

Weed Management Plan for Bellyache Bush (*Jatropha gossypifolia*)

2013



Weed Management Branch

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Cover photo: Flowering bellyache bush plant

Executive summary

This Weed Management Plan forms part of a strategic approach to bellyache bush (*Jatropha gossypifolia*) management in the Northern Territory (NT), with the overall aim being to mitigate the damage caused by bellyache bush in relation to production, environmental and cultural values and prevent possible health implications associated with its spread.

A comprehensive weed risk management assessment found bellyache bush to be a very high risk weed where potential exists for successful management. On the basis of this assessment bellyache bush has been declared under the *Weeds Management Act* as:

Class A: **To be eradicated**, in all areas of the NT except where it is classified as Class B;

Class B: **Growth and spread to be controlled**. This is an area roughly described as Greenant Creek subcatchment in the lower Daly River catchment; Aroona, Mathison and Scott Creek subcatchments in the upper Daly River catchment; upper Roper and Hodgson river catchment; and the Rosie Creek catchment; and

Class C: **Not to be introduced into the NT**, in all areas of the NT. (All Class A and B areas are also classified as Class C.)

The mixed declaration classes (A/C and B/C) reflect the varying feasibility of control between the two areas. Low density, high feasibility of eradication and control (Class A), and high density, lower feasibility of eradication (Class B), plus the need to prevent new introductions across all of the Territory (Class C).

The delineation of management zones associated with these declaration classes represents a defensible balance between the difficulty of managing large established infestations (B/C zone) and the urgent need to eradicate outlying populations (A/C zone).

This plan establishes the objectives and outcomes to be achieved by land managers and the minimum actions to be taken to achieve these outcomes. Conducting land management practices in accordance with this plan will secure compliance with the requirements of the *Weeds Management Act*. As this is the first plan to be prepared for bellyache bush, the outcomes and options identified represent a first step towards reducing the impacts and threats of this weed. It is acknowledged that the range of capabilities for managing weeds vary between land managers and that in the first instance some will need time to build knowledge and capacity to adjust to new requirements. Accordingly this plan takes effect for a period of three years, during which it will be monitored. The plan will be reviewed and any necessary adjustments made at the end of that period.

This plan also incorporates *best management practice goals* which will ultimately contribute to strategic weed control at a Territory scale. Information on a range of management techniques and control methods, including physical and chemical control, controlled burning and hygiene procedures is included.

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1. Introduction

1.1 Background

Bellyache bush is a multi-stemmed, perennial shrub that can grow up to 4 metres in height which is widespread within its natural range from Mexico to southern Brazil. It is likely that bellyache bush was introduced, with other *Jatropha* species, into the Darwin Botanic Gardens approximately 100 years ago. Some subsequent spread in the NT can be attributed to the use of bellyache bush as a garden ornamental plant. There are currently two distinct strains of bellyache bush present in the NT: the 'Darwin Purple' with predominantly purple/red foliage and the 'Katherine Green' with green foliage.

Bellyache bush reduces production values and increases land management costs. Bellyache bush populations can replace native plant communities, forming dense monospecific stands which can impact ecological functioning and restrict access to country. Bellyache bush is poisonous to both humans and stock if ingested.

1.2 Period and application of plan

This plan, being the *Weed Management Plan for Bellyache bush (Jatropha gossypifolia)*, has been approved under section 10 of the *Weeds Management Act* (the Act). This plan applies to the whole of the NT and specifies the minimum requirements for managing bellyache bush in the NT. It applies to all landholders, including the Northern Territory Government.

The plan takes effect from the 24th day of December 2013. It must be reviewed within three years of this date and will cease ten years from this date, unless replaced by a revised plan.

During the first three years of this plan, the NT Government will monitor the effectiveness of the plan to determine the most appropriate management obligations of landholders for future planning and control. In the meantime, the requirements specified should be observed by all landholders.

Meeting the objectives set out in this plan is important for long term effective management of bellyache bush in the NT. Landholders are required to meet the management requirements outlined in the plan in order to secure compliance with the Act. Penalties of between 77 and 770 penalty units (\$10 857 and \$108 570) for individuals and between 385 and 3850 penalty units (\$54 285 and \$542 850) for a body corporate apply for failure to comply with this plan*.

* Penalty units are determined by the *Penalty Units Act*. As at 22 May 2012 the Penalty Units Regulations prescribed the monetary value of a penalty unit as \$141.

Coordinated management

This Weed Management Plan has been developed with extensive stakeholder consultation. It aims to address the concerns of all stakeholders by providing strategic management directives which are intended to mitigate the economic and environmental risks posed by bellyache bush. The Department of Land Resource Management (DLRM) will work closely with stakeholders, including other government departments, to implement and monitor the performance of the plan. Continued improvement will be made possible through a commitment to regularly review the plan and make changes where necessary. In particular, it is recognised that the initial three year period of implementation will be extremely important with respect to informing and supporting landholders and managers and gauging the costs and effectiveness of actions taken pursuant to the plan. Feedback will be sought from landholders executing their own control plans; a process which will be greatly assisted by maintaining good records of management actions undertaken and the results of those actions.

2. Aim and objectives

2.1 Aim

To mitigate the damage caused by bellyache bush in relation to production, environmental and cultural values and prevent possible health implications associated with its spread by:

- providing clear and measurable management actions and targets (refer section 5 and Appendices A and B);
- defining the management requirements applicable to all land users in the NT, which form an integral part of the strategic management of bellyache bush across the Territory; and
- providing recommendations and information on actions required to meet management obligations.

2.2 Management objectives

1. To eradicate all existing infestations and prevent further establishment of bellyache bush in the A/C zone by:

- a) eradicating isolated plants and outbreaks;
- b) implementing early detection and eradication programs;
- c) designing and implementing a weed spread prevention program; and
- d) prohibiting the production, sale or purchase and transport of bellyache bush, seed or products.

2. To control the growth and spread of bellyache bush in the B/C zone by:

- a) eradicating isolated plants and outbreaks;
- b) implementing early detection and management programs outside major infestations;
- c) actively containing major infestations;
- d) preventing/minimising further seed production;
- e) designing and implementing a spread prevention program; and
- f) prohibiting the production, sale or purchase and transport of bellyache bush, seed and products.

3. To apply an adaptive approach to weed management by:

- a) developing and implementing nationally consistent and targeted extension products and activities (refer section 9);
- b) developing and maintaining an ongoing monitoring program;
- c) maintaining accurate records of control methods applied and results achieved for analysis at regional and Territory-wide scales; and
- d) evaluating the efficiency of control and containment programs over time.

2.3 Targets

Bellyache bush management is an ongoing process. This Plan outlines a number of targets to assist all land users to measure the effectiveness of the management objectives over the life of the plan (refer Appendix D).

3. Bellyache bush declaration status

3.1 Declaration

Bellyache bush is declared under section 7 of the Act as:

- **Class A (to be eradicated)** in all areas of the NT except where it is classified as Class B;
- **Class B (growth and spread to be controlled)** in that that area described as inside of NTP 2682; and inside that area starting at the most north west corner of NT Portion (NTP) 3982, moving southerly along the western boundary of NTP 3982, and of NTP 3983, moving easterly along the southern boundary of NTP 3983, then the southern boundary of NTP 3867, then moving in a northerly direction along the eastern boundary of NTP 3983, then in a easterly direction along the southern boundary of NTP 3983, then moving northerly along the eastern boundary of NTP 3983, then moving in a north westerly direction along the north-eastern boundary of NTP 3983, then moving in a north easterly direction along the south eastern boundary of NTP 3982, then the south-eastern boundary of NTP 3981, then moving in a northerly direction along the eastern boundary of NTP 3981, then moving in a westerly direction along the northern boundary of NTP 3981, NTP 4175, and NTP 3982 closing at the north west corner of NTP 3982; and inside that area starting at the most north west corner of NTP 1288, then moving southerly along the western boundary of NTP 1288 until intersecting the northern boundary of the NTP 5417, then moving in a generally westerly direction along the northern boundary of NTP 5417 to the north eastern most corner of NTP 3069 then along the northern, western and south westerns boundaries of NTP 3069 until re-joining the northern boundary of NTP 5417, then moving in a westerly direction along the northern boundary of NTP 5417, then following the western and southern boundary of NTP 5417 until intersecting the western boundary of NTP 671, then moving in a southerly direction along the western boundary of NTP 671, NTP 700 and NTP 1513 to the south western corner of NTP 1513, then moving in an easterly direction along the southern boundary of NTP 1513 to the south eastern corner of NTP 1513, then moving in a northerly direction along the eastern boundary of NTP 1513, NTP 700 and NTP 671, to the north eastern corner of the NTP 671, the moving in a westerly direction along the northern boundary of the NTP 671 to the south eastern corner of NTP 4777, then moving in a northerly direction along the eastern boundary of NTP 4777 to the south eastern boundary of NTP 3276, then moving in a north easterly direction along the south eastern boundary of NTP 3276, and the south eastern boundary of NTP 4775 to the eastern boundary of NTP 4775, then moving in a northerly direction along the eastern boundary of NTP 4775 to the north eastern corner of NTP 4775, then moving in a westerly direction along the northern boundary of NTP 4775 and NTP 1288 closing at the most north west corner of NTP 1288; and inside that area of NTP 1333; which is shown on the map as the area banded by the thick black line; and
- **Class C (not to be introduced)** in all areas of the NT.

The boundaries of the Class A/C and Class B/C zones are shown in Figure 1.

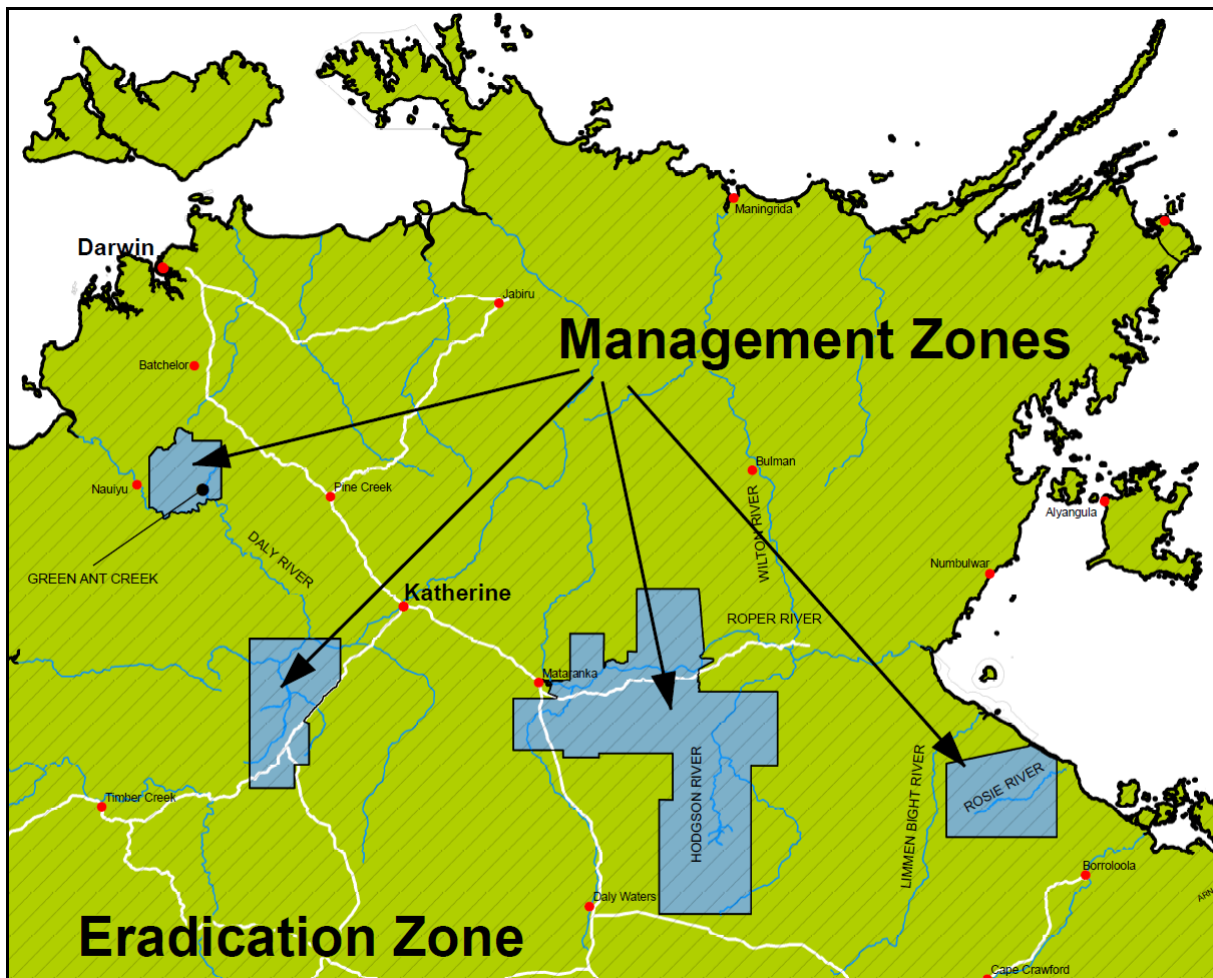


Figure 1: Bellyache bush declared management zones, showing eradication (Class A/C) and growth and spread to be controlled (Class B/C) management zones.

3.2 Northern Territory Weed Risk Management System

The NT Government uses the NT Weed Risk Management System to identify and prioritise plants to be declared as weeds in accordance with the Act and to determine the appropriate management requirements for those plants. The bellyache bush declaration status is consistent with the results of the risk assessment process.

The Class A/C zone has been identified as having a lower number of bellyache bush infestations. Eradication in this zone is considered technically and economically feasible. The Class B/C zone contains a number of large and dense infestations. Eradication in this area would be prohibitively expensive and is unlikely to be achieved. The aim is therefore to contain existing infestations, while eradicating any smaller and/or new infestations within the zone.

For management to be effective in the Class A and B zones, the restriction of spread must be prioritised. The whole of the NT is classified as Class C, so therefore no bellyache bush is to be introduced into any area within the NT.

For further information on the Weed Risk Management System or how it specifically applies to bellyache bush please refer to the NT Weed Risk Management System Fact Sheet or the *NT Weed Risk Assessment Report: *Jatropha gossypifolia* (Bellyache Bush)* available at www.nt.gov.au/weeds.

4. Current distribution

Bellyache bush has been recorded in at least 40 localities within the NT. The most extensive infestations exist south west and south east of Katherine. There has also been on-going management in the Mary River catchment. Scattered populations also occur around Darwin, Katherine, Batchelor, Pine Creek, Mataranka, Timber Creek, Borroloola, Nhulunbuy, Daly Waters, Roper Bar and Elliot. Infestations also occur along the Barkly Highway and in the Victoria River and Gulf districts (refer Figure 2).

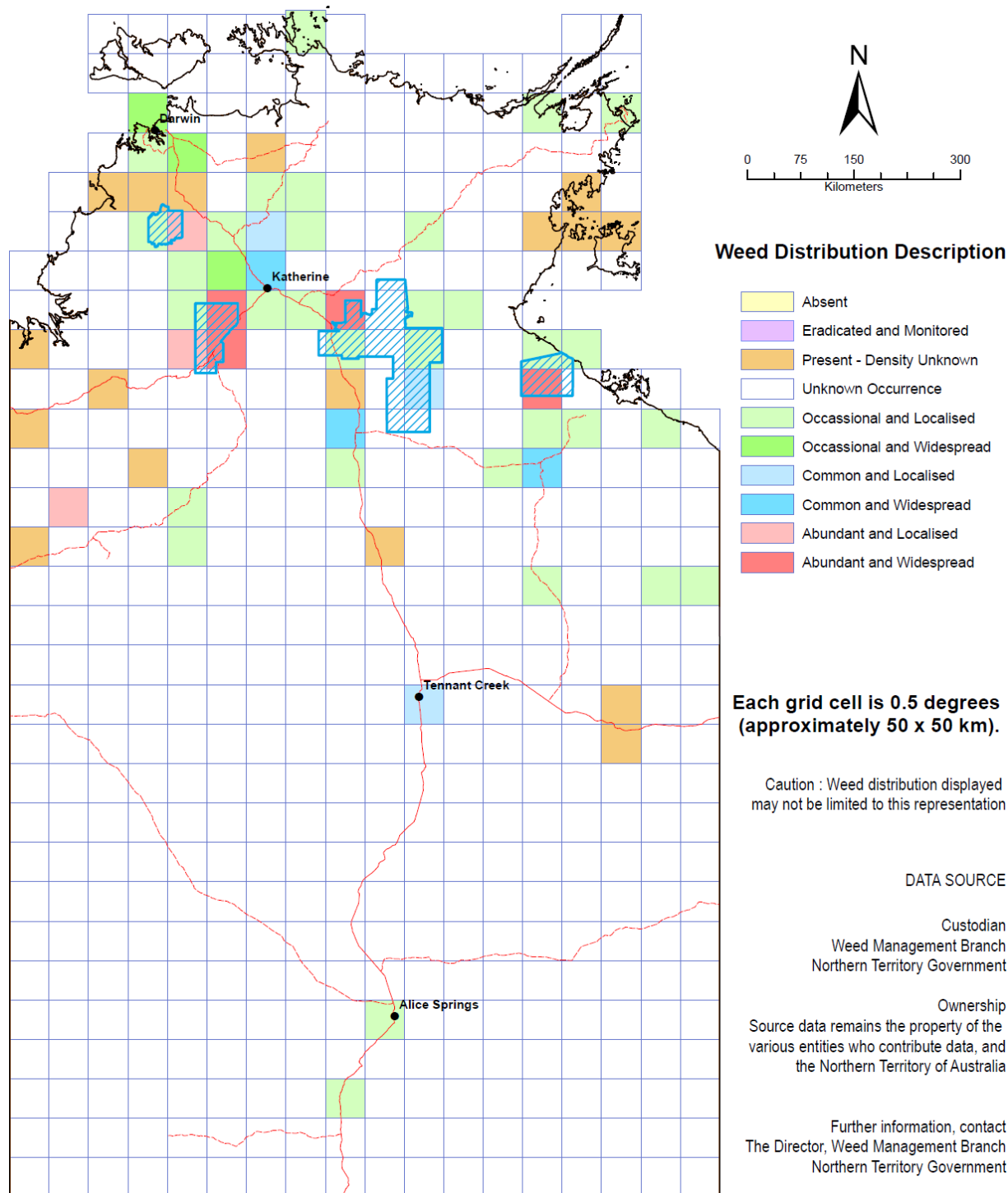


Figure 2: Distribution of bellyache bush in the NT, showing areas (blue hatching) declared as class B/C zones (Weed Management Branch 2013).

5. Management requirements

5.1 Introduction

Successful weed management may require significant investment over an extended period of time. In particular, the control of large, established infestations will require careful planning, prioritisation and budgeting. Results may not be immediately apparent, as repeated effort may be required to produce obvious reductions in distribution and density.

The actions detailed below have been identified as the minimum acceptable requirements needed to achieve the objectives sought and compliance with each declaration class. Landholders may choose to implement a higher level of management than is required by this plan e.g. a landholder within the B/C zone may seek to eradicate, rather than contain, a large population of bellyache bush. Similarly it would be reasonable to assume that bellyache bush should be eradicated from all urban settings despite major centres falling within the B/C zone.

A summary of the management requirements for the A/C and B/C zones are provided at Appendices A and B.

5.2 Eradication (Class A)

Land managers and land users in the A/C zone are required to actively identify and eradicate all bellyache bush infestations and prevent new infestations. To achieve this, the following must be undertaken:

1. inspect the property (including any previously treated areas) to identify any bellyache bush plants/infestations. This should be done at least annually prior to flowering and seeding (refer section 6.1.3 – flowering generally starts after the onset of the wet season, however this may vary depending on the environment and amount/timing of rain);
2. design and implement an eradication program using the control methods detailed in section 6;
3. regularly monitor/survey land to identify new or re-establishing bellyache bush infestations. If your property is on the A/C and B/C zone border or has previously contained bellyache bush, you should undertake regular surveys prior to flowering and seeding to allow for any necessary control work to be undertaken prior to seed maturation and dispersal;
4. design and implement a weed spread prevention program, which will ensure that no new bellyache bush infestations establish as a result of seed or spread (refer section 7);
5. notify the Weed Management Branch of the presence of bellyache bush when it is identified in areas which it has not been found previously; and
6. monitor the results of bellyache bush management. In order to evaluate success and get the most out of your program, it is recommended that you keep a record of the methods used and management outcomes which is consistent with the example provided at Appendix D.

5.3 Controlling growth and spread (Class B)

Land managers and land users in the B/C Zone are required to control the growth and prevent the spread of bellyache bush. To achieve this, the following must be undertaken:

1. inspect the property (including any previously treated areas) to identify any bellyache bush plants/infestations. This should be done at least annually prior to flowering and seeding (refer section 6.1.3 – flowering generally starts early in the wet season, however this may vary depending on the environment and amount/timing of rain);
2. develop and implement a control program using the methods detailed in section 6;
3. use best endeavours to prevent the spread of bellyache bush within or from the property using the control methods detailed in sections 6 and 7 of this plan;
4. avoid creating conditions which would promote bellyache bush germination and spread by implementing appropriate grazing regimes, managing feral animals and controlling erosion and fire where applicable;
5. regularly monitor/survey land, including any treated areas, to identify new or re-establishing bellyache bush infestations outside major population areas;
6. design and implement a weed spread prevention program which will ensure that no new bellyache bush infestations establish as a result of seed transfer or spread (refer section 7); and
7. monitor the results of bellyache bush management. In order to evaluate success and get the most out of your program, it is recommended that you keep a record of the methods used and management outcomes which is consistent with the example provided at Appendix D.

5.4 Preventing introduction (Class C)

This zone includes all of the Territory. All land users must ensure there is no further introduction of bellyache bush into the NT or into areas which are not currently infested.

1. If you have bellyache bush on your property you must design and implement a weed spread prevention program that will ensure that no new bellyache bush infestations can establish as a result of seed transfer or spread (refer section 7); and
2. You must not transport, sell, buy or propagate bellyache bush plants or seed within the NT.

5.5 Permits

Section 30 of the *Weeds Management Act* enables people to apply to the Minister for a permit to use a declared weed. The Minister may refuse or grant a permit subject to a range of conditions.

6. Eradication and control methods

6.1 General

Effective bellyache bush management is dependent on the application of an integrated natural resource management approach. Weed control will be more successful where land managers are also implementing appropriate grazing regimes, managing feral animals and controlling erosion and fire on their properties. It is recognised that, in some instances, successful weed management outcomes may take time and repeated effort to become clear due to the complexities associated with integrated natural resource management and level of investment requirement.

6.1.1 Integrated weed control

Integrated weed control involves using a combination of control techniques to manage weeds. Integrated control generally results in more effective, longer term weed management outcomes. This plan describes the control methods which can be used to control bellyache bush on your property. Spread prevention is the most successful and cost effective way of managing weeds.

6.1.2 Property management planning and mapping

It is recommended that all land holders who have declared or problematic weeds on their land develop a property weed plan, which includes a detailed assessment of all infestations on the property. The assessment will enable consideration of the current distribution of the weed, the potential for spread (along water courses, access tracks/roads, animal movement etc) and potential impacts on land use and other values such as biodiversity. Once this information is collated, priority control areas and suitable control methods can be identified.

A property weed plan should detail exactly what needs to occur in order to meet or exceed all requirements of this statutory weed management plan, and any other weed management requirements which may be applicable to a certain property.

The Weed Management Branch has produced Guidelines for Weed Data Collection in the Northern Territory. These, more technical, guidelines describe what information to collect when mapping, controlling and monitoring weed infestations in the NT. The supply of weed data to the Weed Management Branch, in accordance with these guidelines, will contribute to the collection of accurate data fundamental to planning and delivering strategic and coordinated weed management across the NT. The guidelines can be downloaded at <http://www.nt.gov.au/weeds>.

6.1.3 Timing weed control

The growth and reproductive cycles of a weed species must be taken into account when developing a management program. Implementing control measures at the wrong time of year can significantly reduce both the short and long-term success of the management action.

Table 1 provides an overview of bellyache bush growth and reproduction and identifies corresponding optimal treatment times for different control options. It should be noted that peak growth, flowering and seeding times can vary according to seasonal conditions; these will influence the optimum timing of control.

Table 1: Guide to the management of bellyache bush

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Flowering		▨	▨	▨								
Seed drop					▨	▨	▨					
germination	▨	▨										▨
Foliar spray	■											
Basal bark/hand held burners	■											
Cut stump	■											
Slashing, mulching and/or cutting	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨
Stick-raking	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨
Fire	▨	▨	▨	▨							▨	▨

- Striped cells (▨) Approximate times for reproductive events
- Black cells (■) Months most suitable for control option specified
- White cells (□) Months that are unsuitable for control option specified
- Shaded cells (▨) Months that are less suitable for control option specified

6.2 Chemical control

There are two herbicides registered for use in the NT for the management of bellyache bush. These herbicides, fluroxpyr and/or metsulfuron methyl are found in a number of products.

6.2.1 Disclaimer

In the Northern Territory, a registered product must only be used in situations consistent to those appearing on the label, unless authorised under a permit; and a person:

- must not have in their possession or use a chemical product unless the product is registered in Australia (exemptions apply);
- may use a registered product at a concentration, rate or frequency lower than that specified on the label unless this is specifically prohibited on the label. This does not apply to herbicide use occurring under an APVMA permit;
- may use a registered product to control a pest not specified on the label provided the pest is in a situation that is on the label and use on that pest is not specifically prohibited on the label; and
- may also use a registered product using a method not specified on the label unless this is specifically prohibited on the label.

Users of agricultural (or veterinary) chemical products must always read the label and any permit, before using the product and strictly comply with the directions on the label and any conditions of any permit. Users are not absolved from compliance with the directions on the label or conditions of the permit by reason of any statement made in or omission from this publication.

Table 2: Herbicide management options for bellyache bush infestations

Chemical and concentration	Rate	Situation and method
Fluroxypyr Various trade names/formulations	500ml/100L water + wetting agent	High volume Foliar spray - apply when actively growing Seedlings or adult (individuals or infestation)
	3L/ha + wetting agent	Boom spray – apply when actively growing Seedlings or adult plants
	3L/100Ldiesel	Cut stump and/or basal bark treatment Best suited to adult plants
Metsulfuron methyl Various trade names/formulations	10g/100L water + wetting agent	Foliar application – apply when actively growing. Seedlings or adult plants

6.2.2 When to apply herbicide

Foliar herbicides should only be applied when the plant is actively growing to enable efficient uptake of herbicide by the plant. In the NT bellyache bush generally actively grows from January to April, although this may vary depending on water availability and rainfall. The recommended time of year for spraying therefore coincides with the wet season. When applying herbicides using a foliar spray the addition of a wetting agent is essential.

Basal bark and/or cut stump herbicide application techniques can be used year round, however the effectiveness will improve when applied to actively growing plants.

Plants which are undergoing heat or water stress may not uptake the herbicide as effectively, resulting in lower kill rates. Avoid spraying plants when temperatures are extremely high or when plants are in standing water.

An effective management program based on herbicide use will require at least two to three treatments. The initial treatment of existing mature plants and any seedlings should ideally occur following the onset of initial wet season rains, when there is active growth (usually December to April). A follow up treatment in approximately two to four weeks time will be necessary to treat plants which may have been missed or newly germinating seedlings.

A further treatment of the management area will generally be required to treat seedlings which have grown from the seed bank. While bellyache bush seeds can persist in soil for up to six years, the vast majority of seeds will germinate within 12 months of dispersal. It is also important to ensure that no mature plants have persisted which may produce seed (bellyache bush generally sets seed around May). The results of a strict chemical control program will become more evident with each application. Continual maintenance is imperative as the introduction or production of any new seeds will enable the infestation to persist.

6.2.3 How to apply herbicide

Herbicide should be applied in a fine spray at a low application pressure to enable good coverage of the whole plant. A range of dyes are available where herbicides are sold, which can be used to identify when herbicide has been applied to the plant(s).

Basal bark treatment involves spraying around the whole stem up to 750 mm from the ground. Cut stump treatment involves applying herbicide to a newly cut stump immediately following chain sawing. The cut should be horizontal and as close as possible to the ground.

To treat large infestation areas, start at the edges and work inwards, gradually reducing infestation size.

6.2.4 Monitoring results and follow up

Treatment areas must be revisited no less than four weeks after spraying, but prior to seed-set in May to ensure the plants are dead. Follow-up control to kill any regrowth or new germinants is to be done, as part of an on-going monitoring program, for at least three to four years after treatment. This time period takes into account remaining seeds in the soil which may remain viable for extended periods.

6.3 Non-chemical control

6.3.1 Physical removal

Individual plants (seedlings and juveniles) can be removed by hand or by using a mattock. The entire root mass should be removed and excess soil shaken off the root system to ensure regrowth does not occur. Physical removal is very laborious and may therefore only be effective and/or feasible where plant numbers are limited.

6.3.2 Slashing, mulching or cutting

Slashing or mulching will not eradicate bellyache bush, but will kill most mature plants, reduce the biomass, provide easy access for other treatments options and create opportunities for more desirable species to establish. Many seedlings will emerge after these treatments, however removal of the mature plants will mean complete herbicide coverage of the seedlings can be easily achieved; reducing costs and increasing control effectiveness.

Cutting individual plant stems as close to the ground as possible during active growth periods can kill mature plants. Care should be taken to ensure that the cutting does not re-shoot and become viable.

Slashing, mulching or cutting can be undertaken at any time of year, but ideally should occur prior to flowering or seeding. Ensure equipment and machinery is cleaned after use.

6.3.3 Stick-raking

Stick-raking can be used to kill plants and to clear access path and fire access trails, however it should be recognised that this level of soil disturbance will facilitate extensive seedling recruitment. Follow up treatments with either fire or preferentially herbicide application will be necessary.

The removal of vegetation and disturbance of soils may lead to erosion if large areas are left bare. In particular, wet season rain events pose a risk to exposed soils. DLRM recommends that, in the Top End of the NT, any soil disturbance activities do not commence prior to the 1st May and are completed and/or stabilised prior to 30th September. Information on erosion controls can be downloaded from the DLRM website.

Management activities should only be attempted with clean machinery. Ensure equipment and machinery is cleaned prior to moving to new sites.

6.3.4 Monitoring results and follow up

The physical removal of plants can result in prolific seedling germination. Follow-up control (chemical or non-chemical) must be undertaken as part of an on-going monitoring program, for at least three to four years after treatment taking into account potentially dormant bellyache bush seeds in the soil bank.

6.3.5 Grazing

Grazing should be minimised after any control efforts to encourage the growth of any perennial grasses. The competition from many pasture species can reduce bellyache bush germination and seedling growth.

6.3.6 Biological control

Biological control is not currently being used in the NT; however its potential as a control method continues to be researched.

6.3.7 Further Information

Further information on the eradication and control methods described in this plan can be found in the *Northern Territory Weed Management Handbook*. The Queensland Government Department of Employment, Economic Development and Innovation produced '*Bellyache bush (Jatropha gossypifolia) management manual: Control options and Management Case Studies from across Australia*' in 2009. This document details what considerations should be incorporated into a property weed management plan for bellyache bush, such as the identification of problem areas, the prioritisation of areas for control, the schedule of activities and the monitoring of progress, follow up and review. Copies are available by phoning the Tropical Weeds Research Centre in Charters Towers on (07) 4761 5700 or the Weed Management Branch in Darwin on (08) 8999 4567.

6.4 Buffer Zones

Bellyache bush is extremely adept at spreading into new areas either through seed dispersal or distribution of vegetative parts (cuttings). Bellyache bush seeds are formed in a fruit capsule which naturally bursts (dehisces) as a means to disperse seeds as far from the parent plants as possible (distances of up to 13 metres have been documented). Once released, the buoyant seeds can be readily transported by rain, floodwaters and down watercourses. Seeds may also be transported by insects, birds, animals and humans. Some species of ants actively source and collect bellyache seeds to feed from the nutrient rich caruncles which grow on the seeds. Bellyache bush can also be spread if any fill or gravel contains seeds.

In an attempt to restrict spread of bellyache bush, this plan stipulates that suitable buffer zones must be implemented on all properties containing bellyache bush. A buffer zone is a designated area which isolates all bellyache bush on a property from adjoining properties; as such buffer zones cannot contain any mature bellyache bush plants or seedlings. Buffer zones may surround the entire property, however it is preferred that a buffer zone only surrounds the area/s containing bellyache bush.

It is recommended that a GPS is used to record the outermost extent of all major infestations; the waypoints collected can then be used to create accurate maps that can be used for planning purposes. Any expansion or contraction in the infestation can then be assessed and control efforts may be altered accordingly. The establishment of photo monitoring points will assist with buffer maintenance and reporting requirements. For information on the establishment of monitoring programs please contact the Weed Management Branch for advice.

Buffer zones do not require the clearing of all native vegetation, however they should be of a sufficient width to prevent the inadvertent spread of bellyache bush seed to surrounding properties.

Buffer zones do not detract from the requirement for fire access trails (fire breaks) to be established and maintained under the *Bushfires Act* and *Fire and Emergency Act*. Clearing of vegetation for buffer zones may also be subject to approvals as required by *Planning Act* or *Pastoral Land Act*.

More information on controlling seed spread is included in Section 7 – Developing a weed spread prevention program.

6.5 Fire management

6.5.1 Weed control

Fire can be an effective tool in bellyache bush management provided that there is adequate fuel. Dense infestations of bellyache bush, particularly those which have excluded grass growth, may not contain sufficient fuel loadings to support a fire capable of killing mature plants. Even with good fuel loads, multiple burns may be required to kill mature infestations.

Controlled fire can be used as part of an integrated control program to kill young bellyache bush seedlings. Burning can also improve access for other control methods.

Hand held burners can be used to control bellyache bush in areas where chemical or mechanical control is not appropriate or possible. Flaming for at least 10 seconds around the base of each plant is required to kill mature plants.

6.5.2 When and how to burn

Fires can be highly destructive and hard to control making careful planning and a cautious approach essential.

Early burning (late wet /early dry season) will produce low intensity “cooler” fires, which are easier to control and less likely to damage native vegetation.

Well maintained and strategically located fire breaks/access trails can help to contain fires and provide access to control fires.

Back burning involves lighting small fire/s which burn back towards the fire front of a larger fire. By controlling the available fuel, back burning can assist in controlling the direction and spread of a wildfire.

Any management incorporating burning must be in accordance with the *Bushfires Act* and *Fire and Emergency Act*. Please contact your local Volunteer Fire Brigade Captain or local fire station for permits to burn if you live within a Northern Territory Fire and Rescue Service Emergency Response Area (NTFRS ERA). If you live outside a NTFRS ERA, contact your local area Fire Warden through the Bushfires Council on 8922 0844 (Darwin) or 8976 0098 (Batchelor).

7. Developing a weed spread prevention program

Spread prevention is the most successful and cost effective way of managing weeds. As previously described bellyache bush seeds can be readily spread through a number of natural and non-natural means. In particular long distance spread can be very problematic from a management perspective. Spread facilitated by water flow (rain, floods), feral animals and domestic livestock and vehicles can result in distribution to environments which may be highly suitable for germination and establishment (such as floodplains, access roads and other disturbed areas).

7.1 Hygiene procedures

Vehicles, produce and machinery are recognised as the major source of bellyache bush spread. The following actions are recommended for inclusion into prevention programs to reduce bellyache bush spread:

- a) map and monitor isolated infestations;
- b) always work from clean areas back toward infested areas;
- c) schedule control works to occur prior to seed set;
- d) designate wash down areas (see below);
- e) ensure contractors and machinery operators are familiar with hygiene protocols and weed identification; and
- f) ensure machinery entering and leaving your property is clean.

Pastoral land managers should consider the use of holding yards and cattle inspections to ensure seeds are not being inadvertently transferred to clean areas.

7.2 Wash down facilities

Wash-down facilities should be established on all affected properties. They may utilise high pressure wash-down, compressed air blast, vacuuming and/or physical removal (e.g. hand brush). Wash down facilities:

- a) must be located in an area(s) which will minimise the risk of spread (on or off site);
- b) must to be regularly checked for weed seedlings which may have germinated from seeds washed off vehicles etc. Any weeds should be controlled immediately; and
- c) should be sited in degraded areas to minimise the risk of undetected weed spread.

Where it is impractical to establish a wash-down facility, consideration is to be given to adopting alternative options and solutions to manage seed transfer.

7.3 Avoiding weed transfer

It is illegal to transport declared weeds. You must dispose of any weed material on site. Burning will destroy vegetative plant material and also render most seeds unviable. As some hard coated seeds may survive, on-site deep burial may also be required.

Seed transfer can also occur through the transport and sale of contaminated products. Care must therefore be taken to ensure that any gravel, sand or any other product moved between properties is free of bellyache bush seeds.

7.4 Integrated natural resource management

Weed management should be closely linked to broader natural resource management at the property and catchment levels. Weed spread and germination can be enhanced in degraded areas, such as those impacted by erosion, wild fire overgrazing and feral animals. Large feral animals, such as buffalos and pigs, can facilitate germination through behaviours, such as roaming, wallowing and rooting.

These issues must be addressed in a weed spread prevention program if they are present in the area being managed.

8. Tracking progress and judging success

A property weed management plan should include realistic time frames and goals, recognising that achievements, particularly with regards to established weed populations, may only become evident in the long term. It is important to document weed occurrences and the control methods used so that success, or failure, can be critically analysed. Accurate records can enable a management program to be reworked or fine tuned depending on the need (refer Appendix C).

8.1 Local level

8.1.1 Follow up control

A key element in any weed management program is inspecting and, if necessary, re-treating eradication areas, buffers and containment areas. Areas where herbicide has been applied must be revisited after spraying but prior to seed set in April to ensure that the plant is dead. Areas must be checked for at least four years after eradication is thought to have been achieved, during the growing season and prior to seed set. The purpose of this is to take into account that remnant seeds in the soil which may remain viable for at up to four years.

8.1.2 Maintaining records

It is important to keep track on what is happening in “the bigger picture” i.e. is the weed control being undertaken contributing to the objectives of this plan? To accurately determine if, and what, progress is being made, records must be maintained that show weed control activities (outputs) and the results of the activities (outcomes).

Improvements relating to efficiency and expenditure are dependent on knowing exactly what is happening. A monitoring and management record may be requested at any time by the Weed Management Branch. An example of an appropriate format is at Appendix C.

8.1.3 The supply of bellyache bush distribution data

The supply of weed data to the Weed Management Branch by individuals and groups is fundamental to planning, prioritising and coordinating strategic weed management. The positive identification of bellyache bush in an unexpected area should be reported directly to the Weed Management Branch, as immediate action may be deemed necessary.

A more detailed description of bellyache bush on your property can be submitted in accordance with the *Guidelines for Weed Data Collection in the NT*. This level of information collection and transfer is more important for large scale land owners, however all data received will be collated and recorded.

8.2 Territory level

All statutory Weed Management Plans endorsed under the *Weeds Management Act* must be reviewed every three years.

8.2.1 How will we know if this Weed Management Plan is working?

Full compliance with a Weed Management Plan can require a great deal of effort, commitment and investment from land managers, particularly from those who are already affected by declared weeds. For this reason it is essential that the NT Government monitors whether the stipulated management actions are contributing towards the identified outcomes at a Territory level.

8.2.2 Adaptive management

Each Weed Management Plan has been drafted using the best information available at the time of writing. However, new information may become available which should be included in, or influence the structure and content of this plan. Allowing for this flexibility enables an adaptive management approach.

The NT Government is committed to applying an adaptive management approach to weed management across the Territory. Specifically it will use data and feedback gathered from land managers and other stakeholders to refine and improve future management decisions and ultimately, the weed management plans.

Continuous improvement can only be achieved if the following can be determined:

- if investments in weed management are resulting in progress towards the identified objectives; and
- if the recommended management actions are achieving the most effective and efficient control outcomes.

8.2.3 Performance indicators

A performance indicator is something which can be used to assess performance. The following indicators will provide a way to measure the performance of this plan against its objectives. This plan also sets and annually reviews targets against the stipulated management requirements (refer Appendix D).

Table 3: Performance indicators

Performance indicator	What will be measured?	How will it be measured?
Increased awareness	Knowledge of issues and management Compliance	<p><i>Quantitative</i>; the following will be recorded:</p> <ul style="list-style-type: none"> • number of enquiries to weedinfo.dlrn@nt.gov.au; • number of hits on internet site www.nt.gov.au/weeds; • number of reported breaches of the Act; and • number of major awareness raising events held and number of attendees. <p><i>Qualitative</i>; the following will be undertaken:</p> <ul style="list-style-type: none"> • key land managers to be questioned about their knowledge of relevant Weed Management Plans; and • liaison and consultation with land managers from a range of land tenures will continue.
Better information	Distribution data	Amount of data submitted by the public Strategic and targeted survey programs developed and implemented
	Density data	
	Areas under active management	
Better management	Eradication	Strategic and targeted monitoring programs developed and implemented Reporting
	Containment	
	Spread reduction	

8.2.4 Government commitments and accountability

The Weed Management Branch will work with other Divisions from DLRM and Government landholders to design and implement a monitoring program that allows this management plan, the management actions contained within it and the outcomes produced to be evaluated. The monitoring program should have sufficient resolution to allow management outcomes at a local through to regional management scale to be evaluated.

The Minister will consider advice from the public, community and industry stakeholder groups and the NT Weed Advisory Committee prior to approving, or making changes to, any statutory weed management plan.






8.3 Communication

Effective and cooperative bellyache bush management can only be achieved if all stakeholders understand the risks posed by bellyache bush and the control methods needed to strategically manage these risks. The NT Government, through the Weed Management Branch of DLRM has an obligation to develop a communication strategy to ensure all stakeholders understand the risks posed by bellyache bush, have access to the most appropriate control methods for their situation and have a full understanding of their legal obligations with respect to bellyache bush control.

It is recognised that effective communication is always a two way process. The NT Government is dependent on receiving feedback from people who are involved in on-ground bellyache bush management so that this weed management plan and the communication strategy can be continually assessed, and subsequently improved. Please contact the Weed Management Branch with any information which could be used to refine the approach to managing bellyache bush and other declared weeds in the NT.

9. Support and information for land managers

The Weed Management Branch (DLRM) can provide training, advice and extension materials related to support improved bellyache bush management. The following documents are available by contacting your local Weed Management Branch or accessing the internet site <http://www.nt.gov.au/weeds>.

	Bellyache Bush Weed Identification Table	Contains photos and written descriptions to assist with identification.
	Bellyache Bush Weed Note	Provides information on the bellyache bush identification, impacts, habitat, distribution and management.
	Bellyache Bush in the NT: A Summary of Current Knowledge and Weed Risk	Details the process and information which supported the existing declaration of bellyache bush as a weed in accordance with the Act. It contains detailed information on the biology and ecology of bellyache bush, the environmental, economic, cultural and social impacts of bellyache bush and the feasibility of bellyache bush control.
	NT Weed Management Handbook	Provides information on strategic and planned approaches to weed management, including integrated weed control methods. Specific information is provided on herbicides registered for use in the NT. The 37 'Weed control option tables' include a colour photo of the weed in question, list which herbicides are registered for use, indicate optimum treatment times and which method/s can be employed for maximum effectiveness.
	Bellyache Bush (<i>Jatropha gossypifolia</i>) Management Manual	Control options and management case studies from across Australia (Produced by the State of Queensland, Department of Employment, Economic Development and Innovation 2009)

The following documents are also available:

- Weed Risk Management System for the NT (Fact Sheet);
- Guidelines for Weed Data Collection in the Northern Territory;
- Grow Me Instead: A Guide for Gardeners in the Northern Territory, Nursery & Garden Industry Northern Territory
- The Bush Book: A manual for managing native vegetation across northern Australia (2009), Maria Kraatz, Peter Jacklyn and Mike Clarke, Greening Australia (NT) Ltd.

This plan is consistent with the:

- *Weeds Management Act* and the *Weeds Management Regulations*
- National Weed Strategy; and
- The National Weed Spread Prevention Action Plan.

Appendix A: Summary of management requirements and related actions – bellyache bush in class A/C zone

Objectives	Management Requirements	Management Actions
<p>To eradicate existing infestations and prevent further establishment of bellyache bush</p>	<p>Eradicate established populations, isolated plants and outbreaks</p>	<p>Design and implement a survey and eradication program for bellyache bush. A property management plan should be used to determine areas of priority and establish the most appropriate control methods:</p> <ul style="list-style-type: none"> • Chemical control (section 6.2); • Non-chemical control (section 6.3); and • Fire management (section 6.5). <p>Appropriate buffer zones should be implemented on all properties containing bellyache bush (refer section 6.4).</p>
	<p>Implement early detection and management programs.</p>	<p>Regularly monitor/survey land, including previously treated areas, to identify new or re-establishing bellyache bush infestations at an early stage. Notify the Weed Management Branch of the presence of bellyache bush when it is identified in an area which it has not been found previously. Eradicate new and outlying populations immediately.</p>
	<p>Design and implement a weed spread prevention program.</p>	<p>If you have bellyache bush on your property, design and implement a weed spread prevention program (refer section 7), to ensure:</p> <ul style="list-style-type: none"> • bellyache bush or seed is not moved on machinery or equipment; • all gravel, sand, livestock or other products moved within or between properties is free of bellyache bush seeds; • seed transport and germination is not facilitated by feral animals and poor land condition.
	<p>Prohibit the production, sale or purchase and transport of bellyache bush, seed or products.</p>	<p>Bellyache bush can reproduce vegetatively (from cuttings) and from seed, therefore transport of any viable plant material is not permitted. There should be no trade of plants for ornamental use.</p>
<p>To apply an adaptive approach to weed management.</p>	<p>Develop and implement nationally consistent and targeted extension products and activities</p>	<p>Information and awareness resources and campaigns are developed and implemented to raise awareness and capacity of landholders to control and contain the spread of bellyache bush</p>
	<p>Develop and maintain an ongoing monitoring program.</p>	<p>A monitoring program should be developed in accordance with the Monitoring Report Template attached at Appendix C. A Monitoring Report should record the type and location of all management actions undertaken, including active control, survey works and spread prevention. The result of these actions should be recorded, even if the desired result was not achieved.</p>
	<p>Maintain an accurate record of control methods applied and results achieved for possible collation at a Territory level.</p>	<p>A monitoring and management record, which includes current and past bellyache bush locations, shall be produced when requested by the Weed Management Branch.</p>
	<p>Evaluate the efficiency of control and containment programs over time.</p>	<p>Determine the success of various management actions employed and use this information to fine tune the performance of your management program.</p>

Appendix B: Summary of management requirements and related actions – bellyache bush in class B/C zone

Class B/C Objectives	Management Requirements	Management Actions
<p>To control the growth and spread of bellyache bush in the B/C zone.</p>	<p>Eradicate isolated plants and outbreaks.</p>	<p>Design and implement an annual control and containment program for bellyache bush that will assist you to contain infestations of the bush to your property. A property management plan should be used to determine areas of priority and establish the most appropriate control methods:</p> <ul style="list-style-type: none"> • Chemical control (refer section 6.2); • Non-chemical control (refer section 6.3); and • Fire management (refer section 6.5). <p>Implementation of buffer zones should be prioritised on all properties containing bellyache bush (refer section 6.4).</p>
	<p>Implement early detection and eradication programs</p>	<p>Regularly monitor/survey land, including previously treated areas, to identify new or re-establishing bellyache bush infestations at an early stage.</p>
	<p>Active containment of major infestations</p>	<p>Major infestations must be actively contained through an appropriate integrated control program. Containment areas should be accurately geo-referenced and documented to ensure the infestation does not gradually expand. Landowners must avoid creating conditions which would promote bellyache germination and spread, which may include managing feral animals and controlling erosion and fire on their properties. Pastoralists must implement grazing land management principles which will encourage the growth of native pastures, limit the establishment of bellyache bush seedlings and prevent any spread through cattle movement.</p>
	<p>Prevent/minimise further seed production.</p>	<p>Seed production is to be suppressed through:</p> <ul style="list-style-type: none"> • Chemical control (refer section 6.2); • Non-chemical control (refer section 6.3); and • Fire management (refer section 6.5).
	<p>Design and implement a weed spread prevention program.</p>	<p>If you have bellyache bush on your property, design and implement a weed spread prevention program (refer section 7), to ensure:</p> <ul style="list-style-type: none"> • bellyache bush or seed is not moved on machinery or equipment; • all gravel, sand, livestock or other products moved within or between properties are free of bellyache bush seeds; • seed transport and germination is not facilitated by feral animals and poor land condition.
	<p>Prohibit the production, sale or purchase and transport of bellyache bush, seed or products.</p>	<p>Bellyache bush can reproduce vegetatively (from cuttings) and from seed, therefore transport of any viable plant material is not permitted. There should be no trade of plants for ornamental use.</p>
<p>To apply an adaptive approach to weed management.</p>	<p>Develop and implement nationally consistent and targeted extension products and activities</p>	<p>Information and awareness resources and campaigns are developed and implemented to raise awareness and capacity of landholders to control and contain the spread of bellyache bush.</p>
	<p>Develop and maintain an ongoing monitoring program.</p>	<p>It is suggested that a monitoring program be developed in accordance with the Monitoring Report Template attached at Appendix C. A Monitoring Report should record the type and location of all management actions undertaken, including active control, spread prevention and survey works. The result of these actions should be recorded, even if the desired result was not achieved.</p>
	<p>Maintain an accurate record of control methods applied and results achieved for possible collation at a Territory level.</p>	<p>A monitoring and management record, which includes current and past bellyache bush locations, shall be produced when requested by the Weed Management Branch.</p>
	<p>Evaluate the efficiency of control and containment programs over time.</p>	<p>Determine the success of various management actions employed and use this information to fine tune the performance of your management program.</p>

Appendix C: Suggested bellyache bush monitoring report template

- Your monitoring report should follow the format provide below. The example provided is suited to a property in the Class B/C zone.
- Digital versions of the form are available at www.nt.gov.au/weeds or by e-mailing weedinfo.dlrm@nt.gov.au.
- Please contact your nearest Weed Management Branch if you need assistance.

Property owner	
Mailing address	
Email address	
Phone	
Fax	
Mobile	
NT Portion/Lot number	
Region/Hundred	
Period of report	

EXAMPLE ONLY

Management Requirements	Management Actions	Bellyache bush location (scale map or GPS points to be provided)	Action taken (outputs) (include date and control technique)	Result of action (include observation notes)	Are any management changes necessary?	Outcomes
Eradication of isolated plants and outbreaks.	Design and implement an annual control and containment program for bellyache bush. A property management plan, including a weed management map should be developed.	Brumby paddock Scattered plants establishing in upland areas. Scattered plants along creek.	07 January 2009 Sprayed Brumby paddock. 14 February 2009 Sprayed Bullock paddock. 14 February 2009 Plants in creekline treated using cut stump and basal bark methods.	Poor results. Excellent results 100% kill. Excellent results 100% kill.	Late start to wet season, plants not very active: need to wait for rain. No change required.	20 January 2010 Delay start of control program until rain commenced and plants active.
Seed spread prevention.	The design and implementation of a weed spread prevention program.	Whole of property	11 September Installation of wash down bays and procedures. Weed ID manuals placed in shed/ vehicles. 25 September 27 feral pigs shot.	No new bellyache bush infestations were identified.	No.	20 January 2010 No new bellyache bush infestations were identified in clean areas.

Appendix D: Targets

Objective 1: To eradicate existing infestations and prevent further establishment of bellyache bush in the A/C zone

Management requirement	Target	Priority	Responsibility	Completion Timeframe		
				Yr 1 - 3	Yr 3 - 5	Yr 5 - 10
<ul style="list-style-type: none"> Eradicate established populations, isolated plants and outbreaks. Implement early detection and management programs. Design and implement a seed spread prevention program. Prohibit the production, sale or purchase and transport of bellyache bush, seed or products. 	Identify location, extent and density infestations of bellyache bush in the A/C zone.	1	All land users	√	√	√
	Develop a bellyache bush mapping and monitoring program for infestations in the A/C zone	1	NT Government	√		
	Property weed management plans are developed for all properties in the A/C zone with bellyache bush infestations.	1	All land managers in A/C zone		√	
	Prioritise areas for control by identifying isolated and small infestations which are easy to treat, significant seed sources or areas with a high probability of seed spread and/or infestations in high value or vulnerable areas.	1	All land managers in A/C zone	√	√	√
	Programs developed and implemented to eradicate infestations of bellyache bush on all NT Government controlled lands in the A/C zone.	1	NT Government	√	√	√
	Programs developed to eradicate high priority infestations of bellyache bush in the A/C zone.	1	All land managers in A/C zone		√	
	All bellyache bush infestations in the A/C zone are under active eradication programs.	1	All land managers in A/C zone			√
	The production of seed and spread of bellyache bush within the A/C zone is prevented.	1	All land users	√	√	√
	The number and size of infestations of bellyache bush in the A/C zone is reduced.	1	All land managers in A/C zone		√	
Results of eradication activities are obtained from land holders.	1	NT Government	√	√	√	

Objective 2: To control the growth and spread of bellyache bush in the B/C zone

Management requirements	Target	Priority	Responsibility	Completion Timeframe		
				Yr 1 - 3	Yr 3 - 5	Yr 5 - 10
<ul style="list-style-type: none"> Eradicate isolated plants and outbreaks. Implement early detection and eradication programs. Active containment of major infestations. Prevent/minimise further seed production. Design and implement a seed spread prevention program. Prohibit the production, sale or purchase and transport of bellyache bush, seed or products. 	Identify location, extent and density of infestations of bellyache bush in the B/C zone.	1	All land users	√		
	Develop a bellyache bush mapping and monitoring program for infestations in the B/C zone.	2	All land users		√	
	Property weed management plans are developed for all properties in the B/C zone with bellyache bush infestations.	2	All land managers in B/C zone			√
	Prioritise areas for control by identifying isolated and small infestations which are easy to treat, significant seed sources or areas with a high probability of seed spread and/or infestations in high value or vulnerable areas.	1	All land managers in B/C zone	√	√	√
	To reassess declared boundaries of the AC/BC zones with the view to extending the A/C zone (i.e. decreasing the extent of the B/C zone) by amending the boundary declared under the <i>Weeds Management Act</i> , so that the focus is increasingly on bellyache bush eradication.	1	NT Government		√	
	Results of management activities are obtained from land holders.	2	NT Government	√	√	√
	The number and size of infestations of bellyache bush in the B/C zone is reduced.	1	All land users			√
	Bellyache bush is actively managed in the B/C zone.	1	All land managers in B/C zone	√	√	√
	Programs developed and implemented to control and/or eradicate (where feasible) bellyache bush on all NT Government controlled lands in the B/C zone.	1	NT Government		√	
	Programs developed and implemented to manage infestations of bellyache bush in the B/C zone.	2	All land managers in B/C zone		√	
	Programs developed and implemented to prevent the spread of bellyache bush from pathways of spread.	1	All land users	√	√	√

Objective 3: To apply an adaptive approach to weed management:

Management requirements	Target	Priority	Responsibility	Completion Timeframe		
				Yr 1 - 3	Yr 3 -5	Yr 5 – 10
<ul style="list-style-type: none"> • Develop and implement nationally consistent and targeted extension products and activities. • Develop and maintain an ongoing monitoring program. • Maintain an accurate record of control methods applied and results achieved for possible collation at a Territory level. • Evaluate the efficiency of control and containment programs. 	The Northern Territory Weed Spread Prevention Strategy is developed.	2	NT Government	√		
	A Weed Watcher Reporting System for the Northern Territory is investigated.	3	NT Government		√	
	Results of bellyache bush management and eradication activities are collated and published for the Northern Territory.	2	NT Government		√	√
	Results of successful eradication or control activities or trials are shared.	3	NT Government/CDU/Research organisations	√	√	√
	Information and awareness resources and campaigns are developed and implemented to raise awareness and capacity of landholders to control and contain the spread of bellyache bush.	2	NT Government/Community Groups/NGOs	√	√	
	The A/C and B/C zone declaration boundary is reviewed with the view to expand the A/C zone	3	NT Government			√
	Information and advice on alternative pastures is developed and provided to landholders.	2	NT Government		√	√
	Review the effectiveness of Year 1-3 targets of Weed Management Plan	2	NT Government		√	

WEED MANAGEMENT BRANCH CONTACTS

For more information or advice in relation the identification, management or monitoring of weeds please contact the Weed Management Branch:

Phone: (08) 8999 4567

Email: weedinfo.dlrm@nt.gov.au

Website: <http://www.nt.gov.au/weeds>

The NT Herbarium can also provide plant identification advice

Phone: (08) 8999 4516