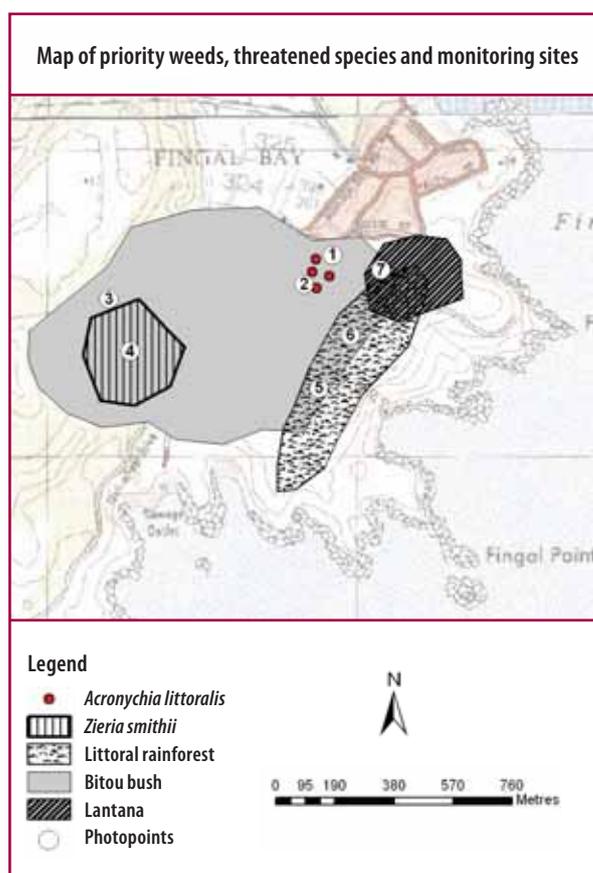
1. Monitoring with a map

Creating a map of your site is a critical component of your management program. This map, if made appropriately, can also be used to monitor the success of your control program. Below is a summary of the key points:

- Separate each aspect of your site and your control program/s onto different maps (layers). For example, a base map showing topography and key orientation objects (e.g. roads) of the site, a map of bitou bush only, a map of where you plan to control bitou bush, and maps showing locations of cultural heritage sites, threatened species, other weeds and monitoring programs such as photopoints.
- By creating each layer of information as a separate map, these layers or overlays can be compiled to produce a composite map. On each layer of your hard copy map, make two crosses of the same size, one at the top and one at the bottom of the page, in the same location, to line them up when forming the composite map. You can use clear plastic for the layers (e.g. overhead projector sheets) to help with viewing the final product. Alternatively, for electronic maps created with a geographical information system (GIS), attributes of each layer can be combined to produce the composite file.
- Each year, create an updated layer of where you undertook bitou bush control.
- Each year, create an updated layer of any other layers that may have changed. For example, if bitou bush or other weeds have

spread or changed their distribution on your site.

- Make notes on the causes for these changes. For example, ‘other weed populations were reduced as a result of spraying for bitou bush control’.
- By comparing the initial layers with the updated layers, measures of success can be made, for example by assessing the area treated, or by assessing the distance you have moved bitou bush away from a threatened species.



Example composite map showing multiple layers including locations of weeds, threatened native species, areas for control and monitoring/photopoint sites

2. Photopoints

Photopoints are a photographic record of changes occurring over time at your site, taken consistently from the same locations. They are an excellent tool for demonstrating progress to members of community groups, the public, and funding bodies.

To assist with monitoring, photos can be taken of:

- Patches of bitou bush, before and after control,
- Other weeds that invade after bitou bush control, and
- Other aspects of your site which are important to your goal (e.g. threatened species).

As soon as each photo has been taken, record the details of the photograph in your site diary, or on the photopoint monitoring field sheet (available in the *Bitou Bush Monitoring Manual*). Include the time and date, the location of the photo, the subject of the photo, and the photo number. Also record the location of where the photos are to be stored and the file name if the photos are taken with a digital camera.



Stephen Booth



Stephen Booth

Photos taken from the same point over time clearly show visual changes before (above) and after (below) bitou bush control (note the headland in the background has been included as a point of reference)

Tips for taking good photopoints

- Always take photos from the same place. Either permanently mark the location with a post or star-picket or use a fixed object (e.g. fencepost).
- Include some prominent, long-lasting features in the photo such as large rocks or trees. You can also record a compass bearing to prominent land marks.
- Use the same camera and zoom setting for each photo. It is easier to match the photos if no zoom is used.
- Take the photos at the same time of the day (preferably not in the middle of the day).
- Take previous photos into the field to help replicate the shots.
- A tripod helps standardise the height of the photo.
- Include an object of known size in the photo for scale. Examples include a person, a clipboard, or a measuring rod.
- If possible, include the horizon in the photo.
- If possible, include an identification label for the site, for example an A3 piece of cardboard clearly identifying the site name, date of photo and subject of photo which will be easily recorded in the photo. Try to position the label about 5 m from the camera position.
- Take several photos, as the first one may not be the best.

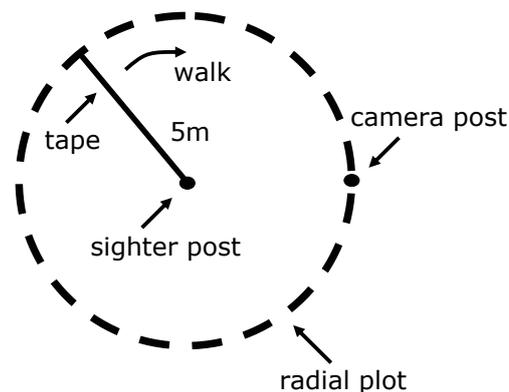
3. Observational data (to support photopoints)

While photopoints can be a very valuable monitoring tool to illustrate the changes in vegetation over time, they have limitations with respect to reporting your progress to other people or for inclusion in reports (e.g. in many instances the photos show a change from one green plant to another green plant). The *Bitou Bush Monitoring Manual* outlines a series of observational data collection methods to describe the changes observed between

photos taken using the photopoint monitoring method.

Methods for collecting observational data are summarised below:

- Using the permanent marker for your photopoint site and a tape measure, create either a circular or rectangular plot covering the immediate area in the photo (i.e. the first 5 m (see figure opposite)).
- Create a list of key species to observe (both native and weedy – including bitou bush). The number of key species will depend on what you want to show over time. Think about their likely response before selecting your key species (e.g. are they likely to change? Increase? Decrease?). *Use the same key species every time.* If you add new species later, record which ones and why you added them (e.g. they may suddenly become dominant).
- Within the plot, make observations on the presence or absence of your key plant species (both native and bitou bush/weeds).
- You can combine this presence/absence data with observations on the coverage of each species (e.g. bitou bush covered 60% of the area). If using cover estimates use standard percentage classes (e.g. 0%, 1–5%, 6–25%, 26–50%, 51–75%, and >75%).
- Alternatively you may wish to assess the density of your key species by counting the number of individuals of each within each area sampled. Note: if you use this method you will need to permanently mark out the area sampled so you count the same individuals each time. You will also need to work out the area sampled. For example a circle with a 5 m radius around your marker equates to an area of 78.5 m². The number of plants should then be converted into an individual metre squared value (e.g. 23 plants would convert to 0.29 plants per m²).
- Lastly, you might want to break down the number of key plant species into age classes (e.g. adults and seedlings) to show the level of recruitment and the success of that recruitment over time.



Circular photopoint and monitoring plot

4. An economic assessment of the cost of the control effort

Recording the cost of control (both in terms of labour and dollars spent) is important for evaluating the cost-effectiveness of different methods and helps you stay within budget. You should record in a diary the time spent on each day, the number of people involved and costs incurred (e.g. contractors or tools) or partial costs (e.g. 100 mL of herbicide). Where possible, record individual activities such as bitou bush control, other weed control, monitoring etc., either as separate activities (e.g. bitou bush control took three hours) or as a proportion of the total (e.g. bitou bush control took 50% of the time).

Distribution mapping of bitou bush

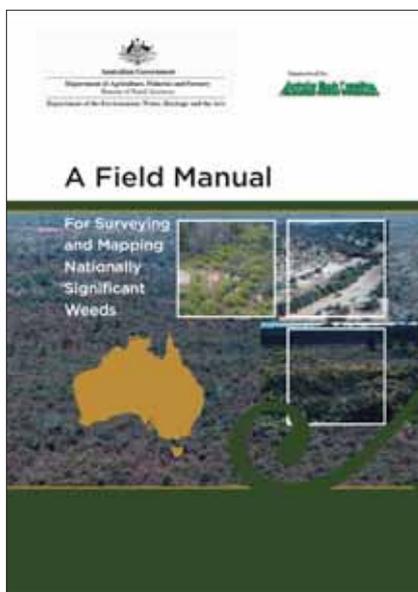
A fine scale of bitou bush distribution is a critical component for your site map and it provides essential information for your management plan and future decision making. Surveying and recording bitou bush distribution can also be performed over a wide area of the landscape either on the ground or from the air (e.g. helicopter surveying using video recording or using aerial photography).

Information on the distribution of bitou bush at any scale is extremely important to a range of stakeholders outside of your site, (e.g. see 'Bitou bush network in Australia' on page vii). It can feed into regional, state and national distribution maps. If you think you have identified a new or previously unknown bitou

bush infestation, report it to your local weeds officer (contactable through your local council or shire) and provide them with your map. The information can then be passed on to state agencies, and be added to maps at state and national levels.

 **Recording the absence of bitou bush in an area is also important to ensure the area is known to have been surveyed and is free of bitou bush. Be sure to pass the results of your survey on to the relevant weed authorities.**

Standard protocols for mapping the density of bitou bush and other Weeds of National Significance (WoNS) in Australia have been developed by the Australian Government (McNaught *et al.* 2006). Where possible you should use these so that your distribution map is consistent with and can feed into other broader maps. Copies are available from www.weeds.org.au.



Recording control history is also worthwhile as this can indicate the reasons for changes in density or distribution over time. Mark the areas treated by various control methods (e.g. handweeding, aerial spraying etc.) on your distribution map. Chance natural events such

as fire or flooding can also affect bitou bush distribution, therefore mark affected areas as a reference for future assessment.

 **A problem may arise when trying to classify recently controlled infestations. For example, a heavy infestation (100% cover) may reduce to less than 10% cover immediately after control, and may be 40% by the time of next control. For consistency, always record the density pre-treatment.**

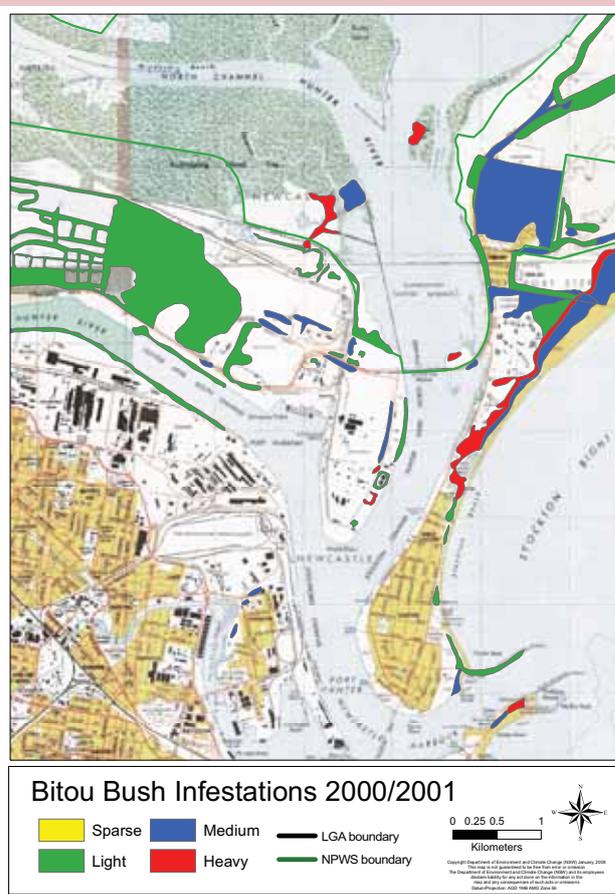
National bitou bush mapping program

Prior to 2007, individual states and regions had been collating their bitou bush distribution maps independently and not necessarily in the same format. For example, comprehensive mapping was carried out in New South Wales in 1984 and 2001, while in Queensland bitou bush has been surveyed annually since the late 1990s using slightly different density classes. The national WoNS program provided an opportunity to map bitou bush in 2008 on a national scale.

Density classes were adopted to enable appropriate comparisons between historic bitou bush data and newly collected data in 2008, on a national scale. While the density classes provided on page 78 are slightly different to the WoNS standard density classes, they can be suitably fed into the WoNS classes and may therefore be used for future bitou bush distribution mapping, enabling further comparisons with historical data.

Density classes for bitou bush mapping*

Standard colour scheme	Bitou bush density class	Description	Standard WoNS density class**
Grey	Absent	No plants found during survey	Class 1
Yellow	Sparse	One or two plants only	Class 2
Green	Light	<10% cover, infrequently dispersed seedlings, small or large plants and small clumps	Class 3
Blue	Medium	10–40% cover, plants and small clumps readily located, generally uniformly dispersed throughout the site; occasional clumps	Class 4 equivalent
Red	Heavy	40–70% cover, dense clumps forming continuous infestations in patches, with native flora still present in patches	Class 5 equivalent
Black	Very heavy	>70% cover, bitou bush plants essentially forming monocultures	
White	Not surveyed	Not surveyed	Class 8



* The methods adopted for bitou bush mapping were based on previous mapping methods bitou bush in New South Wales (Thomas (2002), originally defined by Williams and Gerrand (1999)).

** McNaught *et al.* 2006.

Class 6 (present, density unknown) and Class 7 (not known, or uncertain) are not shown as they have not been used in previous bitou bush mapping.