

District Weed Management Guide Marree-Innamincka



November 2023

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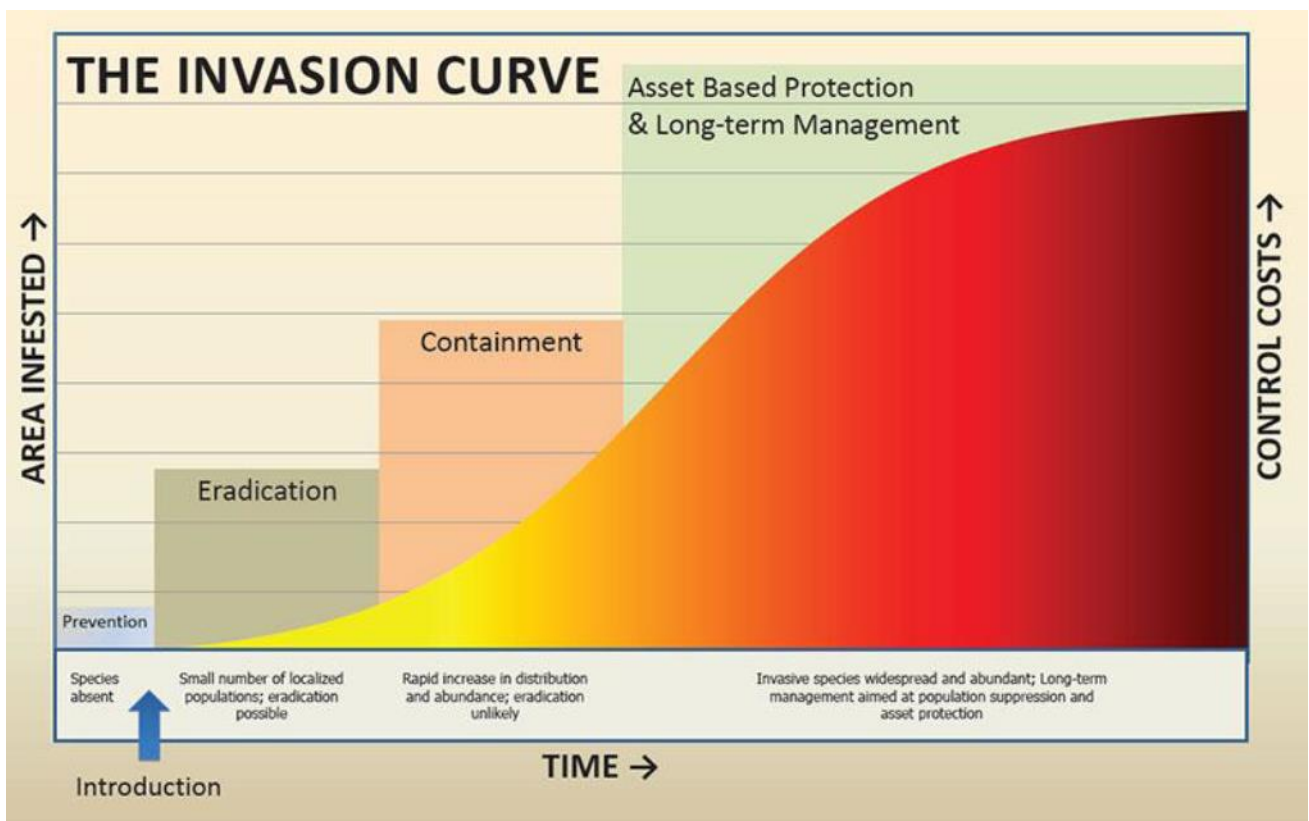
Photo front page: African Rue (DEW), Prickly Acacia (DAFF, Qld) and Noogoora Burr (www.depi.vic.gov.au)

Purpose of the Guide

This guide provides information on priority weeds in the Marree-Innaminka District within the SA Arid Lands (SAAL) Landscape Board region. The intent of this document is to guide prioritisation of weed management activities within the district over the next five years.

This document outlines management actions that landholders and organisations can implement within the District with the aim to reduce the current and potential impacts of priority weeds. These management actions, outlined for each of the priority weeds, are in accordance with South Australian State policies for declared weeds and the SAAL Landscape Board regional weed policies.

It also provides information regarding the known locations, possible threats, impacts, policy and monitoring activities for each of the priority weeds and provides a link to current best practice control methods.



Weed species included in this guide are at differing stages on the invasion curve. All of the weeds included have a demonstrated ability to rapidly expand their distribution given favourable seasonal conditions. Preventing the establishment of new infestations and eradication of localised populations is considered the most efficient use of resources. Conversely, trying to control widespread, well-established, persistent weeds can quickly exhaust resources. Keeping this in mind we have sought to prioritise weeds that can be controlled before they become too widespread to contain.

The District groups can be influential in the implementation of on-ground land management programs within their district. By following this guide landholders, group members and organisations can develop proactive weed management programs within their district for the long term protection of its environmental and productive assets.

Role of the Landscape Board

The SA Arid Lands Landscape Board have a strong commitment to weed control and have a responsibility under the Landscape SA Act 2019 to ensure this is carried out by landholders across the region.

Weed species that are declared under the Landscape Act requiring landholders to control on their land can be found at https://www.pir.sa.gov.au/biosecurity/weeds/landholder_responsibilities.

The Board staff are available to provide advice and assistance on weed issues and coordinate projects addressing identified priority weed control when funding is available.

Roadsides Management

Road reserves are a recognised pathway for the introduction and movement of declared plants. It is a priority of the Marree-Innamincka District to stop the establishment and minimise the spread of weeds by managing road reserves through a systematic inspection and strategic control regime.

The Landscape Board is responsible for the control of declared weeds on public roadsides outside of townships and may recover costs from the adjacent landholder. Further information on management of roadsides can be found at https://www.pir.sa.gov.au/_data/assets/pdf_file/0009/388593/manual-for-roadside-weed-management.pdf

Limited resources determine that not all declared plants will be managed on road reserves to the same levels. A plant's level of management will be determined by the Weed Risk Assessment system and the potential threat that it poses to the adjoining land-use.

The following plants have been identified as priorities for roadside control in the Marree-Innamincka District:

- Buffel grass

New Infestations or Unknown Weeds

If you find a new infestation of a weed you haven't had before or a weed species that you don't know, the Landscape Board would like to know about it. You can contact the SA Arid Lands Landscape Board on (08) 8429 9666 and ask for the Community Landscape Officer for your District or the Biosecurity Officer.

If you could provide the following information when you call, this will help us assist you:

- Your name
- Name of property (if applicable)
- Paddock name (if applicable)
- GPS location or description of location
- Description of weed
- Extent of weed
- Description of site where weed is located

It would also help if you could take some photos of the weed. The Officer you speak to will be able to provide an email address for the photos to be sent to. We will then attempt to identify the weed and may forward the information and photo to the Weeds Botanist at the State Herbarium.

Marree-Innaminka District

The Marree – Innaminka District covers more than 200,000 square kilometres and occupies the north east corner of the State. The District runs north from the northern Flinders Ranges to the Northern Territory and Queensland borders, and east from Lake Eyre to the New South Wales and Queensland borders. The resident population of the District is small with 150-200 residents working in the pastoral industry. There are no major towns in the District. At Moomba, a transient population of 200-300 petroleum industry workers boost the population. It is estimated another 40,000 to 50,000 tourists visit the District each year.

The climate is characterised as hot to extremely hot, normally very dry summers and mild dry winters. Occasionally, moist tropical air from the northwest monsoons penetrates into the northern parts of the region during summer bringing intense rainfall events that are normally short-lived. Rainfall is “reliably unreliable” in the District with the annual average being approximately 125 mm but the average rarely occurs, with fluctuations in annual rainfall occurring between 0 mm to over 500 mm. Evaporation rates are between 3,200 mm per annum in the south to 3,800 mm in the northwest.

Arid, desert landforms dominate the District. Sandridge deserts cover much of the District, including the Tirari and Strzelecki Deserts and part of the Simpson Desert. Gibber-covered downs and plains extend across much of the south of the District and in a belt running along the Birdsville Track, including Sturt’s Stony Desert. The major ephemeral river systems of the Cooper Creek and the Diamantina River, known as the “Channel Country”, with their channels, floodplains and ephemeral lakes are associated with areas of heavy clay. The only ranges in the District are the Willouran Ranges, in the far south-western corner, with an elevation of 260m above sea level.

The dominant vegetation of the District includes:

- Dune systems: Sandhill canegrass, open hummock grassland, lobed spinifex hummock grassland, tall shrubland to low woodland, sandhill wattle, needlebush, whitewood and narrow-leaved hopbush
- Watercourses, floodplains and “Channel country”: Woodland with tall shrubland layer, red gum woodland, coolabah, river cooba and Broughton willow woodlands, old-man saltbush, Queensland bluebush, Mitchell grass, cottonbush low open shrubland, tussock grassland and ephemeral herbland and lignum shrublands
- Gibber and stony plains and downs: Chenopod (saltbush/bluebush) shrublands, Mitchell grass tussock grasslands, copperburr low open shrubland, low open shrubland of bladder saltbush, low bluebush and cottonbush, tall open shrubland with emu-bush, naturally bare gibber plains.

The most important good quality groundwater source for the District is the main aquifer of the Great Artesian Basin (GAB). Groundwater is discharged from the GAB by mound springs, flowing bores (pastoral bores) and diffuse upward leakage through the Bulldog Shale. Cooper Basin petroleum wells and the Roxby Downs township rely on GAB water. Mound springs form along fault lines which allow the groundwater to discharge more easily through the Bulldog Shale. The aquifer is shallow in these areas. These springs are found along an arc from the south west area of the District across the northern end of the Flinders Ranges and across Lake Frome to the NSW border. Other groundwater in the District can be found in the dunefields at shallow depths adjacent to the major watercourses, Cooper and Strzelecki Creeks and Diamantina River. This water exists in unconfined aquifers and is mainly recharged from surface stream flows.

The primary land uses in the District are pastoralism (60% of the land), oil and gas exploration and production, conservation and tourism. Conservation areas in the District include Innamincka Regional Reserve, Coongie Lakes National Park (includes RAMSAR wetland), Strzelecki Regional Reserve, Simpson Desert Regional Reserve and Conservation Park and Lake Eyre National Park.

Land management issues include: increased mining and exploration impacts, increased use of infrastructure by tourists, total grazing pressure; pest plants and animals, GAB water extraction, geothermal testing and interstate hydrology management (e.g. Queensland government and Cooper Creek).

Declared Weeds

The weeds identified as priorities for the Marree-Innamincka District dealt with in this guide are declared weeds under the *Landscape SA Act 2019* and demonstrated to be regional threats where their management is a strategic option.

Weed risk assessments have been undertaken by the SAAL Landscape Board on each of the priority weeds. This process determines a weed's risk as low, medium or high, in a particular land system by assessing the weeds invasiveness, impact and potential distribution. The management action for each weed was identified using the assessment of each weed's risk category in the table on the following page.

Alert Weeds

These declared weeds have not been sighted in the Marree-Innamincka District. However, there have been infestations of them in neighbouring district(s) and the threats they pose are significant. If you discover any of these plants in the Marree-Innamincka District please contact SA Arid Lands Landscape Board on (08) 8429 9666 immediately and report the location. The following links are provided for information and identification:

- [Cacti spp. \(Opuntoid cacti spp.\) and \(Cylindropuntia spp.\)](#)

Established Weed Species

Weed species that are widespread and/or established, will be managed if opportunity arises through project funding or on a case by case situation, with the same objective as this plan. Landholders are encouraged to contain any weed on their land to prevent further spread. The following links are provided for information, identification and/or policies:

- [Mexican poppy \(*Argemone ochroleuca*\) – Not declared](#) (See Appendix 1)
- [Mimosa bush \(*Vachellia farnesiana*\) – Not declared](#) (See Appendix 1)
- [Neurada \(*Neurada procumbens*\) – Not declared](#) (See Appendix 1)

Priority weeds in the Marla-Oodnadatta District

Priority Weed	Management Action	Distribution in the District	Description of management guide
African rue	Protect sites	Limited	Prevent spread of the weed species to key sites/assets of high economic, environmental and/or social value. See page 10 for more details.
Athel pine	Protect sites	Limited	Prevent spread of the weed species to key sites/assets of high economic, environmental and/or social value. See page 13 for more details.
Bathurst burr	Manage sites	Limited	Maintain the overall economic, environmental and/or social value of key sites/assets through improved general weed management. See page 17 for more details.
Buffel grass	Manage weed	Common	Reduce overall economic and/or social impacts through targeted management. See page 20 for more details.
Noogoora burr	Monitor	Limited	Prevent spread through targeted control. See page 23 for more details.
Prickly acacia	Destroy infestations	Very limited	Aims to significantly reduce the extent of the species. See page 26 for more details.

Definitions of management guide aims

Management Action	Aims
Alert	<p>Species that are not known to be present in the management area and present a significant threat if permitted to enter and establish.</p> <p>Aims to prevent the species arriving and establishing:</p> <ul style="list-style-type: none">• Prevention of entry to management area• Ongoing surveillance for incursions• Training & awareness activities for the community to enable early detection• Report and destroy any plants found
Eradicate	<p>Aims to remove the species:</p> <ul style="list-style-type: none">• Detailed surveillance & mapping to locate all infestations• Destruction of all infestations including seed banks• Prevention of entry to management area and movement within• Must not be grown and all cultivated plants to be removed• Monitor progress towards eradication
Destroy	<p>Aims to significantly reduce the extent of the species:</p> <ul style="list-style-type: none">• Detailed surveillance & mapping to locate all infestations• Destruction of all infestations, aiming for local eradication at feasible sites.• Prevention of entry to management area and movement and sale within• Must not be grown• Monitor progress towards reduction
Contain spread	<p>Aims to prevent the ongoing spread of the species:</p> <ul style="list-style-type: none">• Surveillance & mapping to locate all infested properties• Control all infestations, aiming for a significant reduction in weed density• Prevention of entry to management area and movement and sale within• Must not allow to spread from cultivated plants (if grown)• Monitor change in current distribution
Protect sites	<p>Aims to prevent spread of the weed species to key sites/assets of high economic, environmental and/or social value:</p> <ul style="list-style-type: none">• Weed may be of limited current distribution but only threatens limited industries/habitats (lower weed risk). Or the weed may be more widespread but is yet to invade/impact upon many key industries/habitats (higher weed risk)• Surveillance & mapping to locate all infested properties• Identification of key sites/assets in the management area• Control of infestations in close proximity to key sites/assets, aiming for a significant reduction in weed density.• Limits on movement within the management area• Must not allow to spread from cultivated plants (if grown) in close proximity to key sites/assets• Monitor change in current distribution within and in close proximity to key sites/assets

Manage weed	<p>Aims to reduce the overall economic, environmental and/or social impacts of the weed species through targeted management</p> <ul style="list-style-type: none"> • Research and develop integrated weed management (IWM) packages for the species, including herbicides and biological control, where feasible • Promote IWM packages to landholders • Monitor decrease in weed impacts with improved management • Identify key sites/assets in the management area and ensure adequate resourcing to manage the weed species
Manage sites	<p>Aims to maintain the overall economic, environmental and/or social value of key sites/assets through improved general weed management.</p> <ul style="list-style-type: none"> • Promote general IWM principles to landholders, including the range of control techniques, maintaining competitive vegetation/crops/pastures, hygiene & property management plans • Identify key sites/assets in the management area & ensure adequate resourcing to manage these to maintain their values • Broaden focus beyond weeds to all threatening processes
Monitor	<p>Aims to detect any significant changes in the species' weed risk</p> <ul style="list-style-type: none"> • Monitor the spread of the species and review any perceived changes in weediness
Limited action	<p>The weed species would only be targeted for coordinated control in the management area if its local presence makes it likely to spread to land uses where it ranks as a higher priority</p> <ul style="list-style-type: none"> • Undertake control measures if required for the benefit of other land uses at risk • Otherwise limited advice to land managers, if required

African Rue *Peganum harmala*

Description

Perennial herb or shrubby plant 30-80 cm high. Leaves 1-5 cm long, bright green, divided several times into three or more linear segments. Flowers with five white broad petals, 12-17 mm long, in late spring to early summer. Fruit is slightly flattened capsule, 8-12 mm across and 7-12 mm long, which opens at the top, containing black angular seeds. Originally from the Mediterranean region and the Middle East, introduced in the 1930s for unknown reasons. It is considered to be an aphrodisiac in India, and its seeds and leaves have been used traditionally to treat various ailments including asthma, jaundice, colic and as a diuretic.



African Rue plant (Credit: B Shepherd)



African Rue flowers (Credit: DWLBC)

Distribution

Australian distribution: Confined to New South Wales and South Australia.

SA distribution: Known to occur in patches at Tintinara, Taylorville and Snowtown as well as numerous other sites. In the SAAL region African Rue primarily occurs along roadsides and flood out areas. A core infestation exists in the eastern pastoral district and other occurrences exist in the northern Flinders Ranges and in the area between Lake Torrens and Port Augusta including along the Stuart Highway.

District distribution: There is a core infestation of African Rue at Yerelina Creek on the Strzelecki Track as well as other smaller infestations at various locations around the district.

Potential distribution: African Rue has the potential to become widespread throughout the SAAL region in disturbed areas such as roadsides and areas receiving run-on water such as flood outs and depressions. The zone of potential distribution has been described as between the 350 mm and 175 mm isohyets.

Threats and Impacts

Invasiveness

Dispersal of the plant is predominately through seed, with the majority being dropped close to the parent plant. Seeds can easily be dispersed through water flow, but also in mud moved by animals or vehicles. Stock and other animals may also eat the fruit and aid in the dispersal. African Rue prefers disturbed sites with little or no competition, and requires moisture for seed germination. African Rue is drought and salt tolerant, and therefore has the potential to thrive in semi-arid and arid areas.

Impacts

African Rue can be toxic containing more than 25 alkaloids, however the plant is highly unpalatable to livestock with few poisonings reported. The likely impact on native vegetation is unknown, but due to its tolerance to drought and salt the potential impacts could be significant.

Persistence

African Rue is difficult to destroy once established as regeneration may occur from severed root pieces. African Rue is known to persist despite treatment with herbicide or manual removal.

Policy

National Strategy

African Rue is not classified as a Weed of National Significance, therefore there is no National Strategy for this species.

State Policy

African Rue is a declared species under the *Landscape SA Act 2019*, to prevent establishment in non-infested pastoral lands:

- Prohibit movement of African Rue on roads
- Prohibit the sale of African Rue or contaminated produce
- Require landholders to control African Rue on their properties
- Allow recovery of roadside control costs of African Rue from adjoining landholders

SA Arid Lands Landscape Board Risk Assessment

The SAAL Landscape Board risk assessment for African rue is to **PROTECT SITES**.

Aim: To prevent spread of African rue to key sites/assets of high economic, environmental and/or social value.

Marree-Innaminka District Risk Management Action

As above

Best Practice Control

Control method and description	Best time to control	Link for PIRSA current best practice chemical control and rates
Foliar Spray Useful on all sized plants. African rue has very deep roots and glyphosate may not effectively translocate to kill established plants. Repeated application over successive seasons is required. Spray the entire plant until run off. Better results will occur on plants that have dust free foliage.	After rainfall events and retreat annually. Best sprayed before the plant flowers.	African rue - PIRSA

Spot spraying with a knap sack or quad/ute mounted spray unit can be used for scattered occurrences.

Boom spray can be used for dense infestations where no native vegetation exists between African rue plants e.g. along roads.

Cut stump

Cut off close to the ground and apply herbicide to stump surface immediately.

When actively growing.

[African rue - PIRSA](#)

Physical and/or Organic Control

Due to its deep roots, African rue cannot be successfully controlled through hand-pulling or grubbing (it will regrow from the broken root).

Organic properties - To provide long term suppression and reduce African rue proliferation, increasing competition from native plants, by reducing grazing pressure from livestock, rabbits and kangaroos, in areas where African rue is present, is the best option.

Recommended Actions for African rue Management in Marree-Innamincka District

1. Support landholder education in identification, monitoring and control of African rue.
2. Encourage landholders to provide data on distribution of African rue so that it can be surveyed and mapped.
3. Provide input into identification of key sites for control of African rue infestations.
4. Assist in identifying and coordinating African rue control programs using integrated weed management, especially in areas where key sites are threatened.
5. Encourage landholders to monitor success, following control of African rue, and carry out follow up control as necessary.
6. Restrict sale and movement of African rue within SAAL Landscape region.

Surveys and Monitoring

Undertake targeted surveys and/or opportunistic monitoring of African rue during pastoral management activities, especially along and adjacent to roadsides and other disturbed areas. Targeted surveys and control activities should occur annually, especially 2-3 weeks after rainfall. Record locations with GPS or appropriate app and advise SA Arid Lands Landscape Board of infestation.

Athel Pine *Tamarix aphylla*

Description

Tree to 15 m high, with branchlets which appear jointed but are small leaves, 1-2 mm long, surrounding the stem. Flowers are pink-white, summer. Produces bell shaped fruit containing numerous seeds. Originally from Mediterranean region, north Africa and India. Athel Pine was introduced in the 1930-1940s to arid and semi-arid areas for shade, shelter and erosion control. Tamarisk or Salt Cedar (*Tamarix ramosissima*), is similar to Athel Pine and has also shown weedy tendencies in SA, NSW and WA.



Mature Athel Pine (Credit: B Shepherd)



Athel Pine in riparian zones (Credit: B Shepherd)



Pink-white flowers (Credit: B Shepherd)



Athel Pine flowers (Credit: B Shepherd)

Distribution

Australian distribution: Semi-arid and arid areas of SA, NT, QLD, WA and NSW. Plantings occur across Australia.

SA distribution: Common in the SAAL Landscape region where planted and there are 18 known locations where Athel Pine is wild (naturalised). The largest population occurs in the eastern area of the SA arid lands where approximately 50 km of river and lake environment are infested.

District distribution: Common throughout the District and were planted in station gardens, community areas and around waters for shade and shelter trees. Since 2008, control has been carried out on three properties and landholders at another five properties have sites they are monitoring.

Potential distribution: Athel Pine is classified as a Weed of National Significance (WONS). Athel Pine has the potential to infest all rivers, creeks and waterways in arid areas. Drainage lines and lower reaches of water courses are of particular risk of invasion.

Threats and Impacts

Invasiveness

Seeds of Athel Pine require a moist environment to germinate, however generally germinate in autumn. Seed is easily moved by flood waters and wind, but also by animals including birds. Athel Pine also has the ability to reproduce from pieces of stem and root and therefore has the capability spread easily.

Impacts

Athel Pines may form dense stands which compete with native trees and understorey plants. Athel Pines may also alter the flow of watercourses, lower water tables, decrease pasture production and make mustering more difficult. The leaves of Athel Pine excrete salt which leads to high salinity levels in leaf litter.

Persistence

Athel Pine is tolerant to drought and fire resistant, and has the ability to sucker. Athel Pine commonly reshoots following chemical and mechanical control and therefore follow up control is imperative.

Policy

National Strategy

Athel Pine is classified as a Weed of National Significance (WONS).

- Non-riparian - Locate, map and remove all high risk Tamarix spp. plantings adjacent to ephemeral lakes and streams in arid and semi-arid areas.
- Riparian - Eradicate all infestations in riparian areas.

State Policy

To protect native vegetation from invasion by preventing further plantings of this species and by removing existing Athel Pine from high risk areas, under the *Landscape SA Act 2019*:

- Prohibit sale of Athel Pine or contaminated material; and
- Require landholders to control Athel Pine on their properties where it is within 100m of a watercourse.

SA Arid Lands Landscape Board Risk Assessment

The SAAL Landscape Board risk assessment for Athel pine is to PROTECT sites. Aim: To prevent spread of Athel pine to key sites/assets of high economic, environmental and/or social value.

Marree-Innaminka District Risk Management Action

As above

Best Practice Control

Control method and description	Best time to control	Link for PIRSA current best practice chemical control and rates
Cut stump		
<p>Useful for medium to larger trees. The main stem(s) are cut off by chainsaw and the stump immediately (within 10 seconds) painted or sprayed with the recommended herbicide mixture.</p> <p>The stump should be cut as close to the ground as possible.</p> <p>Remove all cut material from moist environments to prevent root growth from tree sections.</p>	Any time of year	Athel pine - PIRSA
Basal bark		
<p>Useful for smaller trees that have not developed rough bark.</p> <p>Remove all debris from around the base of the tree prior to applying the herbicide.</p> <p>Spray all sides of each stem with the recommended herbicide mix, to a height of between 250 – 750 mm above soil level.</p>	Any time of year	Athel pine - PIRSA
Foliar spray		
<p>Useful when plants are smaller than 2 m.</p> <p>Spray the entire plant with the recommended herbicide mix.</p>	Any time of year	Athel pine - PIRSA
Physical		
<p>Useful for very large trees, dense infestations and broad scale germination or regrowth.</p> <p>The entire plant is removed from the ground using a suitable bulldozer or loader.</p> <p>Roots must be cut about 30-50 cm below the soil surface to reduce the incidence of regrowth. This is best done with a blade plough.</p> <p>Branch and root fragments of Athel pine can take root, therefore woody material must be moved out of creek lines and moist areas.</p> <p>Ongoing inspections and hand-pulling of seedlings will additionally be required where recruitment is occurring, until the seedbank is exhausted.</p>		

Recommended Actions for Athel pine Management in Marree-Innamincka District

- 1.** Support land manager education in identification, monitoring and control of Athel pine.
- 2.** Encourage landholders to provide data on distribution of Athel pine so that it can be surveyed and mapped.
- 3.** Provide input into identification of high priority areas such as significant rivers, creeks and waterholes and coordinate Athel pine control programs to protect identified priority sites.
- 4.** Require landholders to undertake control of Athel pine plants within 100m of rivers, creeks and waterholes.
- 5.** Encourage landholders to monitor success, following control of Athel pine, and carry out follow up control as necessary.
- 6.** Restrict introductions and movement of Athel pine within SAAL Landscape region.

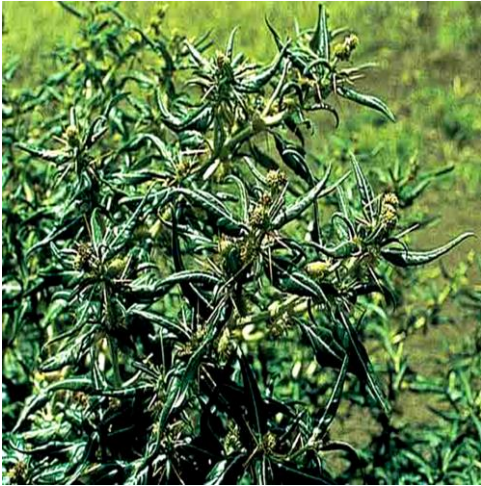
Surveys and Monitoring

Regular searches along watercourses for new occurrences of wild Athel pine, especially in areas downstream from planted Athel pine, is important to detect and control Athel pine before it becomes a problem. Athel pine is a perennial plant and will be detected anytime of the year. Look for grey, green pine looking leaves growing within river beds in swamps and around water holes.

Bathurst Burr *Xanthium spinosum*

Description

Bathurst Burr is an erect, multi-branched annual herb, growing up to 1 m high but usually 30–60 cm. Leaves are dark green on the upper surface, a paler green on the under surface, up to 7 cm long and usually three-lobed. Stems are branched with one or two three-pronged yellow spines at the base of each leaf stalk. Flowers are creamy green and small, developing into straw-coloured burrs, 1–1.5 cm long, with numerous yellow hooked spines, flowering in summer generally but generally opportunistic when moisture is available. Each burr contains two seeds. Originally from South America, it was introduced in the early 1800's in contaminated grain or livestock imports.



Bathurst Burr with seed pods
(Credit: Biosecurity QLD)



Bathurst Burr close-up (Credit: Biosecurity QLD)

Distribution

Australian distribution: Widespread, occurring in all states and the Northern Territory. It is particularly widespread in Queensland, occurring in southern, western and central areas, but is seldom important in the tropics. It prefers drier areas, such as well-drained contour banks and lighter soils.

SA distribution: Disjunct distribution due to its habitat requirements, but extends from eastern Eyre Peninsula through the North East Pastoral, mid North, Yorke Peninsula, Riverland, South East and parts of the mallee.

District distribution: Around dams, along drains and the flood-out areas associated with ephemeral creeks, mainly after summer rains.

Potential distribution: Across the agricultural zone from western Eyre Peninsula to the South East, and also in suitable microhabitats in the Alinytjara Wilurara and SAAL Landscape regions. The main sites open to infestation are around dams, along drains and the flood-out areas associated with creeks and rivers.

Threats and Impacts

Invasiveness

Heavy infestations occur where the ground has been disturbed, such as on roadsides, old cultivation paddocks and irrigated pastures or watercourses. It does not tolerate dense competition from other weeds or dense pasture. It has been widespread in the more marginal pasture areas for over a century, rarely incurring into areas of higher rainfall. The hooked spines will readily attach to the fur or wool of animals and other fibrous material such as clothing, making burrs easy to disperse. Burrs are also able to float and can spread along watercourses.

Impacts

Burrs are a major contaminant of fleeces in some years, especially when summer rainfall has been high. Seedlings are poisonous to domestic stock animals, especially horses and pigs, causing death in some circumstances.

Persistence

Of the two seeds present in each burr, only one will germinate in a single season. The other seed will remain dormant for two or three years, sometimes longer. The registered chemical control methods are highly effective on growing plants, but will survive as a seed bank for several years.

Policy

National Strategy

Bathurst Burr is not classified as a Weed of National Significance, therefore there is no National Strategy for this species.

State Policy

To minimise losses to the wool industry due to hardhead burr contamination, under the *Landscape SA Act 2019*:

- Prohibit movement of Bathurst Burr on public roads.
- Prohibit sale of Bathurst Burr.
- Prohibit sale of goods contaminated with Bathurst Burr.
- Landholders to control Bathurst Burr on their properties.
- Landholders to comply with regulations or instructions.
- Allow authorities to recover costs from landholders for control of Bathurst Burr on adjoining road reserves.

SA Arid Lands Landscape Board Risk Assessment

The SAAL Landscape Board risk assessment for Bathurst burr is to **MANAGE sites**.

Aim: To reduce the overall economic and/or social impacts of this weed through targeted management.

Marree-Innaminka District Risk Management Action

As above

Best Practice Control

Control method and description	Best time to control	Link for PIRSA current best practice chemical control and rates
Foliar Spray		
Spot or boom spraying	Before flower and burr formation	Bathurst burr - PIRSA
Physical		
Ground can be cultivated in suitable areas during seedling stage.		

Recommended Actions for Bathurst Burr Management in Marree-Innamincka District

- 1.** Support landholder education in identification, monitoring and control of Bathurst Burr.
- 2.** Encourage landholders to provide data on distribution of Bathurst Burr so that it can be surveyed and mapped.
- 3.** Provide input into identification of key sites for control of Bathurst Burr infestations.
- 4.** Assist in identifying and coordinating Bathurst Burr control programs using integrated weed management, especially in areas where key sites are threatened.
- 5.** Encourage landholders to monitor success, following control of Bathurst Burr, and carry out follow up control as necessary.

Surveys and Monitoring

Keep an eye out for Bathurst Burr during routine pastoral management activities, particularly in late spring through to late autumn and after summer rains, and record locations using a GPS.

Buffel Grass *Cenchrus ciliaris*

Description

Buffel Grass is a perennial grass to approximately 1 m high, with very strong root stock. Leaves bluish-green, 3-25 cm long, 1-6 mm wide. Leaf blade base with a ring of short hairs, 0.2-2 mm long. Flower heads form dense hairy cylindrical spikes 2-15 cm long, pale or purplish. Flowers in summer. Originally from Africa and south western Asia and introduced in the 1840s as a pasture species and for erosion control. It can withstand heavy grazing and is the most drought tolerant introduced grass species in Australia.



Buffel Grass seed head (Credit: B Shepherd)



Buffel grass infestation (Credit: B Shepherd)



Buffel grass plant (Credit: B Shepherd)

Distribution

Australian distribution: Common throughout central Australia. Widely cultivated by pastoralists as a preferred pasture species for cattle. In some outback towns, namely Alice Springs it was cultivated for dust control and has since successfully naturalised and overrun large tracts of land.

SA distribution: Large areas in the far north west of northern SA are infested with Buffel Grass and it is common along the Stuart Highway (from the Northern Territory border down to about Port Pirie) and the Tarcoola Road. Buffel Grass also occurs along selected rivers of the region with infestations ranging from scattered single occurrences to dense patches. It also occurs in other areas including around townships and as isolated patches along secondary roads.

District distribution: Buffel Grass infestations have occurred along the Strzelecki and Birdsville Tracks. There have also been other reports of infestations along roadsides and drainage lines across the District.

Potential distribution: Buffel Grass establishes readily and has the capacity to expand across a large proportion of northern and central South Australia.

Threats and Impacts

Invasiveness

Buffel Grass is easily distributed by wind, water, stock and machinery. High levels of disturbance, such as flood, fire and heavy grazing, can assist the establishment. Buffel Grass can also root from lower nodes. The species requires summer rain for growth, and is not frost tolerant.

Impacts

Buffel Grass competes with and displaces native species. It forms monospecific stands, out-competing native grasses. Plants are fire resistant but can carry fire in areas where fire is not normally part of the ecosystem. Buffel Grass aids fire by increasing the intensity and frequency of natural fire regimes to the point of removing competing shrubs and trees.

Persistence

Buffel Grass is the most drought tolerant introduced grass species in Australia, is highly persistent on lightly textured soils and is quick to respond to small amounts of rainfall.

Policy

National Strategy

Buffel Grass is not classified as a Weed of National Significance, therefore there is no National Strategy for this species.

State Policy

Buffel Grass is a declared species under the *Landscape SA Act 2019*. Buffel grass must be contained to minimise its impacts on native vegetation, grazing systems, remote communities and infrastructure.

Objectives:

- Protect vulnerable sites currently free of Buffel Grass from invasion.
- Contain Buffel Grass within its present range in SA, and reduce this range incrementally where possible.
- Remove Buffel Grass infestations from key dispersal nodes and pathways.
- Protect natural and built assets from the fire risk associated with Buffel Grass infestations.
- See *SA Buffel Grass Strategic Plan 2019-2024* for details.

SA Arid Lands Landscape Board Risk Assessment

All SA Arid Lands Landscape Districts (except Marla-Oodnadatta) lie within Zone 2 (**PROTECT SITES**) in the South Australia Buffel grass Strategic Plan 2019-2024. The Marla-Oodnadatta Landscape District lies within Zone 1 (**MANAGE WEED**) in the South Australia Buffel grass Strategic Plan 2019-2024.

Aim: Zone 1 – To reduce the overall economic, environmental and/or social impacts of Buffel grass through targeted management. Zone 2 - To prevent spread of Buffel grass to key sites/assets of high economic, environmental and/or social value.

Marree-Innamincka District Risk Management Action

Marree-Innamincka District Risk Management Action is to **PROTECT SITES** from the spread of Buffel grass.

Aim: To prevent spread of Buffel grass to key sites/assets of high economic, environmental and/or social value.

Best Practice Control

Control method and description	Best time to control	Link for PIRSA current best practice chemical control and rates
Foliar Spray		
<p>Spray all sides of the entire plant.</p> <p>Ensure the entire plant is covered in the herbicide mix.</p> <p>Spot spraying with a knap sack or quad/ute mounted spray unit can be used for scattered occurrences.</p> <p>Boom spray can be used for dense infestations where no native vegetation exists between Buffel grass plants e.g. along roads.</p> <p>Buffel grass can quickly regenerate from seed and ongoing monitoring and control is required after warm season rain.</p>	<p>Between 2-4 weeks after warm season rain</p>	<p>Buffel grass - PIRSA</p>
Physical and/or Organic Control		
<p>Burning dried-out Buffel grass allows for better control from chemical spraying when plant re-shoots after rain (e.g. better coverage of new foliage).</p> <p>Organic foliar spraying can be carried out using Bioweed (680g/L pine oil) at a rate of 20L per 100L water. Complete coverage of plant is required and should be applied when the plant is actively growing. This mixture will also kill seed it contacts both on the plant and on the ground.</p> <p>Grubbing can be used for isolated occurrences or small infestations.</p> <p>Dig the entire plant out of the ground.</p> <p>Ongoing monitoring and follow up hand pulling/grubbing will be required annually.</p>		

Recommended Actions for Buffel Grass Management in Marree-Innamincka District

1. Support landholder education in identification, monitoring and control of Buffel Grass.
2. Encourage landholders to provide data on distribution of Buffel Grass so that it can be surveyed and mapped.
3. Provide input into identification of key sites requiring control of Buffel Grass.
4. Assist in identifying and coordinating Buffel Grass control programs using integrated weed management, especially in areas where key sites are threatened.
5. Encourage landholders to monitor success, following control and carry out follow up control as necessary.
6. Restrict introductions and movement of Buffel Grass within SAAL Landscape region.

Surveys and Monitoring

Monitor during routine pastoral management activities. Look in areas adjacent to roads, railways and beside watercourses. In the weeks following rainfall, look for a large clumpy grass with purple or black seed heads.

Noogoora Burr *Xanthium strumarium* species

Description

A single or multi stemmed herb growing up to 2 m high. Its stems are hairy but without spines. The leaves are broad-ovate to triangular, 50-150 mm wide, 3 or 5 lobed, with a lobed base and toothed margins. The upper leaf surface is darker green than the under surface and with three prominent purplish veins. The leaf stalk is 20-120 mm long. The cream or creamy green male flowers are clustered at the end of the branches, or in the upper leaf axils while the yellowish green to brown female flower heads occur in the leaf junctions. Flowering occurs from mid-summer to autumn with burrs forming from February to May. The burrs 15-25 mm long, covered with numerous hooked spines and with 2 longer stout and straight spines. Two seeds formed in each burr, one larger than the other. Seeds may germinate in response to late spring/summer rain. Originally from North America, it was introduced into Australia in the 1860's. It was recorded in SA in 1916 and eradicated but reintroduced in 1959 when large numbers of sheep were imported. Noogoora Burr also includes *X. occidentale* and *X. californicum*, both of which are annual plants that are very similar in appearance and ecology and can be described together.



Seed pods (Credit: www.depi.vic.gov.au)



Dry burrs (Credit: www.lrm.nt.gov.au)

Distribution

Australian distribution: Widespread throughout most parts of New South Wales and Queensland, extending across into the Northern Territory, particularly around the Katherine, Daly Waters and Darwin regions and also the river systems flowing into the Gulf of Carpentaria. A few collections have been recorded from around the Alice Springs region. It also has a scattered distribution through northern Victoria and eastern South Australia, particularly around the Murray River and some tributaries. A few infestations have been recorded from the Kimberley region and the Perth region of Western Australia. One infestation was recorded in Tasmania but has since been eradicated.

SA distribution: Two species of the *Xanthium strumarium* complex are known to occur in SA. The Californian burr (*Xanthium californicum*) is distributed along the River Murray from the Victorian border to Swan Reach, with occasional plants and small patches downstream from Swan Reach. It is also established on the Gawler River. The true Noogoora Burr (*Xanthium occidentale*) is also found with Californian burr adjacent to the River Murray from Lyrup ferry upstream to the Victorian/NSW border. Other areas include 5500 ha at Kallioota Swamp on Lake Torrens, small isolated infestations along the Coopers Creek system, and in the Mingary-Cockburn area. Occasional plants are found throughout the state, especially adjacent to dams, waterholes, saleyards, transport depots and stock holding areas.

District distribution: Isolated infestations along the Cooper Creek system.

Potential distribution: Suitable habitats in SA are restricted to wetlands adjacent rivers, some flood irrigation areas, drains, creeks and flood outs, which may be inundated during summer.

Threats and Impacts

Invasiveness

Large dense infestations are dependent on periodic wet summers. The seed must be in good contact with water to germinate. Low temperatures are lethal. Dispersed by burrs attached to stock, and also along watercourses by floodwaters. To establish it requires a year with summer rains to provide adequate water to break seed dormancy.

Impacts

The major concern with Noogoora Burr is as a contaminant of wool. The burrs contribute to hardheads, which damage shearing machinery. Spines of this plant also cause physical damage to stock and people. Wool processors generally reject infested wool. Although seedlings are poisonous, the main toxin (carboxyatratyloside) is found only in the cotyledons. Cases of stock poisoning are very rare in Australia. Noogoora Burr competes strongly with pastures due to its extensive root system and rapid growth.

Persistence

In SA, most infestations of the Noogoora Burr group have been eradicated easily. This is probably due to unsuitable environments or by controlling the few plants surviving after many dry years. There are few areas of SA suitable for Noogoora Burrs to persist. In the pastoral lands, these areas are often the most productive, as they are the accumulation areas for runoff. There are two seeds in each burr and the upper one germinates in the following season while the lower one remains dormant for two or more years. It has several types of dormancy (enforced, innate and induced) making control difficult.

Policy

National Strategy

Noogoora Burr is not classified as a Weed of National Significance, therefore there is no national Strategy for this species.

State Policy

For Grazing Rangelands the State Policy is to Monitor and under the *Landscape SA Act 2019*:

- Prohibit entry to area of Noogoora Burr.
- Prohibit movement of Noogoora Burr on public roads.
- Prohibit sale of Noogoora Burr, or produce or goods carrying Noogoora Burr.
- Notify of Noogoora Burr infestations to authorities.
- Require landholders to control Noogoora Burr on their properties.
- Allow recovery of control costs on adjoining road reserves of Noogoora Burr.

SA Arid Lands Landscape Board Risk Assessment

The SAAL Landscape Board risk assessment for Noogoora burr is to **MONITOR**. Aim: To detect any significant changes in the species weed risk & monitor the spread of Noogoora burr and review any perceived changes in invasive risk.

Marree-Innamincka District Risk Management Action

As above.

Best Practice Control

Control method and description	Best time to control	Link for PIRSA current best practice chemical control and rates
Foliar spray		
Spot spray - As per label directions	When actively growing and before flower and burr formation.	<u>Noogoora burr (<i>Xanthium strumarium</i>)</u>
Boom spray - As per label directions		
Aerial spray – As per label directions		
Physical		
Seedlings and individual plants can often be pulled up by hand (In large infestations this may not be practical).		
Manual hoeing or slashing should occur before burr formation.		
Plants with burrs should be collected and burned.		

Recommended Actions for Noogoora Burr Management in Marree-Innamincka District

1. Support landholder education in identification, monitoring and control of Noogoora Burr.
2. Encourage landholders to provide data on distribution of Noogoora Burr so that it can be surveyed and mapped.
3. Provide input into identification of key sites requiring control of Noogoora Burr.
4. Assist in identifying and coordinating control programs using integrated weed management, especially in areas where key sites are threatened.
5. Landholders are encouraged to monitor success following control and carry out follow up control as necessary.

Surveys and Monitoring

Keep an eye out for Noogoora Burr during routine pastoral management activities, particularly in summer through to late autumn and after summer rains, and record locations using a GPS.

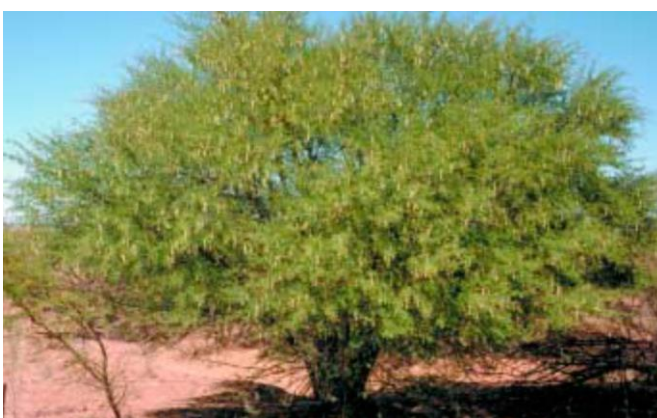
Prickly Acacia *Vachellia nilotica* subsp. *indica*

Description

Deep-rooted thorny shrub or small tree that usually grows to 5 m but occasionally to 10 m. Umbrella-shaped canopy, usually single-stemmed but may be multi-stemmed at the base, particularly if damaged by fire or frost. Bark on saplings often has an orange and/or green tinge. Mature trees have a rough, brown to black bark. Very deep taproot and several branching lateral roots close to the soil surface. Leaves are finely divided and fern-like with pairs of stout thorns growing at the base. Flowers are ball-shaped, golden-yellow, 1 cm in diameter, and on the stems with two to six flowers per group. Grey-green pods, flat, 6–25 cm long, with narrow constrictions between the seeds, and usually contain 8–15 brown, rounded seeds with a very hard seed coat. Originally from southern Asia Minor to Burma, introduced to QLD in 1890's for shade and fodder. During a good season one plant can produce 175,000 seeds.



Prickly Acacia in SA (Credit: DEW)



Prickly Acacia with fruit (Credit: CRC, Weed Guide)



Flowers with spines (Credit: DAFF, QLD)



Seed pods (Credit: DAFF, QLD)

Distribution

Australian distribution: Over 6.6 million ha of arid and semi-arid land in central and western QLD is infested with Prickly Acacia. Smaller infestations have also been found in central eastern QLD, the Barkly Tablelands and Arnhem Land in NT, north-east SA and the south-eastern Kimberley Ranges in WA.

SA distribution: Recorded infestation on Cordillo Downs that was initially treated in 2010.

District distribution: Apart from Cordillo Downs, not a lot is known of distribution in the District. There have been occurrences where initial reports of Prickly Acacia have turned out to be Mimosa (*Vachellia farnesiana*).

Potential distribution: Prickly Acacia has the potential to invade most of northern Australia, including the majority of QLD and the NT and a significant area of WA. The Channel Country in north-eastern SA is also potentially at risk.

Threats and Impacts

Invasiveness

Prickly Acacia seeds sprout readily and plants grow rapidly. It does well in dry localities and on loamy or sandy soils, forming thickets and spreading along watercourses. Seeds are primarily dispersed when livestock and feral animals eat the fruit and pass the seeds intact. Seeds may also be dispersed along water courses, when they are flowing.

Impacts

The thorny thickets cause considerable nuisance during mustering and can also hinder stock access to water. Infestations can drastically alter the ecological balance of grasslands and threaten biodiversity. The thorns may also cause eye injuries to stock and native fauna. The thickets may provide harbour for rabbits. Biodiversity issues exist with native species being out-competed and becoming displaced.

Persistence

Prickly Acacia withstands drought well, is readily eaten by stock, and has good regrowth after grazing. It reproduces by seed, and also produces suckers when its above-ground parts are damaged. The hard coating on the seeds allows them to persist in the environment for a long time and they don't all germinate at the same time.

Policy

National Strategy

Prickly Acacia is a weed of national significance (WONS). The National Strategy states: Prickly Acacia is eradicated outside of core infestations within QLD and national impacts reduced to a minimum.

State Policy

To protect the northern rangelands and their native vegetation from invasion by Prickly Acacia, under the *Landscape SA Act 2019*:

- Prohibit sale of Prickly Acacia or of goods contaminated with the plant
- Landowners are required to destroy the plant on their properties (SA Arid Lands Landscape region).

SA Arid Lands Landscape Board Risk Assessment

The SAAL Landscape Board risk assessment for Prickly Acacia is to **DESTROY INFESTATIONS**. Aim: To significantly reduce the extent of Prickly Acacia in the SA Arid Lands.

Marree-Innamincka District Risk Management Action

As above

Best Practice Control

Control method	Best time to control	Link for PIRSA current best practice chemical control and rates
Cut stump		
<p>Cut trunk off horizontally as close to the ground as possible. Immediately, within 15 seconds, swab cut surface with herbicide mixture.</p> <p>On organic properties, where scattered trees are not near water, tree guards, made from star droppers and chicken wire, can be put around each stump. Barbed wire can be threaded through the top of tree guards to prevent any access (by cattle) to the treated stump.</p>	Any time of year	Prickly acacia (<i>Vachellia nilotica</i> subsp. <i>Indica</i>)
Basal bark		
<p>For stems up to 10 cm basal diameter, carefully spray completely around base of plant to a height of 30 cm above ground level. Thoroughly spray into all crevices.</p> <p>Larger trees may be controlled by spraying to a greater height, up to 100 cm above ground level.</p>	Autumn, when plants are actively growing (providing summer rains have occurred).	Prickly acacia (<i>Vachellia nilotica</i> subsp. <i>Indica</i>)
Foliar spray		
Useful when plants are smaller than 2 m. Spray the entire plant with the recommended herbicide mix.	Any time of year – best when actively growing.	Prickly acacia (<i>Vachellia nilotica</i> subsp. <i>Indica</i>)
Physical		
<p>Useful for very large trees, dense infestations and broad scale germination or regrowth.</p> <p>The entire plant is removed from the ground using a suitably sized bull dozer or loader. Roots must be cut about 30-50 cm below the soil surface to reduce the incidence of regrowth. This is best done with a blade plough. Branch and root fragments of Prickly Acacia can take root, therefore woody material must be moved out of creek lines and moist areas.</p> <p>Ongoing inspections and hand-pulling of seedlings will additionally be required, where recruitment is occurring, until the seedbank is exhausted.</p> <p>Subject to fire restrictions, controlled burning (minimum 2 subsequent burns) can also be effective.</p>		

Recommended Actions for Prickly Acacia Management in Marree-Innamincka District

- 1.** Support landholder education in identification, monitoring and control of Prickly Acacia.
- 2.** Infestations of all Prickly Acacia to be surveyed, mapped and reported to SAAL Landscape Board immediately.
- 3.** Prevent sale and movement of Prickly Acacia within Marree-Innamincka District.
- 4.** Landholders required to destroy all infestations as they are identified, aiming for local eradication.
- 5.** Encourage landholders to monitor success, following control of Prickly Acacia, and carry out follow up control as necessary.

Surveys and Monitoring

Keep an eye out for Prickly Acacia during routine pastoral management activities, particularly from autumn to winter when plants are flowering, and especially along drainage lines. Record locations using a GPS.

Appendix 1 – Noted Weeds

The weeds in this section are not declared under the *Landscape SA Act 2019* and therefore are not considered priority weeds by the Marree-Innaminka Landscape Group. However, they are included in this appendix for identification for local landholders and other stakeholders.

Mexican Poppy *Argemone ochroleuca*

Description

Stiff bluish-green prickly plant that grows up to 1 m in height. Leaves up to 20cm long, silvery green with white veining and deep regular lobes. The upper surface of the leaf is smooth while the underside has a few prickles along the midrib. The stem leaves, in contrast to the rosette leaves, are stalkless and clasp onto the plant's stem. Flowers 6 cm in diameter with four light yellow or cream petals, flowering generally November to February but is opportunistic in arid areas and can flower whenever moisture is available. Fruit spiny, oblong seed capsules, 3.5cm in length with three to six openings at the top. The capsule contains up to 400 seeds. Seeds are oval-shaped, blackish brown, about 1.5 mm long with a pitted seed coat and a ridge along one side.

Originally from Mexico, Central America and USA, it was first reported near Sydney in 1845, probably imported as a contaminant of wheat seed. *Argemone ochroleuca* is similar in appearance and far more widespread than *A. mexicana*, and both species are referred to as Mexican Poppy. *A. mexicana* differs from *A. ochroleuca* in that it has bright yellow flowers as opposed to cream or pale-yellow flowers, and globular flower buds as opposed to the egg-shaped buds of *A. ochroleuca*.



Seed pod and flower (Credit: DAFF)



Flower and spiny leaves (Credit: DAFF)

Distribution

Australian distribution: All Australian states and territories, except Tasmania.

SA distribution: Some intermittent creek-lines, roadsides and areas of soil disturbance within the SA Arid Lands and northern Northern and Yorke regions.

District distribution: Isolated patches across North Flinders, Marree-Innaminka and North East Pastoral districts. Found in intermittent creek-lines and areas of disturbed soil.

Potential distribution: Potential distribution of Mexican Poppy extends across the range lands mainly in drainage lines and along roadsides.

Threats and Impacts

Invasiveness

Establishes readily on disturbed ground, overgrazed pastures, river beds and roadsides. Seed is readily dispersed by moving water, especially where plants grow in riparian habitats and on terrain where erosion and runoff occurs. Contaminated soil, fodder, vehicles and the fur and hooves of livestock are vectors for transport of Mexican Poppy seed.

Impacts

The prickly fruits can become entangled in wool, reducing its value considerably. It is suspected of being toxic to animals and humans due to the presence of alkaloids in all parts of the plant. However, reported cases of poisoning are rare because livestock tend to avoid it in the field, due to the presence of a bitter sap that makes it unpalatable. Poisonings may occur as a result of hay and chaff containing traces of the plant. Poisonings in humans have occurred by the consumption of oils contaminated with the plant.

Persistence

A single plant can produce up to 30 000 seeds per year. The seed can stay dormant for many years, making control difficult.

Policy

National Strategy

Mexican Poppy is not classified as a Weed of National Significance, therefore there is no national Strategy for this species.

State Policy

No State policy exists for Mexican Poppy.

SA Arid Lands Landscape Board Risk Assessment

SAAL Landscape Board risk assessment for Mexican poppy is to **MONITOR** for any changes in the species weed risk.

Aim: To detect any significant changes in Mexican poppy's weed risk and monitor the spread of the species and review any changes in weediness.

Marree-Innaminka District Risk Management Action

As above.

Best Practice Control

Foliar Spray

While no herbicides are registered specifically for this weed, in general, it's legal to use a registered herbicide in accordance with the label directions, i.e. method of application and situation, on any weed, not just the ones mentioned by name on the manufacturer's label.

Physical

Hand pulling or grubbing using a mattock/hoes for immature plants that haven't seeded.
If you locate a plant with mature seeds, apart from removing plant, collect seeds and burn them (e.g. campfire).

Recommended Actions for Mexican Poppy Management in Marree-Innamincka District

1. Support landholder education in identification, monitoring and control of Mexican poppy.
2. Monitor distributions of Mexican poppy over time through the use of surveillance and mapping.
3. Provide input into identification of key sites requiring control of Mexican poppy.
4. Encourage landholders to monitor success, following control and carry out follow up control as necessary.

Surveys and Monitoring

Monitor during routine pastoral management activities, particularly late spring to late autumn and after summer rains, and especially along roadsides and drainage lines.

Mimosa bush *Vachellia farnesiana*

Description

Spreading shrub usually less than 3 m high, rarely a small tree to 7 m high. Bark smooth or fissured, grey-brown. Straight spines 1–2.5 cm long at base of leaves, mature leaves bi-pinnate, a small gland is usually found on the leaf stalk. Flowers 1–3 per leaf axil, golden yellow, globular, autumn to early summer. Seedpod almost cylindrical, thick, straight to curved, 4–6 cm long, 0.9–1.2 cm wide, pithy inside between seeds, not opening at maturity. Seeds maturing black and remaining on plant. Originally from Central and South America.



Flowers and leaves (Credit: E Fatchen)



Seed pod and thorns (Credit: E Fatchen)



Mimosa Bush south of Susan's Dam, Peake
(Credit: R Murphy)



Seeds and pod (Credit: LRT, North West Weeds)

Distribution

Australian distribution: Widespread throughout northern Australia (although absent from extreme north), north-eastern SA and the North Coast to western NSW as far south as Jerilderie.

SA distribution: Watercourses and disturbed roadsides in the north of the State. Cooper Creek and Neales-Peake catchments.

District distribution: Mimosa Bush is currently found in the north east area of the District in the Channel Country.

Potential distribution: Watercourses and disturbed roadsides across the northern half of the State.

Threats and Impacts

Invasiveness

Mimosa Bush often forms thorny thickets. Seeds sprout readily and plants grow rapidly. It does well in dry localities and on loamy or sandy soils, forming thickets and spreading along watercourses. Seeds are primarily dispersed when livestock and feral animals eat the fruit and pass the seeds intact. Seeds may also be dispersed along water courses when they are flowing.

Impacts

The thorny thickets cause considerable nuisance during mustering and can also hinder stock access to water. The thorns may also cause eye injuries to stock and native fauna. The thickets may provide harbour for rabbits. Biodiversity issues with native species being out-competed and becoming displaced.

Persistence

Mimosa Bush withstands drought well, is readily eaten by stock, and has good regrowth after grazing. It reproduces by seed and also produces suckers when its above-ground parts are damaged. Apart from chemical control, there are no other effective means of controlling this species. This is a very real problem on organic properties.

Policy

National Strategy

Mimosa Bush is not classified as a Weed of National Significance, therefore there is no national Strategy for this species.

State Policy

No State policy exists for Mimosa.

SA Arid Lands Landscape Board Risk Assessment

SAAL Landscape Board risk assessment for Mimosa bush is to CONTAIN SPREAD. Aim: To prevent ongoing spread of the species.

Marree-Innamincka District Risk Management Action

As above.

Best Practice Control

Control method	Best time to control	Link for PIRSA current best practice chemical control and rates
Cut stump		
<p>Cut trunk off horizontally as close to the ground as possible. Immediately, within 15 seconds, swab cut surface with herbicide mixture.</p> <p>On organic properties, where scattered trees are not near water, tree guards, made from star droppers and chicken wire, can be put around each stump. Barbed wire can be threaded through the top of tree guards to prevent any access (by cattle) to the treated stump.</p>	Any time of year	Mimosa bush (Vachellia farnesiana)
Basal bark		
<p>For stems up to 10 cm basal diameter, carefully spray completely around base of plant to a height of 30 cm above ground level. Thoroughly spray into all crevices.</p> <p>Larger trees may be controlled by spraying to a greater height, up to 100 cm above ground level.</p>	Autumn, when plants are actively growing (providing summer rains have occurred).	Mimosa bush (Vachellia farnesiana)
Foliar spray		
<p>Useful when plants are smaller than 2 m. Spray the entire plant with the recommended herbicide mix.</p>	Any time of year – best when actively growing.	Mimosa bush (Vachellia farnesiana)
Physical		
<p>Useful for very large trees, dense infestations and broad scale germination or regrowth.</p> <p>The entire plant is removed from the ground using a suitably sized bull dozer or loader. Roots must be cut about 30-50 cm below the soil surface to reduce the incidence of regrowth. This is best done with a blade plough. Branch and root fragments of Mimosa bush can take root, therefore woody material must be moved out of creek lines and moist areas.</p> <p>Ongoing inspections and hand-pulling of seedlings will additionally be required, where recruitment is occurring, until the seedbank is exhausted.</p> <p>Subject to fire restrictions, controlled burning (minimum 2 subsequent burns) can also be effective.</p>		

Recommended Actions for Mimosa bush Management in Marree-Innaminka District

1. Support landholder education in identification, monitoring and control of Mimosa bush.
2. Provide input into identification of high priority areas such as significant rivers, creeks and waterholes and coordinate control programs to protect identified priority sites.
3. Encourage landholders to control Mimosa bush, where key sites are threatened.
4. Encourage landholders to monitor success, following control of Mimosa bush, and carry out follow up control as necessary.

Surveys and Monitoring

Keep an eye out for Mimosa bush during routine pastoral management activities, from autumn to early summer when plants are flowering, especially along roadsides and drainage lines and record locations using a GPS.

Neurada *Neurada procumbens*

Description

A distinctive low-lying annual herb that is adapted to dry, sandy environments, spreading up to 1 m in diameter. Stems are branching and lie flat on the ground with dense hairs that give a woolly appearance. Neurada also has an obvious tap root. Leaves are a distinctive blue-green colour and are lobed, covered in fine hairs and reach 6-25 mm in length. They are borne on woody stems that radiate from the base of the plant. Flowers are inconspicuous, usually solitary, small, generally off-white in colour and have five petals, flowering 2-4 weeks after rain. The fruit is star shaped, smooth on the underside but has spines on the upper surface that become sharp when dry. The fruit turns hard and woody at maturity. Originally from arid regions of Africa, India and the Middle East, first reported in Australia in 2000 in north-west corner of Simpson Desert.



Neurada flowers (Credit: www.lrm.nt.gov.au)



Neurada prickly seeds (Credit: www.lrm.nt.gov.au)

Distribution

Australian distribution: North-west corner of the Simpson Desert and in some campgrounds in southern Central Australia in Northern Territory. Far north of South Australia.

SA distribution: Simpson Desert and other scattered populations in northern South Australia.

District distribution: Simpson Desert along French Line to west of Rig Road Junction.

Potential distribution: Across the SAAL, especially in the sandy dunefields in the north of the State. Also a threat throughout Central Australia.

Threats and Impacts

Invasiveness

Prickly fruit catches in animal fur and feet, vehicle tyres, shoes and camping gear and is easily transported to new areas. This species grows well in sandy soil and harsh climates and has the potential to spread across the arid lands.

Impacts

The major concern as a contaminant of wool. The burrs contribute to hardheads, which damage shearing machinery. Wool processors generally reject infested wool. Spines of this plant also cause physical damage to stock and people.

Persistence

There are several seeds in each fruit. At a rainfall event only one seed germinates and quickly establishes a fine tap root in the moist sand. If no further rain occurs and the soil dries out, this individual dies but the other seeds remain viable. After subsequent showers, further seeds germinate until at last one of them grows successfully. This system works as an insurance policy to ensure the plant has the best possible chance of reproducing in such a harsh environment.

Policy

National Strategy

Neurada procumbens is not classified as a Weed of National Significance, therefore there is no national Strategy for this species.

State Policy

No State policy exists for *Neurada procumbens*.

SA Arid Lands Landscape Board Risk Assessment

SAAL Landscape Board Risk assessment for *Neurada procumbens* is to **MONITOR** for any changes in the species weed risk. Aim: To detect any significant changes in *Neurada procumbens* weed risk and monitor the spread of the species.

Maree - Innamincka District Risk Management Action

As above.

Best Practice Control

Control method	Best time to control	Link for PIRSA current best practice chemical control and rates
Foliar Spray		
There are no herbicides registered for use in SA.		
Physical		
Hand pulling or grubbing using a mattock/ho.	Seedling stage	
If you locate a plant with mature seeds, collect seeds and burn them (e.g. campfire).	Mature plants	

Recommended Actions for Neurada Management in Marree-Innamincka District

1. Support landholder education in identification, monitoring and control of *Neurada procumbens*.
2. Encourage landholders to provide data on distribution so that it can be surveyed and mapped.
3. Monitor distributions of *Neurada procumbens* over time to see if species weediness increases.
4. Assist in identifying and coordinating *Neurada procumbens* control programs, using current best practice, if the need arises.
5. Monitor campgrounds for the emergence of *Neurada procumbens* and destroy if found.

Surveys and Monitoring

Keep an eye out for *Neurada* during routine pastoral management activities within two months after rainfall events, especially along roadsides and on sandy ground, and near campgrounds in the far north of SA or Central Australia. Record locations using a GPS.

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