

Weed Management Strategy







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INTRODUCTION

In late 2015, UDLA were engaged by the Shire of Broome to undertake a Draft Weed Management Strategy. The Weed Management Strategy is a document that aims to provide a framework for cooperative management that will guide weed management efforts throughout the Shire of Broome and aim to protect the Shire of Broome's economy, community, industries and environment from the adverse impacts of weeds. The strategy is not area specific and cannot be mistaken for a weed management plan. However, will guide weed management funding, planning, monitoring and control. It is interested in species specific targets and outlining a town wide approach to achieving the following objectives:

1. Preventing introduction and spread of weeds
2. Reviewing progress in Weed Management and devising methods for ongoing control
3. Reviewing responsibilities of stakeholders in Weed Management
4. Increasing Public Awareness and Education

The strategy outlines the term weed as a concept, explains weeds in the Broome context, provides key principles to weed management and outlines relevant weed management legislation and policy. Once the broad principles of weed management have been outlined, focus shifts to the Broome context, project boundaries, description of local key weed species, current weed distribution mapping and monitoring practices. The strategy then describes appropriate weed management control methods for the town site of Broome.

The following section of the strategy outlines a Weed Prioritisation Matrix and key recommendations required to develop the strategy into a final document and to assist in implementation and strategic development of weed management in Broome.

1.1 WHAT IS A WEED?

A weed can simply be described as a plant growing where it is not wanted. However, this definition lacks precision and can become confusing as a plant's status as a weed largely depends upon its location and the land use of that place. For example, native plants may be weeds in farm and forage lands. Similarly, non-native plants may become useful in the control of erosion, provision of habitat and shade. What we can assume here is that weeds need to be considered in the context of an area and can basically be broken into sub groups of 'environmental' or 'agricultural' weeds. This strategy focuses on environmental weeds

¹ Broome Growth Plan

² 2016, ABS Quick facts

WEEDS IN BROOME

Broome is positioned at the south-west extremity of the Dampier Peninsula, in a transition zone between the inland desert and tropics. This mix of climatic factors as well as early multicultural development has resulted in an array of exotic tropic plants being introduced for shade, food and ornamental values. Such species originating in tropics around the world are often devoid of natural control mechanisms and are resilient survivors.

Spatially, Broome's Peninsula is surrounded and dissected by large areas of both environmentally and culturally significant endemic bushland experiencing varied levels of urban disturbance. A vast area is foreshore reserve while green corridors protrude through the town site and peninsula, joining ocean to bay.

Broome's urban fabric has a unique green infrastructure system that responds to its unique context. The open space includes a network of formalised and informal bush Parks, often wide road reserves and a significant large urban drainage system. The open trapezoidal shaped drains remove the high volumes of overland wet season rainfall. Currently approximately 35 kilometres of drains traverse the Broome town area and increase with each additional subdivision development. The drainage structures convey urban water to the surrounding bushland reserves, foreshore dunes, tidal creek and the marine habitats beyond. In understanding this context this urban drainage system is an integral feature of urban development in Broome, although provide a significant challenge for managing weeds as left unchecked becomes an extensive distribution network. To effectively manage environmental weeds direct management of the drainage system is required to control, contain and reduce the environmental weed populations, including the aforementioned surrounding bushland reserves.

PRINCIPLES OF WEED MANAGEMENT

The implementation of the Strategy is important and will be supported by the following Weed Management Principles.

1. Weed management is an integral part of all land management
2. Prevention is the best form of weed management.
3. Weed management requires a continuous, long term commitment.
4. When introduction does occur, early detection followed by swift action is the essence of successful weed management.
5. The integrated weed management is the key in achieving successful weed management.
6. Landholders and land users are responsible for weed management
7. Cooperative weed management amongst landholders and land users on a catchment basis is recommended and supported.
8. Co-ordination between all local stakeholders is necessary to establish the research, educational and legislative framework required for successful weed management.



LEGISLATION AND POLICY

The following provides a background to weeds legislation at a federal, state and local government level.

FEDERAL

Environment Protection & Biodiversity Conservation Act

The Environment Protection and Biodiversity Conservation Act 1999 (the EPBC Act) is the Australian Government's central piece of environmental legislation. It provides a legal framework to protect and manage nationally and internationally important flora, fauna, ecological communities and heritage places as defined in the EPBC Act as matters of national environmental significance.

Weeds of National Significance

The Weeds of National Significance (WONS) is a Federal system to prioritise weed problems for national action as developed in 1999 by a joint Commonwealth Government taskforce. Thirty two Weeds of National Significance (WoNS) have been agreed by Australian governments based on an assessment process that prioritised these weeds based on their invasiveness, potential for spread and environmental, social and economic impacts. Consideration was also given to their ability to be successfully managed. A list of 20 WoNS was endorsed in 1999 and a further 12 were added in 2012. The current list of WONS can be found in appendix A.

National Alert List

The National Environmental Alert List for environmental weeds identifies 28 plant species that are in the early stages of establishment and have the potential to become a significant threat to biodiversity if they are not managed. The National Alert List can be found in appendix A.

STATE

Biosecurity and Agriculture Management Act

In 2007 the Biosecurity and Agriculture Management Act 2007 (BAM Act) was passed by Parliament, followed in 2013 by the Biosecurity and Agriculture Management Regulations. The BAM Act replaced sixteen Acts, in whole or in part, including the Plant Diseases Act 1914, Agriculture Protection Board Act 1950, Agriculture and Related Resources Protection Act 1976 and the Seeds Act 1985, which were the main Acts responsible for managing pests and weeds in this state. The BAM Act became fully operational on the 1 May 2013 with all biosecurity and quarantine operations within Western Australia (WA) now the responsibility of this Act. All trade within Australia and between neighbouring countries is covered by a series of national and international agreements which are intended to balance trade with biosecurity protection. The aim is to maximise both in the interests of all. Therefore quarantine conditions are put in place with the aim of achieving an 'acceptable level of protection' whilst allowing trade

LOCAL

Kimberley Region Priority Alert Weeds List

A state body, but locally developed, the Department of Parks and Wildlife also have a Kimberley Region Priority Alert Weeds List for species not found in WA, not found in the Department of Parks and Wildlife's Kimberley Region but known to exist in an adjacent region, or found in the region but not on Parks and Wildlife managed lands or waters.

Currently no local laws exist to enforce weed management. The Shire of Broome's Weed Brochure has been developed to educate residents and contractors in Broome of the key weed species to look out for. This is an area that needs to be developed. Other groups in Broome have also brought out weed cards and other identification tools for Broome residents.

PROJECT BOUNDARIES

The project boundary for this strategy involves all Shire vested lands within the boundary shown in the map on the opposite page. Weed problems traverse all administrative and land tenure boundaries and as such, effective weed management will require a high degree of coordination and integration between stakeholders. Effective coordination and integration will be facilitated through good communication.

Also, increasing public awareness of the causes and appropriate responses to the problems is part of the solution. The ultimate success of environmental weed management will be determined by the degree of community and stakeholder engagement and participation in the process.

WEEDS OF BROOME

In 'Broome and Beyond' (1996), the authors identify 68 alien species recorded from the Dampier Peninsula. Similarly in 'Flora of the Kimberley Region' (1992), the authors identified a total of 108 alien species throughout the Kimberley region.

Most recently, weed mapping undertaken by Australian Government Department of Agriculture and Water resources Northern Australia Quarantine Strategy (NAQS) has found a total of 185 weed species in Broome and surrounds.

This shows that the level of weeds within region is on the rise. The following is a list of weeds of significance, prevalent in the Shire of Broome region and have been published within the Shire of Broome's Weed Brochure. These include:

- *Alternanthera pungens* (Khaki Weed)
- *Azadirachta indica* (Neem)
- *Cenchrus biflorus* (Gallon's Curse)
- *Cenchrus ciliaris* (Buffel Grass)
- *Hyptis suaveolens* (Mint Bush)
- *Jatropha gossypifolia* (Bellyache Bush)
- *Leucaena leucocphala* (Coffee Bush)
- *Macroptilium atropurpureum* (Siratro)
- *Merremia aegyptia*
- *Merremia dissecta*
- *Passiflora feotida* (Wild Passionfruit)
- *Tribulus occidentalis* (Caltrop)
- *Tribulus terrestris* (Caltrop)

The above mentioned Broome specific weeds of concern are further described below and include photos, a brief description of the plant, its dispersal area and possible control measures.

It is important to note that any declared weeds not shown within the list above are controlled on an as needs basis as per relevant legislation



Alternanthera pungens (Khaki Weed)



DESCRIPTION

Leaves opposite, hairy with whitish veins. Ovate to elliptical in shape often rooting at the nodes to form new plants and often with several tap roots per plant. Flowers are a whitish globular head with five sharp sepals that dry to Khaki colour. Fruit and seed inconspicuous. Plants can flower all year but flower and fruit more in the warmer months.

HABITAT

A prostrate annual that colonises bare ground, disturbed areas, road sides, lawns, camp sites and stock yards forming a dense mat with burs that penetrate footwear and tyres to spread easily, preferring moister areas.

DISPERSAL

Found throughout Broome and in all mainland states Of Australia.

CONTROL

Best practice is hand removal before seeding. Larger areas can be treated with chemical control but not as effective as hand removal.

Azadirachta indica (Neem)



DESCRIPTION

Dark green serrated leaflets are 3-8cm long with the young leaves reddish to purple in colour. Bark is deeply fissured. The flowers are cream coloured arranged in an axillary cluster up to 15 -20cm with a strong perfume. The fruit is an olive like drupe 1-3cm long, yellowish when ripe, containing one seed and a sweet pulp. Neems have a strong deep root system producing suckers when damaged.

HABITAT

A fast growing evergreen tree 6-10 metres tall and up to 10 metres wide. Trees start fruiting within 2-5 years and mature at 10-15 years. Trees produce up to 80,000 viable seeds per year and are easily spread by birds, having a dramatic effect on the spread the species.

DISPERSAL

Neems where introduced to Australia in the 1970s as a fast growing shade tree with insecticide properties. Now wide spread throughout the Kimberley.

CONTROL

Removal of whole tree and stump is required so that there is no regrowth

***Cenchrus biflorus* (Gallon's Curse)**



DESCRIPTION

A clumping annual grass that grows up to 60cm metres tall and produces a seed bearing burrs arranged in a cylindrical spike up to 10 cm long.

HABITAT

Commonly found on disturbed areas around Broome including in the Vine thickets and road verges. The burrs are easily dislodged and attach to materials and fur. Seeds germinate with little water.

DISPERSAL

Found throughout the Kimberley and in large areas of disturb land throughout Broome.

CONTROL

Hand removal of grass before it sets seed and bag if the seeds have formed for removal and disposal at the refuse site. Chemical treatment Can assist in large areas to help with regrowth.

***Cenchrus ciliaris* (Buffel Grass)**



DESCRIPTION

A tufted, deep rooted perennial grass, pale green in colour, new shoots can be tinged purple at the base. Produces a cylindrical spike of purple, fluffy seeds. Burrs made up of many bristles attached at the base.

HABITAT

Buffel grass is drought resistant, will grow in a range of soils and is fire tolerant. Grows to 1 metre and spreading. An extremely competitive species that reduces native plants and increases the risk of more frequent and intense fires.

DISPERSAL

Wide spread across Australia as it was introduced as a pasture grass. The seeds are easily dislodged and stick to fur, clothing and machinery. Seeds are also spread by wind, flood waters and through stock faecal matter.

CONTROL

Removal of the whole plant is recommended by physical, mechanical or chemical applications before seed is formed.

***Hyptis suaveolens* (Mint Bush)**



DESCRIPTION

An erect aromatic, fast growing herb that is covered in fine hairs and usually branched. Green leaves are opposite and deeply veined broadly ovate and slightly toothed. Small mauve flowers are arranged in clusters along the stems and seeds are light brown. Flowers April till September.

HABITAT

Growing from 0.5 metres to 1.0 metres tall the herb is usually found growing in clumps and only lives for a year.

DISPERSAL

Widely spread throughout Broome in disturbed areas and where water remains. Each plant can produce a large amount of flowers and a large number of seeds. Seed can either fall or be retained in the plant and germination usually occurs with rains in the warmer months.

CONTROL

Complete removal of the plant by physical mechanical means is recommended but can also be treated by chemical methods prior to seeding. Regular follow up required for ensuing seasons.

***Jatropha gossypifolia* (Bellyache Bush)**



DESCRIPTION

An erect perennial shrub with thick hairy brown stems. The leaves are alternate, palmate 3-5 lobed and are sticky and red in colour when young changing to a bright green. Flowers are reddish purple with a yellow centre and grow in clusters above the main plant with female flowers larger than the males producing an oblong fruit capsule 1.2 x 1cm that explode to release seeds. Flowers and fruits February to May. Habitat Growing from 1-3 metres tall in dense stands as seeds fall straight to the ground near the parent plants. Growing regularly in drainage areas but will adapt to all ranges of soils. Plants will sucker from roots if chopped.

DISPERSAL

Originally grown as an ornamental plant, can be found throughout Broome and the west Kimberley. A mature plant can produce 50 seeds per month aiding the spread. The seeds are toxic to stock and humans.

CONTROL

Complete removal of all plants is recommended and needs to be monitored for several years.

***Leucaena leucophala* (Coffee Bush)**



DESCRIPTION A small dense tree growing to 6m with dark green leaves that are bipinnate. Flower heads are cream coloured and globular at the end of the branches and the seed pods are flat and brown at 10-20 cm long in clusters.

HABITAT

Grows in any soil type preferring moist areas.

DISPERSAL

Found throughout the Broome town site and across Northern Australia. A prolific seeder introduced as cattle fodder, can be transported by wind, water, animals and machinery.

CONTROL

Complete removal of all plants is recommended. Seeds remain viable for several years. Follow up removal of emergent seedlings is required.

***Macroptilium atropurpureum* (Siratro)**



DESCRIPTION

A scrambling often prostrate perennial vine that has long stems up to 4 metres long. Pea flowers are black to deep purple and are erect above the main plant, forming seed pod up to 10 cm long that twist when ripe to release the black to brown seeds. The plants are able to root at the nodes and grow from just a fragment of a plant enabling the spread of the plant.

HABITAT

A vigorous vine that can smother all other vegetation to death for many metres.

DISPERSAL

Grown as fodder throughout the Kimberley and is commonly found around the Broome town site as an aggressive weed along fence lines and in disturbed areas. Produces 12- 15 seeds per seed pod. Seeds can be transported easily by animals, water or vehicles.

CONTROL

Physical removal of smaller plants or chemical control for larger areas is recommended with regular follow ups for the following years.

Merremia aegyptia



DESCRIPTION

A vigorous perennial climber that can grow prostrate with slender twinning hairy stems and a green leaf of 5 segments paler on the under side with a white funnel shaped flowers and a globular seed capsule 1cm in diameter containing 4 seeds light brown in colour.

HABITAT

An invasive creeper that can smother other plants and grow in all soil types but more vigorous during the warmer wetter months and can cover large areas.

DISPERSAL

Commonly found around Broome and other Kimberley town sites, generally dispersed by animals digesting the seeds.

CONTROL

As this plant often smothers other plants over several meters it is quite hard to control. Total removal and follow up is recommended.

Merremia dissecta



DESCRIPTION

A vigorous climbing perennial vine that can grow prostrate with slender twinning stems covered in fine hairs. Green leaves are paler on the under side and segmented into 5-7 lobes slightly serrated at the edge. The white funnel shaped flowers have a purple centre, producing a globular capsule containing black seeds. Flowering from May to August.

HABITAT

An invasive creeper that can smother other plants and grow in all soil types but more vigorous during the warmer months and can cover many metres.

DISPERSAL

Commonly found around the Broome area and other town sites in the Kimberly's it is commonly associated with disturbed areas and water courses. Merremia is spread easily by animals digesting the seeds aiding the spread and also being able to root from nodes.

CONTROL

As this plant often smothers other plants over several meters it is quite hard to control. Total removal is recommended followed up by chemical control in large areas over the next months and years.

Passiflora feotida (Wild Passion fruit)



DESCRIPTION

Leaves palmate and lobed covered in soft hairs with yellowish stems, flowers white to purple fruit a globular berry turning from green to yellowish orange when ripe 20-30 mm across all vegetative materials and unripe fruit can be toxic. Flowering and fruiting February to November.

HABITAT

A fast growing Herbaceous to woody rampant climber from which the seeds are often spread by birds and animals and germinate very easily, causing thick coverage over all plants in large areas suffocating plants beneath. Plant has an unpleasant smell.

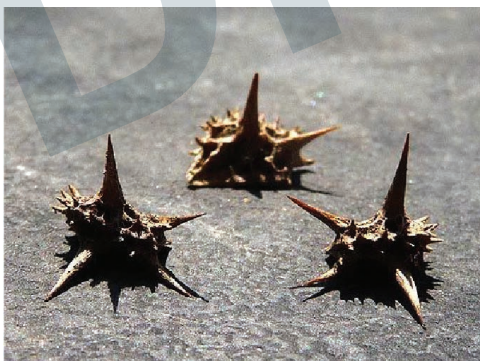
DISPERSAL

Common in disturbed area around Broome, but widespread across Northern Australia more commonly found in coastal areas and river banks

CONTROL

Hand pulling stems from ground and removal before seeding. Once seeded in large infestations regular chemical follow ups will be required for several years.

Tribulus occidentalis (Caltrop)



DESCRIPTION

Greenish grey pinnate leaves covered in hairs with bright yellow flowers. Fruit woody and globular, 30mm across separating into 5 parts when mature with spines 5mm long and a woody tap root. Flowering all year.

HABITAT

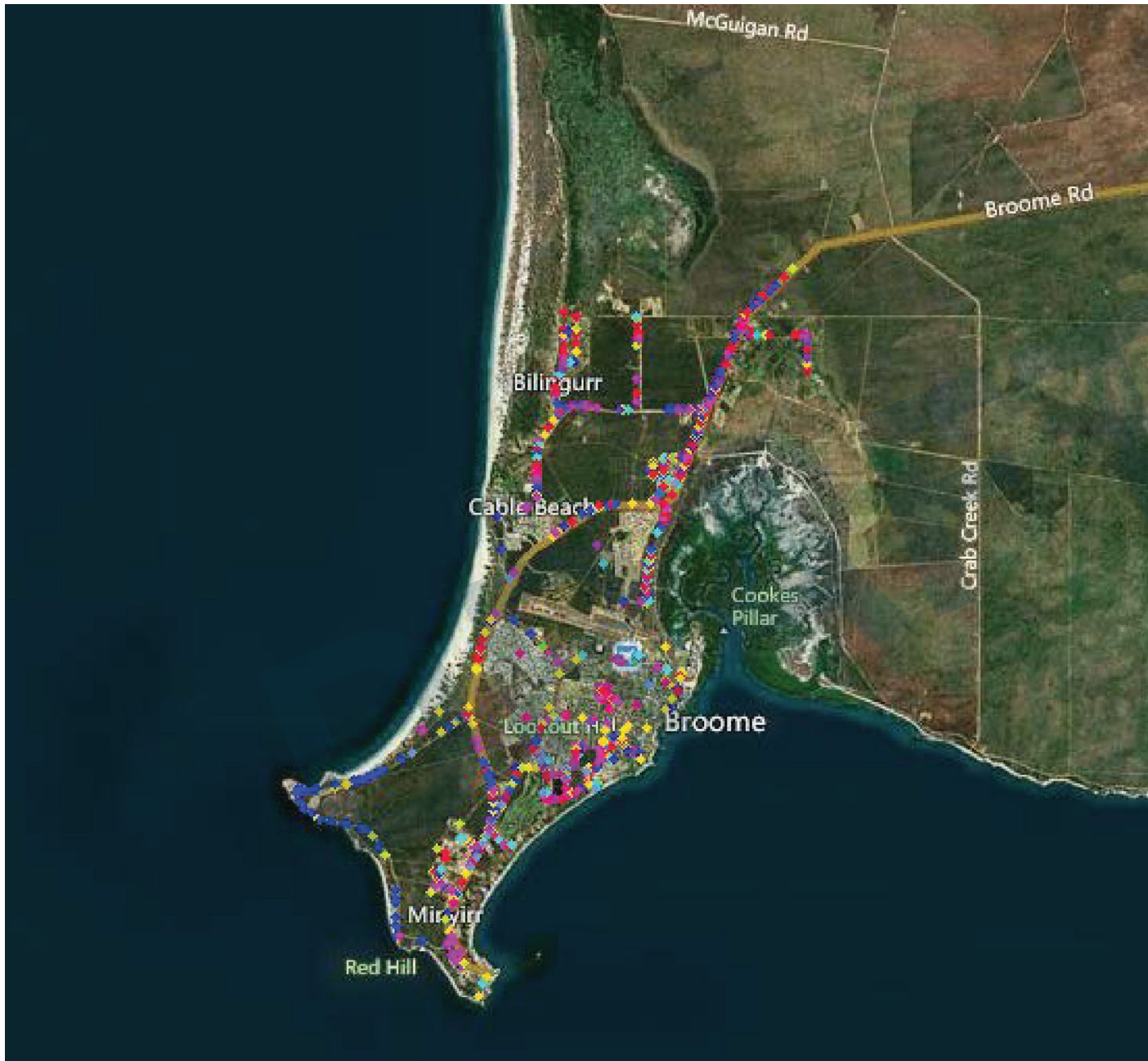
A vigorous prostrate spreading perennial growing up to 300 mm in height and spreading several metres, forming a dense mat that suffocates other plants.

DISPERSAL

Often spread by vehicles, human and animal foot traffic. Common in Pindan soils throughout Broome.

CONTROL

Removal of whole plant before seeding by hand is recommended. In cases of infestation integrated method of control is required such as machine removal and chemical spraying of new plants before the new seeds form.



LAYERS

B WEEDS

- African Mahogany
- Bellyache Bush
- Buffel Grass
- Butterfly Pea (Clitoria)
- Caltrop
- Cashew
- Coffee Bush
- Coffee Senna
- Golden Rain Tree
- Hairy Merremia
- Hyptis (Stinking Roger)
- Lantana
- Neem
- Prickly Acacia
- Rubber Bush
- Rubber Vine
- Siratro
- Unknown Tree or Bush
- Unknown Vine Weed
- Wild Passionfruit

Weed Distribution Mapping data supplied by Environs Kimberley

WEED DISTRIBUTION

Current weed distribution mapping information - provided by Environs Kimberley has been developed using site data from on ground monitoring and control using Weed Tracker software. Current data focuses on Monsoonal Vine Thicket, road verges and natural areas. Key notes relating to the distribution of weeds in Broome and surrounds:

- Weeds prevalent on edges (fence lines, construction areas, road verges)
- Weeds prevalent in disturbed sites (due to livestock, human disturbance)
- Weeds prevalent in wet areas (swales, drains, back of dunes, near sewer treatment plant).
- Distribution is aided by inflow from the drainage system

Monitoring weed dispersal and control data is an important part in growing the data and knowledge of weed infestations. This task is currently carried out on an ad-hoc basis with Shire works crews advising of weed infestation when observed in the everyday operation of duties. 'Weed Tracker' is the platform used for Shire weed mapping collection. NBY Rangers and DPaW are actively monitoring weed infestations and control effectiveness within the Conservation Estate AQIS undertake monitoring off all species within the Broome town site that are declared. Other groups such as Environs Kimberley are undertaking weed monitoring as part of stand alone weed monitoring projects within select areas of Broome such as Minyirr Park. . Dedicated mapping such is crucial in ensuring as much information is known about weed distribution, infestation size, control and regrowth. Collaboration amongst all stakeholders is recommended to pool responsibility, labour, equipment, resources and data.

WEED MANAGEMENT METHODS

This section outlines all common methods used in the control of weeds. What is important to recognise is that while initial control is important, it is largely ineffective unless follow up control is programmed. For control to be effective long term, weed species must be replaced with desirable plants to ensure there is less space for re-infestation.

BIOLOGICAL CONTROL

Biological control is the management of a weed through the use of their natural enemies (biological control agent). A biological control agent is an organism such as a virus, insect or plant disease. Biological control of weeds is an essential part of weed management and is useful for widespread introduced species where manual control is uneconomical. This method is not available for all species nor in all circumstances. Seasonal and environmental conditions in Broome may affect the effectiveness of biological control agents.

CHEMICAL CONTROL

Chemical weed control is often referred to as a 'necessary evil' in the management of weeds. While the additional of chemicals within the ecosystem is commonly frowned upon by the misinformed, small amounts of low toxicity herbicides at key points can have a lesser environmental impacts to the management of weeds than other control methods. Key Chemical control methods are as follows:

Broad Acre Spraying is a primary level of control within open areas of little or no native vegetation. This can be undertaken by hand in small areas and by vehicle to cover larger areas. It involves spraying a weak herbicide solution over the foliage of weeds.

Spot Spraying is similar to broad acre spraying though targets weed infestations amongst germinants rehabilitation or revegetated areas. Care must be taken when spot spraying to avoid off target spray affecting native vegetation. Careful attention to environmental conditions and strengths of chemical solutions must be taken when spot and broad acre spraying.

Wicker Wiping is a method used to minimise off target damage often caused by spraying of herbicide. This method involves wiping a herbicide soaked rope or cloth implement against weed foliage. Whilst this is a more targeted treatment, it is also more labour intensive and should be prescribed for areas of highest condition only.

Cut Stump Control is a specific method used for treating large and woody weeds from sensitive bushland areas. Trees and shrubs have foliage cut and often trunks cut to the stump and a herbicide applied by spray or brush to the cut stumps and stems. Weeds can remain intact onsite without requiring further removal if preferred.

Stem Injection involves drilling or cutting through the bark into the sapwood tissue in the trunks of woody weeds and trees. Herbicide is immediately placed into the hole or cut. The aim is to reach the sapwood layer just under the bark (the cambium growth layer), which will transport the chemical throughout the plant.

Basal Bark involves mixing an oil-soluble herbicide in diesel and spraying or painting the full circumference of the trunk or stem of the plant. This method is suitable for thin-barked woody weeds and undesirable trees. Basal bark spraying is also an effective way to treat saplings, regrowth and multistemmed shrubs and trees. This method allows the herbicide to enter underground storage organs and slowly kill the targeted weed.

A multi- faceted selection of herbicides is recommended. The proximity to waterways and groundwater requires the use of herbicides with low aquatic toxicity. Strengths of solutions and application methods shall be in accordance to the manufacturer's specifications.

Currently within the Shire of Broome, one FTE is assigned to manual spray from a ute/truck mounted spray unit. This is undertaken on Shire managed lands for infestation of particular weed species.

PHYSICAL CONTROL

Hand Removal is commonly prescribed for the control of individual plants, small populations, ecologically sensitive areas and species that are seeding or flowering.

The Bradley Bush Regeneration Method is to guide this process. This option is not recommended for species that reproduce by rhizomes, tubers and corms, nor for areas where soil disturbance is likely to cause knock-on issues.

Care must be taken to remove roots. All removed weeds shall be disposed of appropriately off site.

Mechanical Slashing is a favourable method for control of fast growing annuals and is a standard control measure for grass weeds. This method can be used on a small scale to de-flower weeds and remove vegetative growth.

Burning removes the above-soil body of the weeds killing most of the plants. If carried out before seed is set it can prevent the further spread of weeds. Burning can be undertaken over a wide area with minimal human input. As with tilling, burning exposes the soil surface to erosion. If burning is used as a control method, caution should be exercised to minimise the risk of harm to the environment and to those undertaking the activity. Burning has proven to be a good control method for large infestations of grasses and woody weeds such as *Parkinsonia aculaeata*.

Ploughing or Tilling turns over the soil and buries the weed beneath the soil. This provides a barrier to the sun, therefore killing the weeds. Tilling is a form of physical control that can be easily undertaken over a wide area, using agricultural machinery. This method is useful for making soil ready for planting new crops, but it can lead to damage in soil structure and exposes the soil to erosion and further invasion by weeds.

LAND MANAGEMENT CONTROL

This level of control focuses on how modification of land use practices can prevent the spread of weeds. This type of weed control technique is most relevant to Indigenous Rangers, large tenure land managers, grazers and stations owners.

Hygiene issues allow machinery, livestock and imported soil and other organic matter to spread weeds. This can be minimised by proper wash down facilities and appropriate inspection of any organic matter moving into new areas.

Fire can be used to remove unwanted woody and grass weeds though requires follow up control to remove emergent regrowth weeds. Fire can also encourage some species to expand into thick stands and repopulate bare areas following fires.

Feral Animal Control reduces seed distribution and disturbance to soil and native vegetation, therefore lowering weed invasion susceptibility.

Quarantine isolates a weed prone area and limits further weed dispersion. Quarantine of stock may also be used to limit seed dispersion.

Overgrazing prevention of stock will lessen the opportunity for weeds to grow on bare earth.

INTEGRATED WEED MANAGEMENT

Integrated weed management (IWM) is the control of weeds through a long-term management approach, using several or all of the weed management techniques above.

Integrated weed management (IWM) is a term used to describe the long term management of a weed using a combination of different management and control techniques. An IWM approach will be tailored for a given weed based on its ecology, density and the land-use situation in which it occurs.

All above described weed management techniques may be part of an IWM system—it's unlikely that a single control measure on its own will be effective over the long-term.

Simple weed management generally treats only the symptoms of a weed infestation, typically by using direct treatments to kill weeds. In contrast, IWM attempts to address the underlying causes of a weed infestation, rather than just focusing on controlling visible weeds. It does this by targeting the different stages of the weed's lifecycle and undertaking measures that will prevent weed reproduction, reduce weed emergence, promote seed bank depletion and minimise weed competition with desirable vegetation

Follow up control is the most crucial factor in successful weed management. As such, weed action plans should be set up to assist with realistic control targets and adequate resources (staff, funding) for ongoing control over a five year (minimum) period.

SPREAD PREVENTION

Preventing introduction and spread is one of the key principles to the weed management strategy. Some methods for spread prevention are as follows.

- Site hygiene: control access to infested areas through fencing, blocking off illegal entrances.
- Providing weed wash down bays/kits at entrances/exits of disturbed and clean sites
- Control of movement through known infestations
- Education: At a strategic level, education to the community and correct training to contractors and practitioners in contact with weed infestations is integral in slowing the spread of weeds.



SPECIES PRIORITISATION MATRIX

The following matrix provides control objectives, management actions and outcomes for key Broome weed species. Priority status of individual weed species has been derived as a basis for their control level and is based upon DPaW's Impact and Invasiveness ratings. In general:

- High Priority weed species should be targeted first
- Moderate Priority weed species should be controlled opportunistically, if resources allow after targeted control of High Priority Weeds
- Low Priority weed species should be controlled opportunistically, if resources allow after control of Moderate and High Priority Weeds.

SCIENTIFIC NAME	COMMON NAME	TARGET PERIOD	OBJECTIVE	ACTION	PERFORMANCE OUTCOME
HIGH PRIORITY - targeted control required for site preservation					
<i>Azadirachta indica</i>	Neem	Jul - Sep	Control and limit further infestation	<ul style="list-style-type: none"> • Chemical and mechanical control • Map distribution • Enlist assistance from community groups in control of Neem as it is a simple control technique and one that Broome environmental groups have a lot of experience in controlling. 	<ul style="list-style-type: none"> • Distribution confined to most heavily disturbed sites. • Spread is limited and contained in moderate timeframe. • Distribution mapping data updated for accurate monitoring • Community increase weed management efforts
<i>Cenchrus biflorus</i>	Gallon's Curse	Nov - May	Control and limit further infestation	<ul style="list-style-type: none"> • Chemical and mechanical control • Map distribution 	<ul style="list-style-type: none"> • Distribution confined to most heavily disturbed sites. Spread is limited, ad hoc and easily controlled. Weed spread to new areas is minimised. • Distribution mapping data updated for accurate monitoring

SCIENTIFIC NAME	COMMON NAME	TARGET PERIOD	OBJECTIVE	ACTION	PERFORMANCE OUTCOME
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HIGH PRIORITY - targeted control required for site preservation

<i>Hyptis suaveolens</i>	Mint bush	Feb - Aug	Control and limit further infestation	<ul style="list-style-type: none"> • Chemical control for broad acre areas. • Map distribution • Educate and if required, enforce stricter hygiene practices for works contractors and shire staff within and adjacent to Shire reserves 	<ul style="list-style-type: none"> • Distribution confined to most heavily disturbed sites. Spread is limited, ad hoc and easily controlled. Weed spread to new areas is minimised. • Distribution mapping data updated for accurate monitoring • Improved weed hygiene standards will limit spread of this and other weeds and engages industries, public agencies and communities to adopt weed spread prevention practices.
<i>Jatropha gossypifolia</i>	Bellyache bush	Jan - May	Eradicate all specimens	<ul style="list-style-type: none"> • Chemical and mechanical control • Map distribution 	<ul style="list-style-type: none"> • Eradication of declared weed • Distribution mapping data updated for accurate monitoring
<i>Leucaena leucophala</i>	Coffee Bush	All Year	Control distribution to highly disturbed areas and limit further infestation	<ul style="list-style-type: none"> • Chemical and mechanical control • Map distribution • increase greenwaste sorting standards to limit amount of viable seed that is mulched and distributed throughout Broome 	<ul style="list-style-type: none"> • Distribution confined to most heavily disturbed sites. Spread is limited, ad hoc and easily controlled. Weed spread to new areas is minimised. • Distribution mapping data updated for accurate monitoring • Weed hygiene standards in mulch are improved
<i>Macroptilium atropurpureum</i>	Siratro	All Year	Control and limit further infestation	<ul style="list-style-type: none"> • Chemical and mechanical control, most importantly after fire through bushland areas • Use fire to remove biomass and force regrowth where feasible • Map distribution 	<ul style="list-style-type: none"> • Distribution confined to most heavily disturbed sites. Spread is limited, ad hoc and easily controlled. Weed spread to new areas is minimised. • Distribution mapping data updated for accurate monitoring

SCIENTIFIC NAME	COMMON NAME	TARGET PERIOD	OBJECTIVE	ACTION	PERFORMANCE OUTCOME
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MEDIUM PRIORITY - Target for site enhancement

<i>Cenchrus ciliaris</i>	Buffel Grass	Nov - May	Control further infestation	<ul style="list-style-type: none"> • Chemical and mechanical control, most importantly after fire through bushland areas • Use fire to remove biomass and force regrowth where feasible • Map distribution 	<ul style="list-style-type: none"> • Distribution confined to heavily and moderately disturbed sites. Spread is limited and contained in moderate timeframe. • Distribution mapping data updated for accurate monitoring
<i>Merremia aegyptia</i>	-	Feb - Sep	Control and limit further infestation	<ul style="list-style-type: none"> • Chemical and mechanical control, most importantly after fire through bushland areas • Use fire to remove biomass and force regrowth where feasible • Map distribution 	<ul style="list-style-type: none"> • Distribution confined to most heavily disturbed sites. Spread is limited, ad hoc and easily controlled. Weed spread to new areas is minimised. • Distribution mapping data updated for accurate monitoring
<i>Merremia dissecta</i>	-	As above	As Above	As Above	As Above
<i>Passiflora foetida</i>	Wild Passionfruit	All Year	Control and limit further infestation	<ul style="list-style-type: none"> • Chemical and mechanical control • Map distribution 	<ul style="list-style-type: none"> • Distribution confined to heavily and moderately disturbed sites. Spread is limited and contained in moderate timeframe. • Distribution mapping data updated for accurate monitoring
<i>Tribulus occidentalis</i>	Caltrop	Feb - Aug	Control further infestation	<ul style="list-style-type: none"> • Chemical and mechanical control • Map distribution 	<ul style="list-style-type: none"> • Distribution confined to heavily and moderately disturbed sites. Spread is limited and contained in moderate timeframe. • Distribution mapping data updated for accurate monitoring
<i>Tribulus terrestris</i>	Caltrop	As Above	As Above	As Above	As Above

LOW PRIORITY - Target if resources allow

<i>Cenchrus ciliaris</i>	Khaki Weed	All Year	Control further infestation	<ul style="list-style-type: none"> • Chemical and physical control 	<ul style="list-style-type: none"> • Distribution confined to heavily and moderately disturbed sites.
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