WEEDS OF NATIONAL SIGNIFICANCE

Bellyache Bush

(*Jatropha gossypiifolia*)

Strategic Plan 2013 to 2017

ISBN [to be completed by secretariat]

Supporting information about the Australian Weeds Strategy, Weeds of National Significance and progress to date may be found at www.weeds.org.au**,** where links and downloads provide contact details for all species, their management committees and copies of the strategy.

This strategy was developed under the leadership of the Kay Bailey, National Bellyache Bush Coordinator, Department of Natural Resources, Environment, the Arts and Sport, Northern Territory with full cooperation of all the States, Territories and Commonwealth of Australia.

Published by: Australian Weeds Committee, Canberra

For further information contact:

Secretariat
Australian Weeds Committee
GPO Box 858,
CANBERRA ACT 2601

Publication date: January 2013

Copies available from:
Department of Land Resource Management
PO Box 1120
ALICE SPRINGS NT 0870

Preferred way to cite this publication:

Australian Weeds Committee (2013) *Weeds of National Significance, National Bellyache Bush (Jatropha gossypiifolia) Strategic Plan 2013-2017,* Canberra*.*

CONTENTS

EXECUTIVE SUMMARY

Bellyache bush (*Jatropha gossypiifolia*) is a Weed of National Significance (WoNS) that threatens natural, productive and social values throughout northern Australia. Bellyache bush is currently found in substantial areas of the northern rangelands of Queensland, the Northern Territory and Western Australia.

The weedy nature of this former garden plant was recognised a century ago in Queensland. Since that time, much research and control work has been undertaken, with individual landowners and groups successfully removing bellyache bush from local areas. However, the impacts of bellyache bush and its distribution are still increasing nationally.

Due to its potential to flower and fruit year-round; produce large numbers of seed that remain viable for a number of years; reproduce vegetatively; and spread rapidly through natural localised seed spread as well as via water in flood situations, management of bellyache bush is difficult and must be for the long term to be effective.

As the toxic nature of bellyache bush makes it unpalatable to stock it tends to proliferate at the expense of pasture. The development of dense infestations along and spreading away from riparian areas can reduce the viability of grazing enterprises and significantly increase mustering costs.

The challenge is to ensure that the coordinated, multi-jurisdictional approach provided through the WoNS declaration and development of this national strategic plan builds on past and current action and addresses the key issues for the management of bellyache bush:

- Delimitation of the current extent and distribution;
- Lack of a strategic coordinated approach to identifying management objectives;
- Need for increased education, awareness and extension;
- Further development of integrated weed management methods including biocontrol; and
- Availability of resources to implement strategic actions.

The strategic plan aims to meet four interdependent and integrated goals:

1. **New infestations are prevented from establishing.**
- Establish the location, extent and density of current bellyache bush infestations.
- Develop and maintain early detection measures to protect clean areas.
- Implement eradication programs when new infestations are discovered.
- Implement eradication or containment measures (dependant on strategic significance and feasibility) for outlier infestations.

2. **Established infestations are under strategic management.**
- Promote strategic, catchment based, zone management for bellyache bush control.
- Implement strategic management to:
  a) contain and prevent the spread and impact of core infestations; and / or
  b) protect priority assets within core infestations.
- Promote the continued development and adoption of best practice management.
- Develop and promote integrated land management techniques that maximise effectiveness of control.

3. **Capability and willingness to manage bellyache bush increased.**
- Complete the development of an appropriate legislative framework for bellyache bush management.
- Include bellyache bush in cooperative management and planning frameworks to deliver the strategic plan objectives
- Increase education and awareness of the threats and management options for bellyache bush in Australia
- Continue innovative bellyache bush research and trials to assist management decision making.
- Maintain effectiveness of and commitment to the national strategic plan

Vision

The vision of this strategy is that bellyache bush is managed effectively to stop further spread and to reduce its impact on Australia's natural and economic assets.

1 THE CHALLENGE

Bellyache bush (*Jatropha gossypiifolia*) is an invasive shrub that can have significant economic, environmental and social impacts. Introduced into Australia for ornamental and medicinal purposes in the late 1800s, it now infests substantial areas of the northern rangelands of Queensland, the Northern Territory and Western Australia. Whilst bellyache bush is still in the relatively early stages of invasion, it has the potential to invade vast areas of our tropical savannas.

Bellyache bush forms dense thickets, particularly in riparian areas, out competing pasture grasses and native vegetation. It can rapidly take over productive grazing land and reduce biodiversity due to its short age to reproductive maturity; its ability to produce prolific quantities of seed; and its efficient dispersal mechanisms at both local and regional levels. Bellyache bush thrives in disturbed and overgrazed areas. In addition, most parts of the plant are also highly toxic to both animals and humans with significant stock losses attributed to this weed, particularly during drought when it may be the dominant vegetation in an area.

Bellyache bush grows and spreads via seed and vegetatively and is capable of producing seed from as young as 10 weeks. In dry conditions some seed may remain in the soil for more than 10 years, resulting in continuing seedling establishment and the necessity for ongoing control. The most significant vectors of long distance dispersal are water and man. Large new infestations can rapidly arise and, once established, the control costs are high. Early detection and control is therefore required. Prevention of local spread is difficult as ripe capsules explode, spreading seeds up to 13 metres resulting in rapid expansion of infestations.

Progress has been made on controlling bellyache bush and a number of proven control methods are available (Department of Employment, Economic Development and Innovation, 2009). Integration of these methods has been shown to be more effective than any single treatment in addressing not only the initial infestation but also the subsequent regrowth. Increasing knowledge of and training in the use of these methods is required.

The full extent and distribution of bellyache bush is unknown and this will be an important initial challenge to rectify. Whilst a substantial amount of control work has been undertaken to date, particularly in Queensland and the Northern Territory, a strategic coordinated approach including awareness raising and extension together with control programs, research and collaboration will lead to effective prevention of spread. Catchments have been chosen as the focus of planning, strategic priority setting and implementation of coordinated programs.

Policy and legislation for managing bellyache bush is in place in all three Australian jurisdictions in which it occurs. Strategic, coordinated programs to implement this framework with all partners working collaboratively will increase the effectiveness of efforts.

The challenge is to build on the significant knowledge and achievements in management by landholders, researchers, community groups and state/territory agencies in preventing the spread of and control existing infestations.

2 INTRODUCTION

This document has been prepared by the National Bellyache Bush Coordinator and key stakeholders. It is based on existing literature, discussions with operational, scientific and policy people in government agencies, NRM organisations, community groups and individuals as well as on site visits to infestations and research trials.

The aim of this document is to provide an agreed, co-ordinated approach to the management of bellyache bush throughout Australia. It outlines a number of aspirational, strategic actions designed to prevent further infestations and to minimise the impact that current infestations have on the environment, industry and society.

As part of the Weeds of National Significance (WoNS) initiative, the national bellyache bush program establishes national priorities and facilitates action where there is a significant national or cross-jurisdictional benefit to be gained. This is the fundamental approach adopted in developing this Strategic Plan.

Effective management of Weeds of National Significance and other weeds requires an integrated approach that includes prevention and eradication programs, control of outliers, establishment and implementation of management zones and the protection of key environmental, social and economic assets in areas where the weeds are already widespread. Strategic and coordinated management approaches underpinned by good research and monitoring can reduce current and potential impacts and provide a good return on investment.

2.1 Principles underpinning the plan

This national strategic plan is based on recognition and acceptance of seven principles outlined in the Australian Weeds Strategy:

1. Weed management is an essential and integral part of the sustainable management of natural resources for the benefit of the economy, the environment, human health and amenity.

2. Combating weed problems is a shared responsibility that requires all parties to have a clear understanding of their roles.

3. Good science under pins the effective development, monitoring and review of weed management strategies.

4. Prioritisation of and investment in weed management must be informed by a risk management approach.

5. Prevention and early intervention are the most cost-effective techniques for managing weeds.

6. Weed management requires coordination among all levels of government in partnership with industry, land and water managers and the community regardless of tenure.

7. Building capacity across government, industry, land and water managers and the community is fundamental to effective weed management.

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

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

2.2 The current situation

Bellyache bush currently occurs in Western Australia, Queensland and the Northern Territory where it is a declared weed under the relevant state/territory legislation (see section 6.6 for further details).

Figures 1 and 2 indicate the current recorded distribution and that it has yet to occupy the full extent of its potential distribution.

Weed risk assessments in both the Northern Territory and Queensland have found bellyache bush to be a very high risk weed where the potential exists for successful management. A statutory weed management

plan for this weed is in place in the NT which, in combination with mixed declaration zones under the *Weeds Management Act*, establishes the objectives and outcomes to be achieved by land managers and incorporates the best management practice goals. Delineation of 'control' and 'eradication' management zones through the legislation is seen to represent a defensible balance between the difficulty of managing large established infestations and the urgent need to eradicate outlying populations (Department of Natural Resources, Environment, The Arts and Sport, 2010).

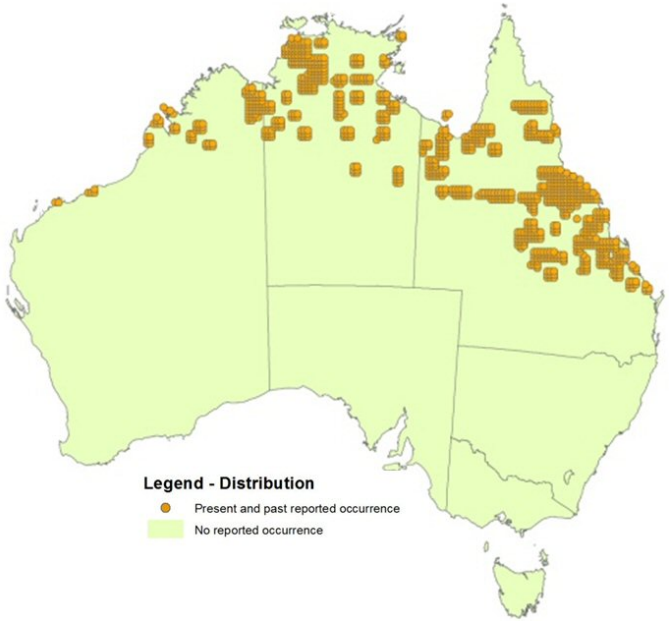


Figure 1: Current (2011) recorded distribution of bellyache bush in Australia.

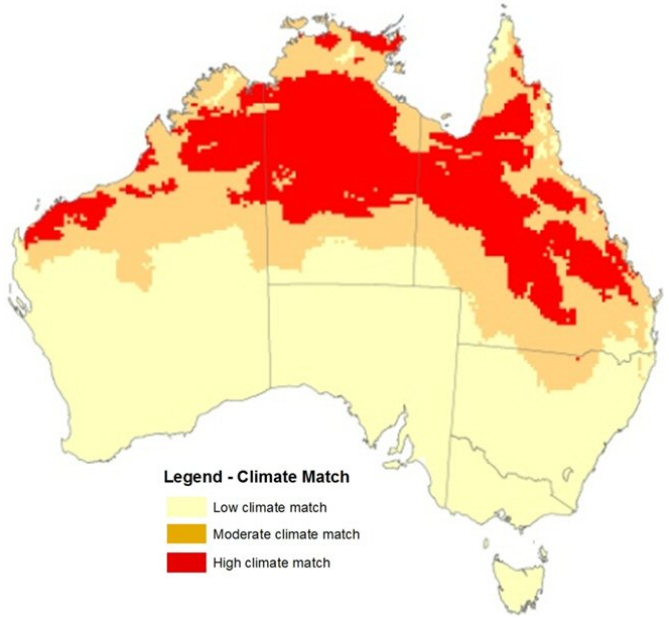


Figure 2: Potential bellyache bush distribution in Australia
Climatch modelling by ABARES

In Queensland a state *Guideline for the management of bellyache bush* sets the operational objectives and actions to be undertaken to achieve those objectives. This Guideline recognises that although the distribution of bellyache bush in Queensland is now so extensive that eradication is not practical or economically feasible, strategically reducing the rate of its spread is. The importance of protecting presently uninfested or clean areas is also recognised. Many regional and local pest management plans have this weed as an eradication or control target.

Although declared in Western Australia, bellyache bush is considered to be a low priority species with the emphasis for management being the protection of assets at risk from the impacts of spread.

The differing jurisdictional priorities allocated to bellyache bush provide a challenge for national coordination.

Due to its impact on productivity, its toxicity and the threat it poses for riparian habitats, control of bellyache bush has the support of many landholders, landcare groups, local government, and regional and state organisations. Extensive research programs have been undertaken over the past two decades and some extension materials have been made available. To effectively implement this strategic plan, it is important that these resources are further developed to increase extension and awareness to ensure this information on management options is passed on to and used by stakeholders.

2.3 Strategic plan development

This strategic plan was developed after extensive consultation with stakeholders from throughout the existing and potential range of this weed. Opportunistic presentations at regional meetings and events were undertaken to gauge distribution, attitudes, priorities, information and research gaps, management needs and threats of bellyache bush. Information was sought from the large amount of research and best practice management information that is available as well as a limited number of field visits.

In March 2012 a two day national workshop was held with participation based on knowledge, experience and/or role in managing bellyache bush as well as geographic distribution and stakeholder representation. The workshop outcomes, including draft strategy action tables, were collated and reviewed by participants.

A draft National Bellyache Bush (*Jatropha* gossypiifolia) Strategic Plan was then prepared and circulated for comment from the workshop participants and key lead agencies.

Public consultation and comment was sought from 18 June to 16 July 2012 through web publication, email notification, letters to stakeholders and direct discussions and presentations. Consultation feedback was considered and incorporated into this national strategic plan which received endorsement from the Australian Weeds Committee in November 2012.

2.4 Relevance to other strategies

Many of the objectives and strategic actions in this plan will align with and complement existing plans at all jurisdictional levels as outlined below:

Scale	Strategies and Plans
National	Australian Weeds Strategy 2007; National Strategy for the Conservation of Australia's Diversity 2010; Native Vegetation Policy 2001; policies, strategies and plans applied to Commonwealth Lands (e.g. those under the *Environmental Protection and Biodiversity Conservation Act 1999*); other WoNS Strategic Plans
State	State / territory biodiversity conservation strategies, invasive species and biosecurity strategies including: Building Nature's Resilience: A Biodiversity Strategy for Queensland. Guideline for the management of bellyache bush (*Jatropha gossypiifolia*), December 2004, Queensland Government. Weed Management Plan for Bellyache Bush (*Jatropha gossypiifolia*) 2010, NRETAS.
Regional	Regional/catchment management pest management strategies & Plans including Fitzroy Basin Weed Management Strategy; Burdekin Dry Tropics Pest Management Strategy; Southern Gulf Catchments Regional Pest Management Plan; Whitsunday Regional Council Pest Plan; Regional Pest Management Strategy Isaac Mackay Whitsunday 2011-2014; Northern Territory Integrated Natural Resource Management Plan 2010-2015;

	Kimberley Science and Conservation Strategy
Local	Weed control plans, local government pest strategies /plans (in Qld), landcare group pest management plans
Property	Property weed management plans.

3 STRATEGIC GOALS AND OBJECTIVES

This strategic plan outlines actions for the 5 year period 2012 to 2017 that are required to contribute to the long term vision of preventing spread of bellyache bush and reducing its impacts.

The three strategic goals are common to the strategic plans for all the WoNS species declared in April 2012 including bellyache bush. A number of objectives have been identified that will contribute to achievement of each goal as listed below:

Strategic Goal	Objectives
1. New infestations are prevented from establishing.	1.1 Establish the location, extent and density of current bellyache bush infestations
	1.2 Develop and maintain early detection measures to protect clean areas
	1.3 Implement eradication (or containment) programs when new infestations are discovered.
	1.4 Implement eradication or containment measures (dependant on strategic significance and feasibility) for outlier infestations.
2. Established infestations are under strategic management.	2.1 Promote strategic, catchment based, zone management for bellyache bush control.
	2.2 Implement strategic management to: a) contain and prevent the spread and impact of core infestations; and / or b) protect priority assets within core infestations.
	2.3 Promote the continued development and adoption of best practice management
	2.4 Develop and promote integrated land management techniques that maximise effectiveness of control.
3. Greater capability and commitment to manage bellyache bush.	3.1 Complete the development of an appropriate legislative framework for bellyache bush management.
	3.2 Include bellyache bush in cooperative management and planning frameworks to deliver the strategic plan objectives
	3.3 Increase education and awareness of the threats and management options for bellyache bush in Australia
	3.4 Continue innovative bellyache bush research and trials to assist management decision making.
	3.5 Maintain effectiveness of and commitment to the national strategic plan

The aspirational objectives in this plan are supported by strategic actions that identify how the objectives can be achieved. In many cases, further work will be needed to develop a means of implementing the actions.

A strategic approach to on-ground weed management objectives has been depicted as a continuum from prevention, eradication, containment, to asset protection. In reality there is overlap within the one region, local government area or property and over time but this is a useful approach to assigning priority objectives and has been utilized in identifying those actions that will strategically address each of the objectives for bellyache bush as listed below.

It is the highest priority to ensure that catchments or sub-catchments (such as the majority of Cape York) that do not have bellyache bush infestations (‘clean areas’) remain free of bellyache bush. Prevention is the relevant management objective for those areas. Catchments (such as the Victoria River catchment in the NT) with scattered outlier infestations or smaller infestations within, but separate from, core infestations

(such as parts of the Burdekin River catchment in Qld) should be targeted for eradication. Large infestations (such as the upper catchments to Lake Argyle in WA) are considered core with containment (or prevention of spread from the current distribution) as the management objective. Extensive, dense infestations in catchments that are remote or difficult to access may not be practical to contain with the resources available. In these areas, priority assets can be identified for the focus of protection.

In recognition of the limitations on availability of resources, priorities have been assigned according to the following criteria:

Priority 1- Critical to the success of the strategy;

Priority 2 - Highly beneficial and will contribute significantly to success of the strategy;

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

3.1 GOAL 1: New infestations are prevented from establishing

As shown in Figures 1 and 2, climate suitability modelling indicates that bellyache bush does not occupy all of its potential distribution. Such modelling shows that there are suitable opportunities for bellyache bush to spread in the Kimberley and Pilbara areas of WA, throughout the Top End and into the Victoria River District and the Barkly areas of the NT and into Cape York and central and southern regions of QLD.

Early detection and management of new infestations is the most cost effective method of preventing the long term impacts associated with bellyache bush infestation. It will require an effective mapping and monitoring system, and resourcing of eradication and containment programs for both new infestations and existing outlier populations. Implementation of hygiene practices to prevent spread via vehicles or machinery is also essential. Underpinning these actions is the need to communicate the impacts associated with bellyache bush and to provide identification and best practice management awareness (included under goal 3 in this strategic plan).

Objectives	Strategic Actions	Priority	Responsible Partners
1.1 Establish the location, extent and density of current bellyache bush infestations.	1.1.1 Establish a national mapping data set for bellyache bush and ensure bellyache bush is included on current national weed mapping programs.	1	National coordination. National Bellyache Bush Management Group.
	1.1.2 Collect and collate existing distribution and density data in line with national weed mapping guidelines and include in national bellyache bush mapping dataset.	1	National coordination. WA, NT and Qld weed management agencies; NRM, regional and local weed management agencies / groups.
	1.1.3 Determine, and update if necessary, the accuracy of bellyache bush potential distribution models.	2	National coordination to collate updated distribution data & liaise with researchers to update model.
	1.1.4 Encourage survey and collation of data for currently unmapped bellyache bush infestations, with priority given to catchments with outlier infestations.	1	National coordination. National Bellyache Bush Management Group. WA, NT and Qld weed management agencies.

			NRM, regional and local weed management agencies/groups.
	1.1.5 Investigate use of remote sensing to: a) establish distribution, density and extent of bellyache bush in unsurveyed catchments, and b) monitor for new infestations.	3	National Bellyache Bush Management Group. Research agencies.
	1.1.6 Produce, maintain and make available, a national management action map based on strategic management objectives for catchments.	1	National coordination. National Bellyache Bush Management Group.
1.2 Develop and maintain early detection measures to protect clean areas.	1.2.1 Utilise updated distribution mapping to identify priority clean areas.	2	National Bellyache Bush Management Group. WA, NT and Qld weed management agencies. NRM, regional and local weed management agencies/groups.
	1.2.2 Promote current bellyache bush identification processes / resources, in particular to stakeholders in priority clean areas and targeting areas adjacent to existing infestations.	2	National coordination. National Bellyache Bush Management Group. WA, NT and Qld weed management agencies. NRM, regional and local weed management agencies/groups.
	1.2.3 Encourage weed hygiene practices to protect clean areas.	2	National Bellyache Bush Management Group. WA, NT and Qld weed management agencies. NRM, regional and local weed management agencies/groups.
	1.2.4 Encourage reporting of suspected outbreaks and ensure processes are in place for identification, response, delimitation and control planning.	1	WA, NT, Qld and NSW weed management agencies. NRM, regional and local weed management agencies/groups.
	1.2.5 Develop, promote and implement plans to rapidly address identified new infestations.	1	WA, NT and Qld weed management agencies.

			NRM, regional and local weed management agencies/groups.
1.3 Implement eradication (or containment) programs when new infestations are discovered.	1.3.1 Confirm identification through ground truthing and delimit new infestations.	1	WA, NT and Qld weed management agencies. NRM, regional and local weed management groups.
	1.3.2 Develop feasible site eradication or containment plan, identify available resources, involve all relevant stakeholders and implement using Best Practice Management.	1	WA, NT and Qld weed management agencies. NRM, regional and local weed management groups.
1.4 Implement eradication or containment measures (dependant on strategic significance and feasibility) for outlier infestations.	1.4.1 Develop guidelines for distinguishing eradication versus containment targets for outliers in line with the catchment based strategic zone management system for bellyache bush control. - Include criteria to delimit infestations and method of prioritisation based on landscape values and feasibility of control.	1	National coordination in consultation with key partners. National Bellyache Bush Management Group.
	1.4.2 Create a management plan framework for use by state, regional, local agencies/groups and landholders to encourage implementation of eradication or containment for outliers. - Include consideration of establishing buffer zones when the target is to contain larger outliers.	2	National Bellyache Bush Management Group.

3.2 GOAL 2: Established infestations are under strategic management

A key component of the vision of this strategic plan is reduction of the impact of existing infestations of bellyache bush. A strategic approach is set out involving use of best practice methods of management, prevention of further spread, protecting key environmental and economic assets, containing core infestations and implementation of integrated weed management (including the use of biocontrol agents in the event that current research proves viable for bellyache bush).

Objectives	Strategic Actions	Priority	Responsible Partners
2.1 Promote strategic, catchment based, zone management for bellyache bush control.	2.1.1 Develop a strategic, catchment-based zone management system for bellyache bush using information such as current and potential distribution data, knowledge of ecology, feasibility of control, assets at risk and knowledge of political and social resources to implement.	1	National Bellyache Bush Management Group.
	2.1.2 Promote awareness of the zone management system among affected stakeholders.	2	National coordination. National Bellyache Bush Management Group.
	2.1.3 Seek resources and support to implement plans to achieve the management	2	National coordination. National Bellyache

	objectives identified in the zone management system.		Bush Management Group. WA, NT and Qld weed management agencies. NRM, regional and local weed management agencies/groups.
2.2 Implement strategic management to: **a) contain and prevent the spread and impact of core infestations; and / or** **b) protect priority assets within core infestations.**	2.2.1 Develop and promote guidelines for the designation of containment or asset protection management objectives within core infestations in accordance with the zone management system.	1	National Bellyache Bush Management Group.
	2.2.2 Encourage and, where feasible, ensure management of bellyache bush in core infestations is in accordance with the best practice management manual.	1	National coordination. National Bellyache Bush Management Group. WA, NT and Qld weed management agencies. NRM, regional and local weed management agencies/groups.
	2.2.3 Identify vectors and high risk pathways for the spread of bellyache bush.	2	National Bellyache Bush Management Group.
	2.2.4 Encourage community-led stakeholder syndicates to form for coordinated bellyache bush control, especially in the case of widespread infestations	2	WA, NT and Qld weed management agencies, including local government NRM, regional and local weed management agencies/groups.
2.3 Promote the continued development and adoption of best practice management.	2.3.1 Continue to provide and promote use of the '*Bellyache Bush (Jatropha gossypiifolia) management manual, 2009'*, the *Bellyache Bush Weed Management Guide* and other resources outlining best practice management. Update BPM manual and other resources as feasible.	1	National coordination. National Bellyache Bush Management Group. State/Territory, NRM and local weed management agencies/groups.
	2.3.2 Encourage the trialling of new control methods and the timely reporting / dissemination / demonstration of results.	2	National coordination. National Bellyache Bush Management Group. WA, NT and Qld weed management agencies. NRM, regional and local weed management agencies/groups. Research agencies.
	2.3 3 Complete current biocontrol research program for insect agents and pathogens (including native pathogens) and promote results.	1	Biosecurity Queensland / CSIRO.

2.4 Develop and promote integrated land management techniques that maximise effectiveness of control.	2.4.1 Further develop, document and promote integrated weed management for bellyache bush including chemical and mechanical control, fire management, utilising natural occurrences (eg flooding) and grazing / competition management.	1	National coordination. National Bellyache Bush Management Group. WA, NT and Qld weed management agencies. DAFWA. NRM, regional and local weed management agencies/groups. Research agencies.
	2.4.2 Identify and promote the most effective suite of control options for use in various geographic situations (habitats); under differing regimes (eg resource availability; density of infestation) and, where appropriate, for multi weed species landscape scale control.	1	National coordination. National Bellyache Bush Management Group. WA, NT and Qld weed management agencies. NRM, regional and local weed management agencies/groups. Research agencies.
	2.4.3 Review existing hygiene protocols for bellyache bush to determine rates of adoption, effectiveness, gaps and needs. Implement recommendations from review to improve uptake of hygiene practices.	2	National coordination. National Bellyache Bush Management Group. WA, NT and Qld weed management agencies.
	2.4.4 Encourage the monitoring of control effectiveness and post-control recovery.	1	National coordination. National Bellyache Bush Management Group. NT and Qld weed management agencies. WA land managers to monitor effectiveness as part of management plans. NRM, regional and local weed management agencies/groups.

3.3 GOAL 3: Greater capability and commitment to manage bellyache bush.

Successful management of bellyache bush relies heavily on land managers and other key stakeholders having the necessary knowledge to identify management priorities and implement control actions, as well as a legislative and policy framework, funding and long term commitment to its management. Objectives within this goal also contribute to actions in the other two goals.

Integration of bellyache bush management into multi-level natural resource management planning and cooperative partnerships; further development of the most effective weed control solutions; establishment of communication networks and monitoring the effectiveness of this strategic plan will all contribute to achieving long term strategy goals.

Objectives	Strategic Actions	Priority	Responsible Partners
3.1 Complete the development of an appropriate legislative framework for bellyache bush management.	3.1.1 Maintain legislative status of bellyache bush in the States / Territory where it is currently recorded (WA, NT and Qld).	1	WA, NT and Qld Governments and weed management agencies.
	3.1.2 Seek declaration of bellyache bush to prevent sale, trade and movement in all remaining Australian States / Territories.	2	National Bellyache Bush Management Group.
	3.1.3 Enforce legislated, landowner bellyache bush management in relevant management zones where other approaches have been unsuccessful.	1	WA, NT and Qld Governments and weed management agencies.
3.2 Include bellyache bush in cooperative management and planning frameworks to deliver the strategic plan objectives.	3.2.1 Establish and support a national bellyache bush management group.	1	NT DLRM. National coordination.
	3.2.2 Encourage the roll out of the strategic, catchment based management zone system at national, state/territory, regional and local planning levels.	2	National coordination. National Bellyache Bush Management Group.
	3.2.3 Foster and support relevant bellyache bush management by state/territory, regional and local weed management groups and inclusion of appropriate actions in regional, local and property management plans.	1	National coordination. National Bellyache Bush Management Group.
3.3 Increase education and awareness of the threats and management options for bellyache bush in Australia.	3.3.1 Develop a national extension and communication plan for bellyache bush. Develop and distribute national awareness resources in accordance with the plan.	1	National coordination. National Bellyache Bush Management Group.
	3.3.2 Build community capability through delivery of best practice management training and demonstration.	1	National coordination. National Bellyache Bush Management Group. WA, NT and QLD weed management agencies; NRM Regions; landcare groups.
	3.3.3 Incorporate bellyache bush education tools into school curriculums in WA, NT and QLD.	3	National coordination. National Bellyache Bush Management Group. WA, NT and QLD weed management agencies
	3.3.4 Raise awareness of and support applications by weed management agencies, groups and landholders for incentive and funding programs.	1	National coordination. National Bellyache Bush Management Group. WA, NT and QLD weed management agencies and NRM

			Regions.
3.4 Continue innovative bellyache bush research and trials to assist management decision making.	3.4.1 Promote the results of the extensive research on bellyache bush ecology and management to date and future research undertaken.	1	National coordination. National Bellyache Bush Management Group. WA, NT and QLD weed management agencies.
	3.4.2 Encourage collaboration and partnerships to undertake further bellyache bush research that will assist management decision making.	2	National coordination. National Bellyache Bush Management Group. WA, NT and QLD weed management agencies.
	3.4.3 Encourage, and promote the results of, innovative bellyache bush research to investigate: a) Affect of biotype on impact, control method effectiveness and cost of control; b) Quantification of direct relationship between domestic livestock / humans and toxicity; c) Benefit cost analysis of control strategies; d) Seed germination trials to establish cold tolerance.	1	National coordination. National Bellyache Bush Management Group. WA, NT and QLD weed management agencies. Research agencies.
	3.4.4 Undertake annual review of research gaps and priority issues. Implement recommendations.	3	National Bellyache Bush Management Group.
3.5 Maintain effectiveness of and commitment to the national strategic plan	3.5.1 Establish and maintain a sustainable bellyache bush weed management network from the national to local level.	1	National coordination. National Bellyache Bush Management Group.
	3.5.2 Monitor and evaluate implementation of this strategic plan through development and implementation of a MERI Plan.	1	National coordination. National Bellyache Bush Management Group.
	3.5.3 Promote achievements in implementation of the strategy to all partners.	2	National coordination. National Bellyache Bush Management Group.

4 STAKEHOLDER ROLES AND RESPONSIBILITIES

While land owners and managers are ultimately responsible for the control of bellyache bush on their land, the effective implementation of this strategy requires the involvement of a range of stakeholders. It is also noted that stakeholders responsibilities may vary between jurisdictions and that some may be optional while others are prescribed by legislation.

The successful achievement of the strategic plan's objectives relies on the development and maintenance of partnerships between community, industry and government and recognition of the roles of each stakeholder. Suggested responsibilities to assist key stakeholders in achieving these are:

Australian Government

Along with state and territory governments and industry, Australian Government funding initiatives recognise WoNS. However all Australian Government assessments are merit based.

- Ensure quarantine controls to prevent importation (DAFF Biosecurity).
- Support governance processes for the effective delivery of the bellyache bush initiative.
- Promote the status of bellyache bush as a WoNS, its impacts and the importance of management.
- Undertake strategic bellyache bush control on all Australian Government managed lands.

Australian Weeds Committee

- Provide a mechanism for identifying and resolving weed issues at a national level.
- Facilitate coordination between the Australian, State and Territory Governments.
- Provide advice to the National Biosecurity Committee on weeds issues.
- Provide planning, coordination and monitoring of the implementation of the Australian Weeds Strategy.
- Promote the importance and benefits of the National Bellyache Bush Strategic Plan, including overseeing its implementation.

National Bellyache Bush Management Group

- Ensure a diversity of community and agency views are represented for effective strategic plan implementation.
- Provide guidance, direction and policy advice for the management of bellyache bush through the delivery of the strategic plan.
- Monitor, evaluate, report and improve strategic plan implementation.
- Assist in the development and implementation of programs and initiatives which support strategic actions.
- Maintain and build partnerships with key stakeholders to improve strategic bellyache bush management.
- Identify funding sources and provide independent advice for prospective applicants for projects consistent with the needs of the National Bellyache Bush Strategic Plan.

Research institutions

- Applied research to address priority national strategic requirements.
- Identify research gaps and seek innovative solutions for the management of bellyache bush.
- Seek new and on-going funding and support for research requirements.

State and territory agencies

- Maintain appropriate legislation and policies to achieve state and territory based objectives for managing bellyache bush.

- Coordinate bellyache bush control and management at a jurisdictional level to complement the management and delivery of bellyache bush National Strategic Plan.
- Work closely with local governments, communities and other stakeholders to prevent and minimise bellyache bush impacts.
- Identify strategic management areas and associated objectives.
- Promote consistency with this Strategic Plan in jurisdictional pest management plans.
- Facilitate the inclusion of strategic bellyache bush management in pest management planning processes.
- Contribute to priority research initiatives.
- Source funding for strategic management programs and research.
- Implement monitoring and reporting protocols in line with the MERI plan and provide relevant information to the national management group and/or Australian Weeds Committee.
- Develop and implement communication and extension plans where appropriate.
- Facilitate state and territory level mapping and contribute to national mapping initiatives.
- Ensure, where appropriate, participation on the National Bellyache Bush Management Group.
- Undertake strategic bellyache bush control on all state / territory government owned or managed lands in accordance with legislation, policy and best practice.

Local governments

- Incorporate bellyache bush objectives in relevant pest management plans and monitor implementation.
- Administer and enforce legislation where applicable.
- Undertake surveying and mapping particularly in relation to outlying bellyache bush infestations.
- Establish local management policies to contribute to strategic control, containment and/or asset protection objectives.
- Improve community awareness of impacts and identification; and promote early detection.
- Control bellyache bush on local government managed or owned land.
- Facilitate the removal of urban plantings of bellyache bush.
- Source funding and/or contribute to strategic control programs.

Natural resource management groups (catchment management authorities)

- Contribute local and regional perspectives to bellyache bush management.
- Administer and enforce noxious weed legislation where applicable.
- Contribute to the development, implementation and/or review of local and regional pest management plans.
- Promote and contribute to local and regional containment and/or management programs in partnership with relevant stakeholders.
- Support and/or develop bellyache bush funding submissions in line with national priorities.
- Participate in local and regional mapping initiatives and contribute to state, territory and national map production.
- Promote awareness and best practice management through event coordination and product distribution.

Community, conservation and other interest groups

- Contribute local and regional perspectives to bellyache bush management.
- Contribute to the development, implementation and/or review of local and regional pest management plans.

- Promote and contribute to local and regional containment and/or management programs.
- Support and/or develop bellyache bush funding submissions in line with national priorities.
- Participate in local and regional mapping initiatives and contribute to state, territory and national map production.
- Promote awareness and best practice management through event coordination and product distribution.

Industry

- Promote and adopt best practice management of bellyache bush.
- Identify gaps and issues associated with implementation of the national bellyache bush strategic plan.
- Contribute to research and development of management practices to support industry members.
- Ensure awareness of sale and movement restrictions of bellyache bush within industry members.
- Improve community awareness of impacts and identification; and promote early detection.

Private land owners / managers

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

5 MONITORING EVALUATION REPORTING AND IMPROVEMENT

The Australian Weeds Strategy (Natural Resource Management Ministerial Council, 2006) assigns the Australian Weeds Committee with responsibility for monitoring and evaluating the management of national priority weeds, which include the Weeds of National Significance.

State agencies responsible for weed management and conservation will benefit from strategic action that reduces the impact and prevents the spread of bellyache bush. Where possible, these agencies should coordinate actions required to implement this Plan, and monitor and evaluate progress towards the Plan's objectives, in conjunction with existing state, regional or local agencies or groups in their jurisdictions. Gathering common data and evidence will permit assessment annually at the national level to ensure progress towards strategic actions.

The priority NRM regions for bellyache bush management action will be identified through implementation of the strategic actions included in this Plan. It is important that all partners in these priority NRM regions collaborate to progress the strategic actions, and monitor and then evaluate what has been achieved. Reporting through the National Bellyache Bush Management Group and the Australian Weeds Committee annually will allow improvement to be achieved.

5.1 Targets and Measures

The framework below will form the basis for minimum annual reporting and assessment of progress toward achievement of the strategic actions within this Plan.

Strategic Plan Goals	Key Evaluation Questions	Data/Evidence Required	Consider
1. New infestations are prevented from establishing.	To what extent have new infestations been prevented from establishing?	1.1National distribution data • Has a national distribution map been developed? • Once developed, has the national distribution map been reviewed and/or updated? • Has the Priority Management Action spreadsheet for each NRM Region been developed /updated?	• Are these documents publicly available? • Have stakeholders been advised of any developments/changes? • Where is this data/info stored? • Do these documents capture national priorities?

		1.2 New infestations • Number of new outlier infestations[1] recorded. • Percentage of known infestations actively controlled. [1] New infestations should be an outlier, outside existing known distribution of bellyache bush	• Are any new outlier infestations occurring in areas identified as a high priority in the management zone system to be developed as part of this national strategic plan? • How were any such infestations detected (passive or active surveillance, community reporting etc)? • Have high risk pathways been adequately identified? And threats minimised?
		1.3 Eradication & containment programs • Percentage of eradication and/or containment programs being maintained	• What percentage of programs identified at the commencement of the national strategy are actively managed? • Is there a plan in place for ongoing management? • How is progress being monitored and reported to stakeholders? • Are there examples (case studies) that can be used to illustrate the programs and progress or lack thereof?
		Overall progress rating	
2. Existing infestations are under strategic management.	To what extent is best practice management being developed and promoted?	2.1 Best Practice Management • Has there been improvement in best practice management of bellyache bush? • Have the best management practice awareness resources continued to be made available?	• Are existing tools providing adequate control of WoNS? • Have new advances/technologies been developed and are they incorporated into BPM information? • Are there barriers to adoption of best practice management? • Are research programs addressing any

			observed gaps (e.g. herbicide trials, biocontrol, restoration requirements post control)?
		2.2 Integrated Weed Management • How effective are IWM programs?	• Are awareness resources available that promote the integrated land management approach to bellyache bush control? • Are there examples (case studies) that can be used to illustrate good use of IWM?
	To what extent is integrated weed management effectively managing core infestations?	2.3 Containment of infestations • Number of catchments identified for 'containment'? • Percentage of containment catchments where bellyache bush is not spreading?	• Has the zone management system identified containment catchments (or sub-catchments)? • Are monitoring and recording programs in place to record change in distribution?
	For those catchments with a designated management objective of 'containment', to what extent are infestations being contained? For those catchments with a designated management	2.4 Asset protection • Number of catchments identified for asset protection? • Number of priority assets identified as 'at risk' from bellyache bush? • Percentage of priority assets being protected (eg assessed against relevant Threat Abatement Plans)? • Percentage of relevant state/regional invasive species plans that identify priority assets at risk from bellyache bush?	• Response should include status report on progress towards asset protection programs. • Methods by which assets are being protected (e.g. targeted annual spray programs, high risk pathway surveillance, strategic plans). • Are long term monitoring programs in place to detect change? • To what extent is management leading to an improvement in asset condition?

	objective of 'asset protection', to what extent are assets being protected through strategic management?		
		Overall progress rating	
3. Greater capability and commitment to manage WoNS.	To what extent has the capability and commitment to manage WoNS increased?	3.1 Legislation • Have there been any legislation or policy changes for this species? • Has a need for legislative change been identified by stakeholders?	• Are minimum requirements being maintained (e.g. ban on sale, trade, movement? • Is control required throughout or in part of jurisdiction? • Is compliance actively enforced?
		3.2 Community engagement & awareness • Has a communications program been established for bellyache bush? • Are partnerships being maintained to ensure collaboration on bellyache bush? • Number and type of media activities. • Number of new collaborative and strategic plans developed and/or implemented.	• Is bellyache bush awareness and education information and/or advice being targeted to priority regions. • Is training being delivered to meet the needs of weed managers (including the community)? • Are networks/groups being supported (e.g. through dissemination of research outcomes, funding opportunities, control options etc)? • Has awareness and engagement in bellyache bush management been raised effectively? • Only those Plans relevant to or resulting from implementation of this Plan only to be included.

		3.3 Resourcing • From what sources are programs being funded?	• Number of projects funded by Commonwealth, jurisdictions, industry, etc
		3.4 Policy & Planning • Are the objectives of the strategy being integrated into commonwealth/state/regional plans, policies and programs? • Has cross border collaboration occurred?	• How are priorities reflected in planning and policy approaches? E.g. WRA, invasive species plans, asset protection plans, district plans, weed spread prevention activities, management programs, incentive programs, state working groups. • How are national priorities being maintained? E.g. management zones, eradication targets, training & awareness raising, research projects.
		Overall progress rating	
Continuous improvement	Are there any unexpected outcomes that have been identified through implementation of strategy?	4.1 Barriers • Have any other management issues or impediments been identified?	

How to score progress rating

1- Insufficient evidence to score

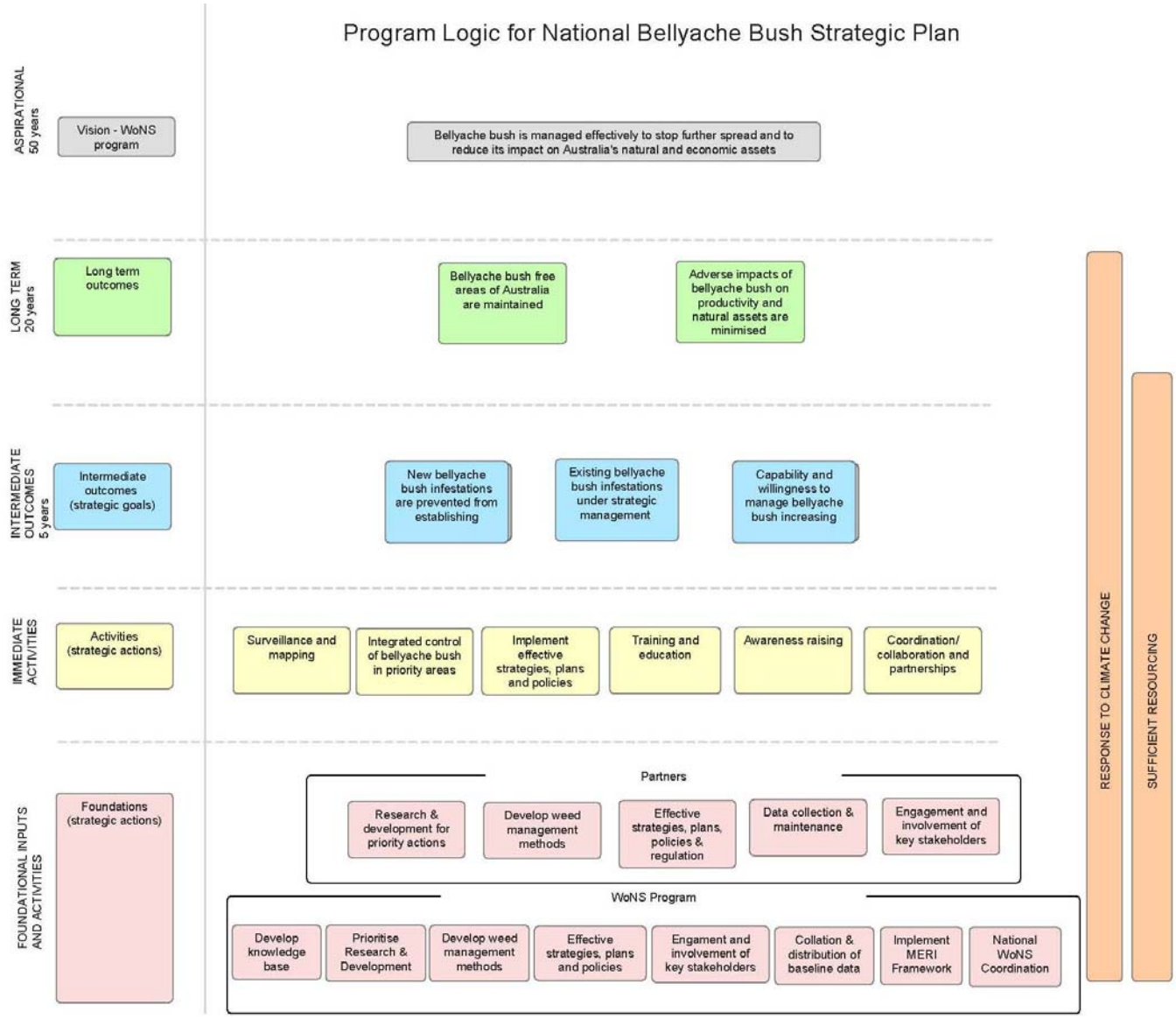
2- No progress against goal

3- Limited progress is being made against this goal

4- Reasonable progress is being made against this goal

5- Excellent progress is being made against this goal

5.2 Program Logic Model



6 Technical Background

The biology, ecology, invasion history, impacts and control methods for bellyache bush are extensively detailed in the national best practice manual (Department of Employment, Economic Development and Innovation, 2009) and other references. A brief overview is presented below.

6.1 Bellyache bush identification

Bellyache bush is an erect, multi-stemmed perennial shrub with a shallow root system. Individual plants have a life span of more than 10 years and can grow up to 4 metres high, although most plants average between 2 and 3 metres. It is deciduous in the dry season with new leaves generally produced with the onset of the wet season.

The branches, stems and leaves are covered with tiny, sticky hairs. The thick stems exude a sticky sap when damaged.

Bellyache bush leaves are alternate and have 3 to 5 lobes with very finely toothed margins. The leaf colour depends on biotype (a group of plants having the same genetic constitution) and the age of the leaf, but ranges from green to bronze, red or purple.

The small flowers are red/purple on the outside of the petals with a yellow centre. Fruit capsules are round to oblong, usually containing 3 seeds. The hard capsules are bright green when immature, pale green or tan and woody at maturity. The fresh brown seeds have a fleshy, lighter coloured outgrowth on one end (caruncle). Seedlings comprise a single stem with 3 or 4 single lobed leaves sprouting from the top.

6.2 Bellyache bush biology and ecology

Bellyache bush has the potential to flower and fruit year-round, although seed production peaks in the late wet season in most locations.

Bellyache bush plants are prolific seed producers with one adult plant producing up to 12,000 seeds per year depending on environmental conditions, biotype and the density of the infestation. Seed capsules open explosively on ripening, catapulting seeds up to 13 metres from the adult plant. Research indicates that most seed will expire within four years although some may last ten years or more under dry conditions. Seedling density can be very high, up to 400 per square metre.

Bellyache bush will also regenerate vegetatively from stem cuttings or from whole removed plants.

6.3 Bellyache bush distribution and spread

Bellyache bush is now widespread across northern Australia, especially along watercourses and associated floodplains.

In Queensland, it is found in the Burdekin, Fitzroy, Walsh, Palmer, Flinders, Leichhardt and Gregory River catchments, as well as the headwaters of Lake Eyre Basin. Scattered infestations are also found in central Queensland.

In the Northern Territory, bellyache bush is most prevalent in the Daly, McArthur, Roper and Victoria River catchments and the Gulf region. Smaller infestations are also found in several coastal monsoonal areas, including the Darwin region and on the Barkly Tableland.

Widespread populations exist in the east Kimberley in Western Australia, with large infestations in the Lake Argyle catchment and Halls Creek area. Smaller infestations occur in the west Kimberley around Derby and Broome and on the Fitzroy River. It also occurs in the Pilbara towns of Karratha and Port Hedland.

Bellyache bush has an extensive potential range in Australia; including all of the savanna woodlands of the wet-dry tropical climate of northern Australia in Queensland, Northern Territory and Western Australia. It is likely to be most abundant on sandy loams associated with creeks and rivers, but will establish and grow in most soil types including rocky cliffs. Most infestations occur in areas receiving between 400 and 1200mm of rainfall.

6.4 Summary of impacts

Bellyache bush is regarded as one of the worst weeds in Australia because of its invasiveness, potential for spread, and economic, environmental and social impacts.

Bellyache bush forms dense thickets, particularly in riparian areas, invading beds and banks of ephemeral watercourses, floodplains, open woodland and grassland. Productive river frontages are often most at risk of invasion as it takes over productive grazing land, reduces biodiversity and restricts access for activities such as mustering and recreation.

Most parts of the plant are also highly toxic to both animals and humans with significant stock losses attributed to this weed.

Bellyache bush is an opportunistic weed that thrives on both natural and man-made disturbance.

6.5 Control options

6.5.1 Preventing spread into new areas

Stopping the spread of bellyache bush into clean areas should be the management priority. By identifying the most likely means of spread to and within a property, the risk of new infestations can be minimised.

All roads and tracks should be maintained free of bellyache bush. Vehicles, weed control equipment and machinery that have been in bellyache bush infested areas should be cleaned prior to movement to new areas. Moving contaminated material (particularly soil or sand) into areas free of bellyache bush should be avoided.

Early detection and control of new infestations is vital. Checking riparian areas after floods, looking for weeds when conducting routine management activities and being on the lookout for outlying plants are all essential activities with immediate treatment of any plants found.

6.5.2 Pasture management and competition

Bellyache bush thrives in disturbed areas and is often a symptom of poor land condition. Good pasture management (both native and improved) is therefore vital to limit the spread of bellyache bush into clean areas and also to minimise the risk of reinvasion of controlled areas.

Maintaining a competitive pasture will:

- Reduce the number of bellyache bush seedlings that emerge;
- Contribute to higher seedling mortality; and
- Delay the onset of bellyache bush seed production.

6.5.3 Chemical control

Herbicides are useful in the management of bellyache bush particularly during the active growth season but follow-up control is vital. If a heavy infestation is sprayed, then ignored, it can worsen the problem.

Only herbicides registered through the APVMA should be used. Product labels should be read prior to use and any permit conditions followed.

Foliar spraying, if applied when plants are actively growing, can kill 95 to 100% of bellyache bush plants. Trials have shown that four consecutive years of foliar spraying have controlled established infestations. Selective herbicides allow grass to remain and compete with bellyache bush seedlings. Registered, selective herbicides for on-ground application are metsulfuron-methyl and fluroxypyr.

Aerial spraying may be an effective option for large, dense infestations in areas of limited access and rugged terrain, and in areas with minimal tree cover. As with all control methods, massive recruitment of bellyache bush seedlings may occur after aerial spraying and follow up control must be planned. This method may require a vegetation management permit in some jurisdictions as there is the possibility of off-target damage.

Other than in the NT for use of metsulfuron-methyl by rotary winged aircraft, an off-label permit will generally also be required.

Basal bark spraying covers the full circumference of the stem from ground level to 20 cm (higher on larger plants). Using the cut stump method, the bellyache bush stem is cut horizontally as close to the ground as possible and herbicide then applied immediately (within 15 seconds). Both these methods are labour intensive but highly selective and effective for small infestations or where plants are too large to be pulled out by hand. Registration of herbicides varies across States for basal bark and cut stump applications. Product labels should be checked prior to use and advice sought from the local weeds officer.

6.5.4 Mechanical control

The biomass of infestations will be reduced by mechanical control and access improved for the necessary follow up control of the resultant seedling recruitment. This method may be suitable for large, dense infestations.

Stick raking can cause greater than 90% mortality of bellyache bush with mostly smaller plants surviving. However as it bares the soil surface, it can result in massive recruitment of seedlings.

Slashing can kill up to 100% of mature plants but is restricted to flat, open woodland and the plants must be cut as close to the ground as possible. Heavy duty mulchers are more robust than slashers and can handle some woody debris on the ground. They may also reduce shooting from cut plants. Both slashing and mulching should be undertaken when the plants are actively growing, during or soon after the wet season.

6.5.5 Manual removal

Due to its shallow root system, small bellyache bush plants can be easily removed by hand and larger ones dug out. This method is effective for small areas. However pulled or dug plants can stay alive, regrow and produce seed many months later so should be burnt or hung where they are not in contact with the ground. As plants hung in trees have been recorded to flower and set seed 130 days later, the stems should be snapped to increase stem moisture loss and allow greater access for secondary pests and diseases.

Cutting plants close to the ground with a brush-cutter or hand tools during the growing season may be useful for relatively small infestations, environmentally sensitive areas or where vehicle and machinery access is difficult. Reshooting may occur.

6.5.6 Use of fire

Bellyache bush is sensitive to fire with young plants more susceptible than mature plants. Bellyache bush plants generally will blister but not burn so a grass fuel load is required to allow the fire to reach sufficient intensity to kill plants. The surface seeds are susceptible to fire but not all seeds in the soil will be killed. The up-front costs of using fire as a management tool may be minimal when compared to other techniques, however loss of pasture and subsequent high seedling recruitment must be considered.

Hand-held burners or flamers have proven effective for bellyache bush control where chemical or mechanical control is not appropriate. Flaming for 10 seconds around the base of each plant has been shown to kill 92% of treated bellyache bush plants but care must be taken with this method during dry times.

6.5.7 Biological control

Bellyache bush has been a target for biological control in Australia since 1996. The only agent so far released is the seed-feeding jewel bug *Agonosoma trilineatum*. Thousands of these insects were released across Queensland and the Northern Territory between 2003 and 2007. To date, the jewel bug is not known to have established in the field.

Host-testing of a rust is currently in progress and it is the last remaining agent to be tested.

6.5.8 Integrated control methods

No single treatment method will be effective in all situations or for both initial treatment and follow-up. A combination of several methods may provide the best strategy depending on factors such as size and density of the infestation, accessibility, presence of non-target species, time of year, cost, resources available and any permit requirements.

Possible integrated control methods that have proven successful are:

- Repeated foliar applications and maintenance of a competitive pasture;
- Initial stick-racking followed by other mechanical or herbicide applications;
- Slashing / mulching repeatedly or follow-up with spot spraying; and
- Incorporation of burning as either an initial or follow-up technique.

6.6 Quarantine and legislation

Bellyache bush is a declared plant or noxious weed in all jurisdictions (WA, NT and Qld) in which it is present.

There are numerous legislative and policy requirements related to water and land management that are not specifically listed in the table below. Implementation of the Strategic Actions will be undertaken in accordance with such requirements.

State / Territory	Legislation	Declaration	Description
Queensland	*Land Protection (Pest and Stock Route Management) Act 2002*	Class 2	Landholders to try to keep land free. Offence to possess, sell or release without a permit.
New South Wales	*Noxious Weeds Act 1993*	Not declared	
Northern Territory	*Weeds Management Act 2001*	Class A/C (in all areas of the NT except where it is classified as Class B); and Class B/C (described as the Aroona, Mathison and Scott Creek sub-catchments in the upper Daly River catchment and the Greenant Creek sub-catchment in the lower Daly River catchment)	A – to be eradicated B – growth and spread to be controlled C – not to be introduced into the Territory
Western Australia	*Agriculture and Related Resources Protection Act 1976* *Plant Diseases Act 1914* *From 1 May 2013 the Biosecurity and Agriculture Management Act 2007 (BAMA) will be the principal legislation for the management of declared organisms in Western Australia*	Class P1 (whole of state) P2 (All municipal districts south of 26th parallel) P4 (All municipal districts north of 26th parallel) Permitted, Declared, C3 (Management)	P1 – prohibits movement P2 – eradicate infestation P4 – Prevent infestation spreading beyond existing boundaries of infestation Management
South Australia	*Natural Resources Management Act 2004*	Not declared	
Victoria	*Catchment and Land Protection Act 1994*	Not declared	
Tasmania	*Weed Management Act 1999*	Not declared	
ACT	*Pest Plants and Animals Act 2005*	Not declared	

7 Appendices

7.1 Weed control contacts

State	Department	Phone	Email	Website
ACT	Environment and Sustainable Development Directorate.	132281	environment@act.gov.au	www.environment.act.gov.au/environment2
NSW	Biosecurity NSW, NSW Dept of Primary Industries	1800 680 244	weeds@dpi.nsw.gov.au	www.dpi.nsw.gov.au/agriculture/pests-weeds/weeds
NT	Dept of Land Resource Management	08 8999 4567	weedinfo@nt.gov.au	www.nt.gov.au/weeds
QLD	Biosecurity Queensland, Dept of Agriculture, Forestry and Fisheries	132523	callweb@daff.qld.gov.au	www.biosecurity.qld.gov.au
SA	Biosecurity SA, Dept of Primary Industries and Regions SA	08 8303 9620	nrmbiosecurity@sa.gov.au	www.pir.sa.gov.au/biosecuritysa/nrm_biosecurity/weeds
TAS	Dept of Primary Industries, Parks, Water and Environment	1300 368 550	www.dpipwe.tas.gov.au/weeds scroll to the bottom of the page and click on “weeds enquiries”	www.dpipwe.tas.gov.au/weeds
VIC	Dept of Primary Industries	136186	customer.service@dpi.vic.gov.au	http://dpi.vic.gov.au/agriculture/pests-diseases-and-weeds
WA	Dept of Agriculture and Food	08 9368 3333	enquiries@agric.wa.gov.au	www.agric.wa.gov.au
Australia wide	Australian Pesticides and Veterinary Medicines Authority	02 62104701	contact@apvma.gov.au	www.apvma.gov.au

7.2 Glossary and key terminology

AWC	Australian Weeds Committee
APVMA	Australian Pesticides and Veterinary Medicines Authority
BPM	Best practice management
Coordinator	WoNS National Bellyache Bush Coordinator
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DAFWA	Department of Agriculture and Food, Western Australia
DLRM	Department of Land Resource Management
Local weed	Local governments that have legislated weed management management agencies responsibilities
MERI	Monitoring, Evaluation, Reporting and Improvement
NRM/CMA	Natural Resource Management / Catchment Management Authority
NRM	Natural Resource Management
NT	Northern Territory
Qld	Queensland
WA	Western Australia
WoNS	Weeds of National Significance

Definition of key terms:

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

Core infestation – A weed infestation which is large and non eradicable for a defined scale.

Outliers – An infestation separate from core and may be eradicable.

Priority outliers – One that is feasible to eradicate or contain or reduce / prevent spread.

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

Partner – Person, group or organisation actively supporting in WoNS strategy implementation .

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

Containment - A weed management approach that aims to prevent an increase in the current distribution of a weed, by using weed control procedures to reduce the density of existing infestations and limit the dispersal of propagules. Highly effective containment programs can actually result in a decrease in the current distribution of a weed.

Coordinated control - A strategic weed management program that takes into consideration all occurrences of a weed and involves the application of weed control procedures towards a specific end (e.g. eradication or containment).

Eradication - The elimination of every single individual of a species from an area to which recolonisation is unlikely to occur, including propagules.

7.3 References

Bebawi, FF, Vitelli, J, Campbell, SD, Vogler, WD, Lockett, CJ, Grace, BS, Lukitsch, B & Heard, TA, 2009, '*Jatropha gossypiifolia* L.', in FD Panetta (ed), *the biology of Australian weeds: volume 3,* RG and FJ Richardson, Melbourne, pp.102-27.

Csurhes, S, 1999, *Bellyache Bush (Jatropha gossypiifolia) in Queensland. Pest Status Review Series – Land Protection Branch,* Queensland Department of Natural Resources and Mines, Brisbane.

Department of Agriculture and Food, June 2007, *Physic nut (Jatropha curcas) and bellyache bush (J. gossypiifolia),* Farmnote 244, Western Australia.

Department of Agriculture, Forestry and Food, in press, *Bellyache Bush (Jatropha gossypiifolia): Weed Management Guide*, Weed of National Significance, Canberra.

Department of Employment, Economic Development and Innovation, 2009, *Bellyache Bush* (*Jatropha gossypiifolia*) *Management Manual: Control options and management case studies from across Australia,* Queensland.

Department of Natural Resources, Environment, The Arts and Sport, 2010, *Bellyache Bush Management Guide,* Northern Territory.

Department of Natural Resources, Environment, The Arts and Sport, 2010, *Weed Management Plan for Bellyache Bush (Jatropha gossypiifolia),* Northern Territory.

Heard, T, Chan, R, Wilmot Senaratne, K, Palmer, W, Lockett, C & Lukitsch, B, 2009, '*Agonosoma trilineatum* (Heteroptera: Scutelleridae) a biological control agent of the weed bellyache, *Jatropha gossypiifolia* (Euphorbiaceae)', *Biological Control*, vol. 48, pp. 196-203.

Natural Resource Management Ministerial Council, 2006, Australian Weeds Strategy – A national strategy for weed management in Australia. Australian Government Department of Environment and Water Resources, Canberra.