

Northern and Yorke Natural Resource Management Board
Southern Flinders & Upper North NRM District
Weed Action Plan
March 2019

Natural Resources
Northern and Yorke

Government of South Australia

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Introduction

Declared pest plants (weeds) described within this plan have a demonstrated ability to rapidly expand their distribution given favourable seasonal conditions impacting on agricultural, natural and social environs.

After stakeholder and community consultation and input, it is intended that this plan be used by the Southern Flinders & Upper North Natural Resource Management (NRM) District to guide prioritisation of declared plant management activities within the district.

This District Action Plan will be reviewed to prioritise weed species and activities regularly. This will be undertaken by district staff who will ensure the Northern and Yorke NRM Board (the Board) remains informed and therefore committed to the plan's ownership and implementation. Monitoring of the district's weed management actions and achievements will be facilitated through quarterly district reporting to the Board.

Purpose

The district plan identifies priority weed species for allocation of resources and outlines best practice weed management principles and management actions that the Board, its staff, landholders and community can implement within the Southern Flinders & Upper North District that aim to reduce the current and potential impacts of twelve priority weeds.

The management actions outlined for each of the twelve priority weeds are aligned with South Australian state policies for declared plants and the Northern & Yorke NRM Board regional declared plant policies. The plan also provides information on the distribution, possible threats and impacts and policy on each of the priority weeds and links to current best practice control methods and surveying/monitoring actions.

Some of the weed species detailed in this plan are at differing stages of the invasion curve. Managing current infestations and removing potential sources for new infestations will save considerable resources required to control large infestations of persistent weeds.

<u>*Prevention* and *Education* of new weeds entering the district holds the highest priority</u>

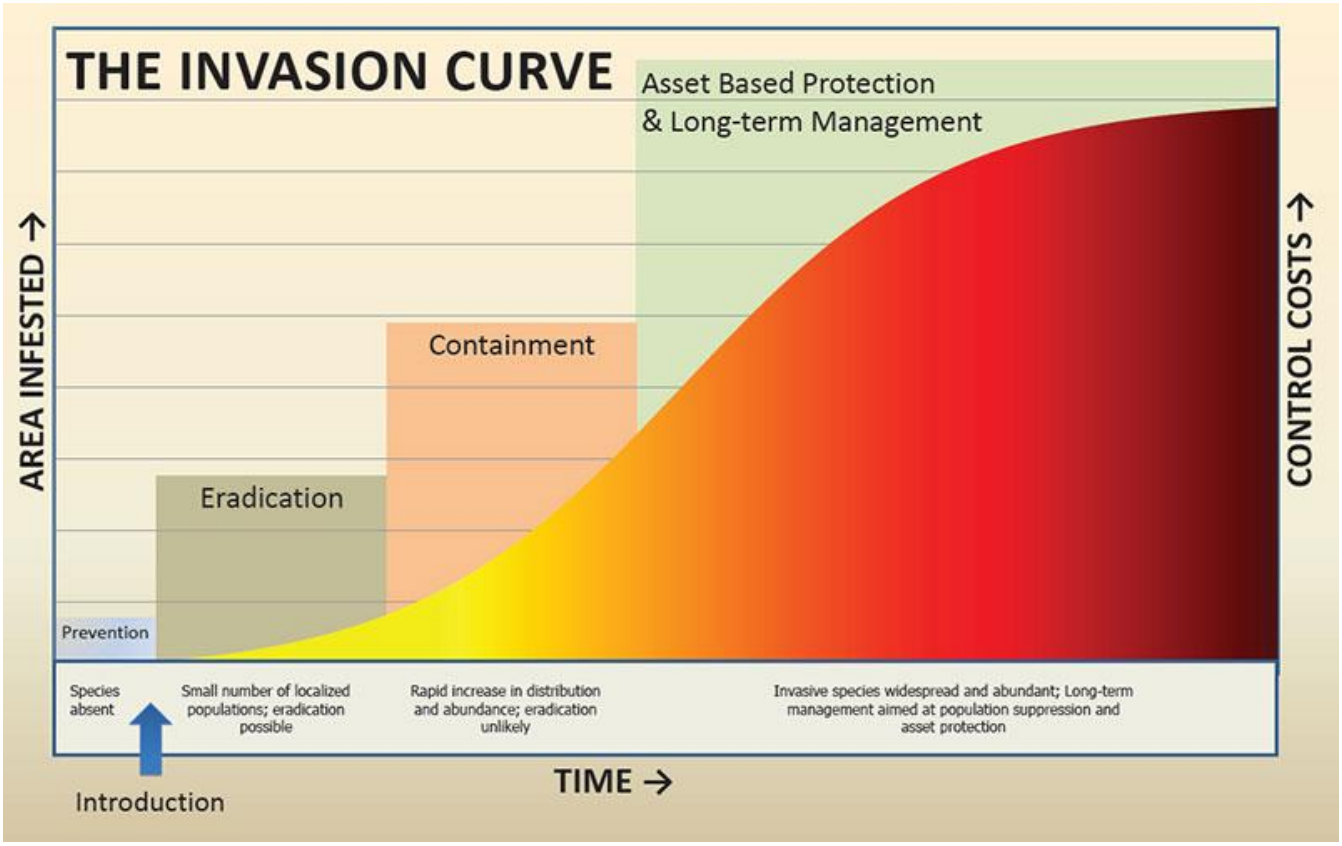


Figure 1. Generalised invasion curve showing actions appropriate to each stage of invasive species (http://www.mda.state.mn.us)

Alert species have the highest priority in the district and should be reviewed by the district staff annually, any situation or legislative changes actioned and communicated to the district's key stakeholders e.g. District Council of Mount Remarkable, Port Augusta City Council, District Council of Orroroo Carrieton, Northern Areas Council, Port Pirie Regional Council, District Council of Peterborough, Flinders Ranges Council, Agricultural Bureaus, Agronomists, Government Departments (e.g. SA Water, DPTI), and Community.

This priority is because the economic practicality of managing weeds before they become established is much higher than if the weeds become widespread and abundant (Figure 1). The feasibility of control is most realistic when the plant populations are new, small in number and localised, and for these reasons the Board places prevention, communication and education of new weeds entering the Northern and Yorke Region and Southern Flinders & Upper North District at the highest priority.

Determining Priority Weeds

There are over 130 declared plants under the NRM Act in SA. Resources need to be allocated to priority plants determined by the level of threat they pose to agricultural, biodiversity and community values. The Board uses a risk management approach to determining the level of threat, priority and the allocation of limited resources to declared weed species in this region. This process involves working through the Biosecurity SA (PIRSA) weed risk assessment (PIRSA weed risk management guide, 2008).

Input from the Living Flinders Community Action Planning (CAP) workshops have helped to determine priority target weed species for specific locations in the Southern Flinders & Upper North using this process of risk assessment. This plan aims to assist the community protect assets identified through the Living Flinders CAP process which aims to combine and focus weed management efforts of the community, experts and stakeholders.

The PIRSA weed risk assessment process establishes a management strategy for each weed for each land-use the process is applied to. It provides initial direction to the following management strategies for the twelve identified priority weed species in the Southern Flinders & Upper North District (Table 1).

Successful implementation of this plan is dependent on;

1. Allocating resources to manage the identified priority weed species.
2. The Board and its staff remaining focussed on this key objective where resources and capacity are available.
3. Resources not being allocated to management of species that are not prioritised through this process; in these cases limited or no action should be taken.
4. The above points being clearly communicated from the Board to staff, landholders and stakeholders in the region.

Opportunities may arise where management of declared weed species other than identified priority species may occur however, this would be through external funding opportunities e.g. Weeds of National Significance (WoNS), or as part of a partnership project objective.

Another factor which determines management actions is land tenure e.g. public land, roadsides and private lands. Actions will vary according to species, land-use and tenure. However, surveillance, education and extension, awareness programs and compliance are a significant portion of management actions available to NRM staff. These actions are described in the management actions for priority weeds in this plan.

Table 1. Seven priority weeds included in the Southern Flinders & Upper North NRM District Plan and for each weed; the landscape they do or can infest, the management strategy and description of the management strategy.

Priority Weed	Landscape	Management strategy	Description of management strategy
African Boxthorn *(Lycium ferocissimum)*	Multiple	Manage sites	African boxthorn is common in the district and aim is to reduce the overall economic and/or social impacts of this weed through targeted management.
African Rue *(Peganum Harmala)*	Multiple	Protect sites	African rue occurs in isolated patches, with some larger infestations on cropping land. The district aims to prevent the spread into native vegetation.
Buffel Grass (*Cenchrus ciliaris*, *Cenchrus pennisetiformis*)	Multiple	Protect sites	Buffel Grass occurs in significant infestations along road and railways. The district aims to create a buffer around Mt Remarkable NP and to Manage Weed and Priority sites infested with Buffel grass with the aim to maintain economic, environmental and/or social values of key sites/assets through improved management of Buffel Grass.
Khaki Weed *(Alternanthera pungens)*	Urban	Alert and Eradicate	The SFUN has low known infestations of Khaki weed, in locations that can be specifically targeted for control. Given the infestations have been identified in high traffic areas e.g. roadside rest areas it is critical that Khaki weed be eradicated to prevent further infestations.
Wheel Cactus *(Opuntia robusta)*	Multiple	Manage weed	Wheel cactus is common and persistent in the district and the aim is to reduce the overall economic and/or social impacts of this weed through targeted management.
Rope Cactus *(Cylindropuntia imbricate)*	Cropping Urban	Eradicate	The district has few isolated plants on roadsides and in some grazing land so it is critical that Devil's Rope be eradicated to prevent spread throughout the district.
Silver leaf Nightshade (*Solanum elaeagnifolium*)	Multiple	Contain Spread	Silverleaf nightshade is widespread in the Southern Flinders and Upper North landscape The aim to manage weed and prevent spread through education and containment management is the objective.

The management strategy of each weed species is determined by assessing each weed species through the weed risk assessment. The assessment process evaluates the potential impacts and feasibility of control in different land uses. When weeds have a social, environmental and/or economic impact on more than one land use, then the priority of management action on those weeds increases.

It is through this localised assessment process that different weeds will be assigned different priorities in the three districts of the Northern and Yorke NRM Region.

Table 2. Management Strategy aims and actions	
Strategy	Aims and actions of management strategies
Alert / Report	Species that are not known to be present in the management area and which represent a significant threat if permitted to enter and establish. Aims to prevent the species arriving and establishing in the management area. • Prevention of entry to management area • Ongoing surveillance for incursions of the species • Training & awareness activities for the community to enable early detection
Eradicate	Aim to remove the weed species from the Southern Flinders & Upper North district (and N&Y NRM Region). • Detailed surveillance and mapping to locate all infestations • Destruction of all infestations including seed banks • Prevention of entry to region and movement and sale within • Must not grow and all cultivated plants to be removed • Monitor progress towards eradication
Destroy Infestations	Aim to significantly reduce the extent of the weed species in the Southern Flinders & Upper North District (and thus the N&Y NRM region). • Detailed surveillance and mapping to locate all infestations • Destruction of all infestations, aiming for local eradication at feasible sites • Prevention of entry to region and movement and sale within • Must not grow • Monitor progress towards reduction
Contain Spread	Aim to prevent the ongoing spread of the weed species in the Southern Flinders & Upper North District (and the N&Y NRM region). • Surveillance and mapping to locate all infested properties • Control of all infestations, aiming for a significant reduction in weed density • Prevention of entry to region and movement and sale within • Must not allow it to spread from cultivated plants (if grown) • Monitor change in current distribution
Protect Sites	Aim to prevent spread of the weed species to key sites/assets of high economic, environmental and/or social value. • 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 sub-regional industries/habitats (higher weed risk) • Surveillance and mapping to locate all infested sub-regions. • Identification of key sites/assets in the region. • Control of infestations in close proximity to key sites/assets, aiming for a significant reduction in weed density. • Limits on movement and sale of species within region. • 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	Aim to reduce overall economic, environmental and/or social impacts of the weed species through targeted management. • 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 region and ensure adequate resourcing to manage the weed species.
Manage Sites	Aim to maintain overall economic, environmental and/or social value of key sites/assets through improved general weed management. • Promote general IWM principles to landholders, including the range of control techniques, maintaining competitive vegetation/crops/pastures, hygiene and property management plans • Identify key sites/assets in the region and ensure adequate resourcing to manage these to maintain their values • Broaden focus beyond weeds to all threatening processes
Monitor	Aim to detect any significant changes in the species' weed risk • Monitor the spread of the species and review any perceived changes in density and location.
Limited/ No Action	The weed species is perceived to be of insufficient risk to warrant any investment in regional strategic management actions.

How will we manage weeds

Property Management

The management of priority weeds on property is not always a simple process and often requires a planned and consistent approach to gain the cooperation of landholders and achieve the desired on-ground actions. District staff will inspect properties and communicate to landholders (public and private) through any available approaches such as face-to-face and written correspondence. Stakeholder groups will be engaged through broader awareness programs and the media dependent upon those detailed in the district actions for each of the priority weeds.

When addressing weed management on property staff are guided by the *Northern & Yorke NRM Board's Operational Process for Achieving Sustainable Natural Resource Management in its Region*. This document provides foundational information, potential information and incentives available to landholders, voluntary remediation options as well as a system of compliance. It is to be noted that higher level compliance activities should only be considered as an option once all reasonable and regular attempts to attain the landholder's voluntary cooperation have failed.

Staff will be guided by the Board's Operational Process for Achieving Sustainable Natural Resource Management for the policy settings and defined actions for individual plants as well as other specific Regional Pest Management Plans that may have been adopted by the Board. In situations where a plant is recently declared at state level, the State Policy for the plant will be applied. Sections of the *Natural Resources Management Act, 2004* which may apply to each priority plant are defined in the following table:

175(1)	Prohibiting entry to area
175(2)	Prohibiting movement on public roads
177(1)	Prohibiting sale of the plant
177(2)	Prohibiting sale of contaminated goods
180	Requiring notification of infestations
182(1)	Landowners to destroy the plant on their properties
182(2)	Landowners to control the plant on their properties
185	Recovery of control costs on adjoining road reserves

Roadsides Management

Road reserves are a recognised pathway for the introduction and movement of declared plants. It is a priority of the Southern Flinders & Upper North District to stop the introduction and minimise the establishment of new pests by managing road reserves through a systematic inspection and strategic control regime.

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 those that will be included in the Southern Flinders & Upper North District Roadside Vegetation Management Plan:

- African boxthorn
- African Rue
- Opuntia sp.
- Silverleaf nightshade

The process for implementing control of declared pants on road reserves in the Southern Flinders Upper North District is currently in draft as a Project Concept: *Roadside Vegetation Management and Education*. The physical control of infestations will be carried out using the internal resources of staff and equipment or the engagement of contractors which will be dependent upon the specific task and availability. Timing of control activities will be as described in the Annual Work Plan.

Declared plants and weeds threaten the condition of assets in the Southern Flinders & Upper North District and weed management activities mitigate these threats. The Southern Flinders & Upper North District assets are:

- Agricultural Assets such as cropping and pastoral land and hobby farms
- Environmental Assets such as National and Conservation Parks, Native Vegetation Heritage Agreements, coastal habitats and threatened species habitat
- Tourist and Recreational areas such as camping areas, town reserves, parks and ovals, amenity of high visitation sites, and
- Aboriginal and European Heritage sites

Noted Species

Weed species not included in this plan will be managed if opportunity arises through project funding or on a case by case situation, with the same objective as this plan.

Blackberry *(Rubus fruticosus sp.)*
Horehound *(Marrubium vulgare)*
Salvation Jane (*Echium plantagineum)*
Bridal Creeper *(Asparagus asparagoides)*
Bathurst Burr (*Xanthium spinosum)*

Review Period

It is intended that this district plan be implemented over the next 5 years (2019 – 2023). The longer length of time on this plan sets a realistic time for weed management and allows substantial time for repeated follow up action.

In the third year of the plan it is suggested that the Southern Flinders & Upper North District, through its Living Flinders Community Action Planning (CAP) process, review progress and update management targets and actions accordingly.

Suggested time frame:

Year	Activity
2018	Draft plan reviewed by the Southern Flinders & Upper North District and feedback incorporated into the Plan Plan endorsed by the N&Y NRM Board
2019	Implementation
2020	Implementation
2021	Implementation Review progress and update the plan as required (and then every 5 years)
2022	Implementation
2023	Implementation

Annual Work Plan

District and staff work plans and priorities can be implemented on a yearly and seasonal basis.

Alert weed species have a higher priority in the district and should be reviewed by the district staff annually and changes actioned and communicated to the districts key stakeholders e.g. District Council of Mount Remarkable, Port Augusta City Council, District Council of Orroroo Carrieton, District Council of Peterborough, Flinders Ranges Council, Northern Areas Council, Port Pirie Regional Council, Ag Bureaus, Agronomists, Departments (e.g. SA Water, DPTI), and Community.

The Annual Work Plan (Table 3) describes seasonal plant growth stages and optimal control periods. It also includes a seasonal schedule for two main weed management activities; 1. Inspect/Monitor and 2. Notify/Educate. Tasks under each activity include but are not limited to;

1. Inspect/Monitor
    - Monitor/collect data conduct roadside and property inspections (low level compliance)
    - Inspecting known control sites, and
2. Notify/Educate
    - Public Media Release (e.g. social media, newsletters, newspaper) about weed management responsibilities
    - Community Group meetings, field demonstrations and workshops
    - Landholder fact sheet mail out
    - Implementing control programs

Table 3. Southern Flinders & Upper North District Pest Plant Management – Annual Work Plan												
African Boxthorn	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Germination/Present												
Active Growth/Flowering												
Fruiting/Seeding												
Inspect or Monitor												
Notify and/or Educate												
Optimal Treatment												
African Rue	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Germination/Present												
Active Growth/Flowering												
Fruiting/Seeding												
Inspect or Monitor												
Notify and/or Educate												
Optimal Treatment												
Buffel Grass	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Germination												
Active Growth/Flowering												✿
Seeding												
Inspect or Monitor												
Notify and/or Educate												
Optimal Treatment												
Wheel cactus	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Germination/Present												
Active Growth/Flowering	✿	✿								✿	✿	✿
Seeding												
Inspect or Monitor												
Notify and/or Educate												
Optimal Treatment												
Rope Cactus	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Germination/Present												
Active Growth/Flowering	✿	✿								✿	✿	✿
Seeding												
Inspect or Monitor												
Notify and/or Educate												
Optimal Treatment												
Khaki Weed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Germination/Present												
Active Growth/Flowering											✿	✿
Fruiting/Seeding												
Inspect or Monitor												
Notify and/or Educate												
Optimal Treatment												
Silverleaf Nightshade	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Germination/Dormant												
Active Growth/Flowering	✿	✿	✿								✿	✿
Fruiting/Seeding												
Inspect or Monitor												
Notify and/or Educate												
Optimal Treatment												

Key to symbols: ✿ - Flowering

African Boxthorn

(*Lycium ferocissimum)*		
Common name(s):	African Boxthorn	
Plant description:	African boxthorn is a branched shrub to 5m high and 3m wide. Spines occur on the main stems and branchlets, branchlets terminate with a spine. Flowers visible predominately in summer (but may occur all year round), are pale lilac to white with purple markings at the base. Fruit is dull orange-red berry (1 cm diameter).	
Weed Risk Assessment Rating:	Native Vegetation	Manage Weed
	Non-arable Grazing/cropping	Manage sites
	Urban	Contain spread
	Coastal	Manage Weed

Threats and Impacts

Invasiveness	African boxthorn is highly invasive and spread by various means. It colonises degraded or naturally disturbed landscapes, such as coastal vegetation where density of the native dominants had been reduced by grazing and other disturbances.
Impacts	African boxthorn usually grows among other shrubs due to seed voiding by perching birds but can grow as a free standing multi-stemmed shrub in open paddocks. It reduces the value of pastoral land and replaces native species in vegetation communities, especially on coastal cliffs, back dunes and along creek lines. It is avoided by livestock, and although it is non-toxic the spines may cause physical injury to stock as well as limiting their access to water and pasture; the spiny thickets also provide harbour for rabbits and foxes. On the other hand, many small native birds adopt boxthorn as a protective habitat and food source.
Persistence	Boxthorns are long-lived shrubs that regenerate after fire. They are also drought tolerant, losing leaves in periods of drought stress or even dying back and later reshooting from the base.

Current Distribution

State and N&Y NRM region	In South Australia, common in large areas of the arid lands, on islands off Yorke and Eyre Peninsula and amongst coastal dunes from western Eyre Peninsula to the South East.
SFUN District	The weed threat of African Boxthorn in the Southern Flinders & Upper North is existing, it is a declared plant with a historical legacy that persists in all environments. African Boxthorn is common in localised infestations throughout the SFUN District.
Potential distribution	African Boxthorn has the potential to re-infest properties that have been previously treated, easily infests coastal areas, invades remnant native vegetation and can increase in density where unmanaged.

Policy

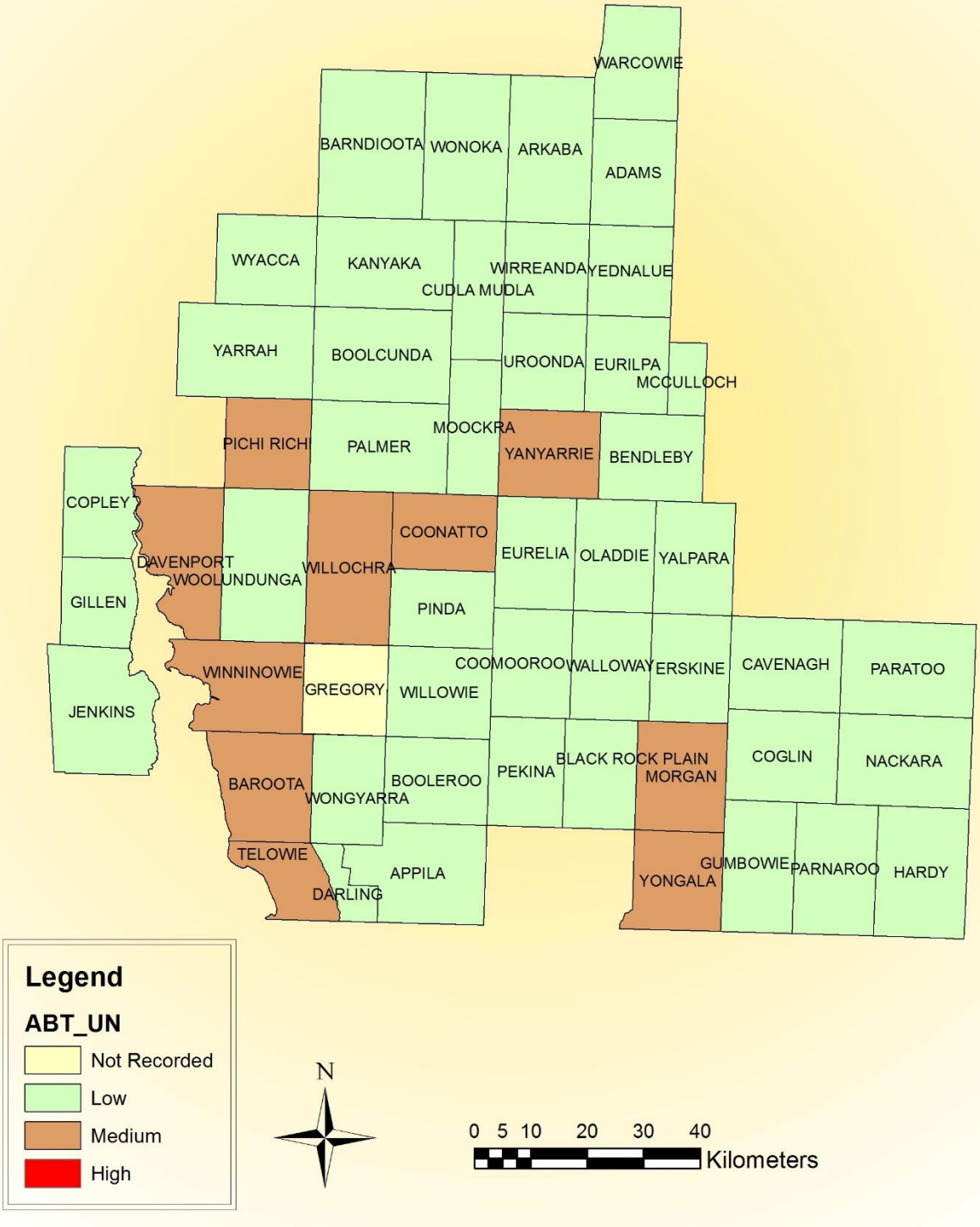
N&Y NRM Policy:	Declarations under the NRM Act: 175(2), 177(1), 177(2), 182(2), 185

SFUN District Action Plan

Justification for Action:
The SFUN District in line with N&Y Region Policy and management strategy is to Manage Weed and Priority Sites infested with African Boxthorn with the aim to maintain economic, environmental and/or social values of key sites/assets through improved management of African Boxthorn.

- Focus control efforts on stand-alone African Boxthorn
- Identify key sites/assets in the district and apply adequate resourcing to manage African Boxthorn
- Educate landholders on their responsibilities for control of African Boxthorn
- Refer to CAP priority listing for funding proposals to conduct on-ground works.

Southern Flinders Upper North African boxthorn Densities 2019



African Rue

(Perganum harmala)

Common name(s):	African Rue	
Plant description:	African Rue is a summer-growing, deep-rooted perennial shrub that grows 0.5 m high. Stems are stiff and branched with green, succulent leaves approximately 2-5 cm long. Leaves are arranged alternately along stems and have a distinct bitter odour when crushed.	
Weed Risk Assessment Rating:	Non-arable Grazing/cropping	Manage weed
	Native veg	Monitor
	Urban	Alert/report

Threats and Impacts

Invasiveness	African rue grows best in open, disturbed areas receiving runoff water. It doesn't establish well in undisturbed or amongst existing vegetation. Seeds are not likely to be spread in the fur or wool of animals, and animals normally don't eat the fruit. African rue is not aggressive and takes several years to become abundant. Spread is primarily by flowing water and human aided dispersal. Spread can occur via pieces of rootstock or seed. Spread of root fragments along roadsides during grading and around paddocks during ploughing may increase plant numbers.
Impacts	African rue is difficult to control or destroy, there is little chance of eradication. African rue is highly unpalatable to sheep and cattle. The plant may lower pasture yields but these effects will only become apparent when pastures are heavily grazed and there is little else left to eat. The alkaloids of African rue inhibit both germination and growth of other vegetation. The plant has been confined mostly to waste places and overgrazed areas.
Persistence	African rue is a prolific seed producer and seeds are scattered over a long time. The higher the available moisture, the higher the chance of plant establishment and survival. It grows densely around wells, dams and bores which have soil disturbance by sheep's hooves and lack competition from desirable pasture species.

Current Distribution

State and N&Y NRM region	African rue is a herbaceous perennial and a minor unpalatable weed in marginal lands and semi-arid pastoral areas.
SFUN District	It is most abundant on flood plains on several properties north east of Orroroo in the upper north of South Australia.
Potential distribution	The potential spread of African rue is high; it has the potential to grow throughout the region and become locally common at overgrazed sites, roadsides and waste places. Degraded marginal and pastoral lands are at risk from invasion by African rue, although it is unlikely to persist in areas that don't receive water runoff.

Policy

N&Y NRM Policy:	Declarations under the NRM Act: 175(1), 175(2), 177(1), 177(2), 182(2), 185

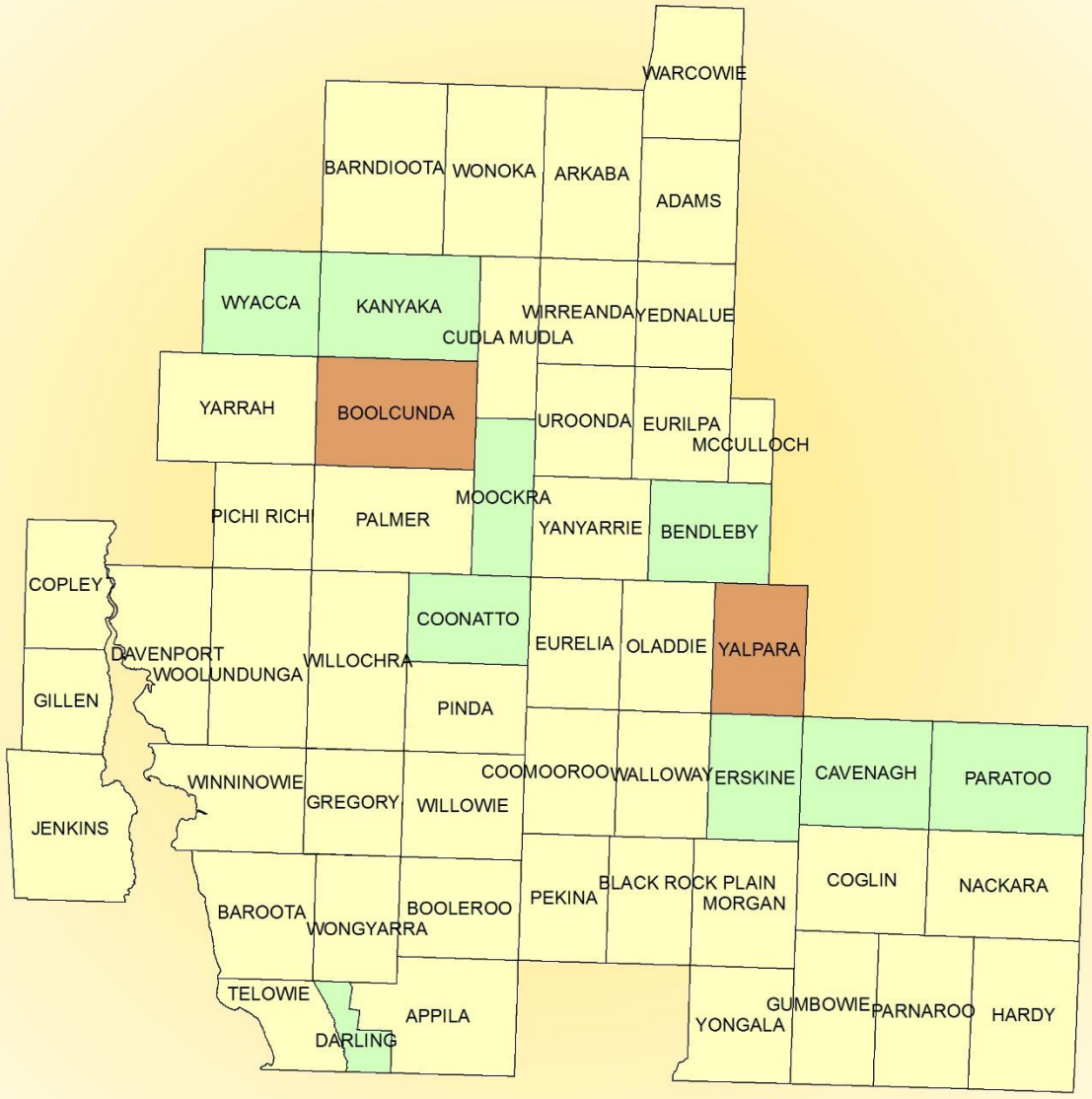
SFUN District Action Plan

Justification for Action:

The SFUN District in line with N&Y Region Policy and management strategy is to Manage Weed and monitor the occurrence in native vegetation, with the aim to maintain economic, environmental and/or social values of key sites/assets through improved management with other declared pest plants.

- Focus control efforts on high value production areas
- Educate landholders on their responsibilities for control of African Rue
- Refer to CAP priority listing for funding proposals to conduct on-ground works.

Southern Flinders Upper North African rue Densities 2019



Legend

- Not Recorded
- Low
- Medium
- High

N

0 5 10 20 30 40

Kilometers

Buffel Grass

(Cenchrus ciliaris, Cenchrus pennisetiformis)

Common name(s):	Mamu grass, Rhodesian foxtail, African foxtail, black buffel grass, foxtail buffalo grass, blue buffel grass, anjan grass	
Plant description:	Introduced from Africa and Asia for rangeland improvement, Buffel Grass is a perennial, erect, tussock forming, deep rooted grass 0.2 -1.5 m high. Buffel has a deep root system, some with rhizomes up to 50 cm in length. Stems grow from a centralised point to form a tuft. Leaves are rough textured due to small stiff hairs, with prominent midribs. Green when actively growing and straw coloured in dry times.	
Weed Risk Assessment Rating:	Native veg	Manage sites
	Non-arable Grazing/cropping	Contain spread
	Urban	Manage weed

Threats and Impacts

Invasiveness	Buffel grass spreads through dispersal of its fluffy burrs by wind, water and animals, particularly along drainage lines, roads and other transport corridors. Its spread along roads can also be assisted by vehicle draughts and movement of soil by graders and other vehicles. Buffel grass may be slow to establish initially but it may then spread readily beyond the introduction sites under favourable seasonal conditions. Buffel grass invasion is facilitated by burning, producing positive feed-back between fire and the invasion of buffel grass. Higher fuel loads associated with large-scale buffel grass invasion can support fires of far greater intensity, frequency or spatial area than would have occurred previously.
Impacts	Buffel grass has been identified as a transformer species in rangelands as it can change the character of vegetation over substantial areas. Although a useful fodder species for periods after rain on rangelands of northern Australia, in many habitats it reduces pasture productivity in the long term. Through competition with native species, it reduces diversity of native pastures including native grasses that are highly valued fodder after rain. Dry foliage can form a relatively continuous flammable ground layer that can carry extensive and intense fires.
Persistence	The high seed production and moderate seed dormancy of buffel grass enables it to build up a large seed bank in the soil. Seeds may lie dormant in the ground for up to 8 months, while retaining their original viability. Beyond 12 months, germination rates drop to less than 12%, and remain at 10% for a further two years.

Current Distribution

State and N&Y NRM region	Within South Australia it has been recorded in the Alinytjara Wilurara, South Australian Arid Lands, Eyre Peninsula, South Australian Murray-Darling Basin (SAMDB), AMLR, and South East NRM regions.
SFUN District	Buffel grass occurs predominantly along the roads and railways extending north from Mt Remarkable National Park, and for some km south of the park.
Potential distribution	Climatic modelling for South Australia predicts that no part of the State's land area is entirely unsuitable for establishment of buffel grass. The model presented in the South Australia Buffel Grass Strategic Plan shows that the degree of suitability for establishment is variable across the State: 30.5% is "moderately suitable", a further 42% is "highly suitable", and a further 27.5% is "very highly suitable". A relatively small proportion of the State (0.03% or 33,000 ha, confined to the South Australian Arid Lands and Alinytjara Wilurara NRM Boards) was predicted as "extremely suitable".

Policy

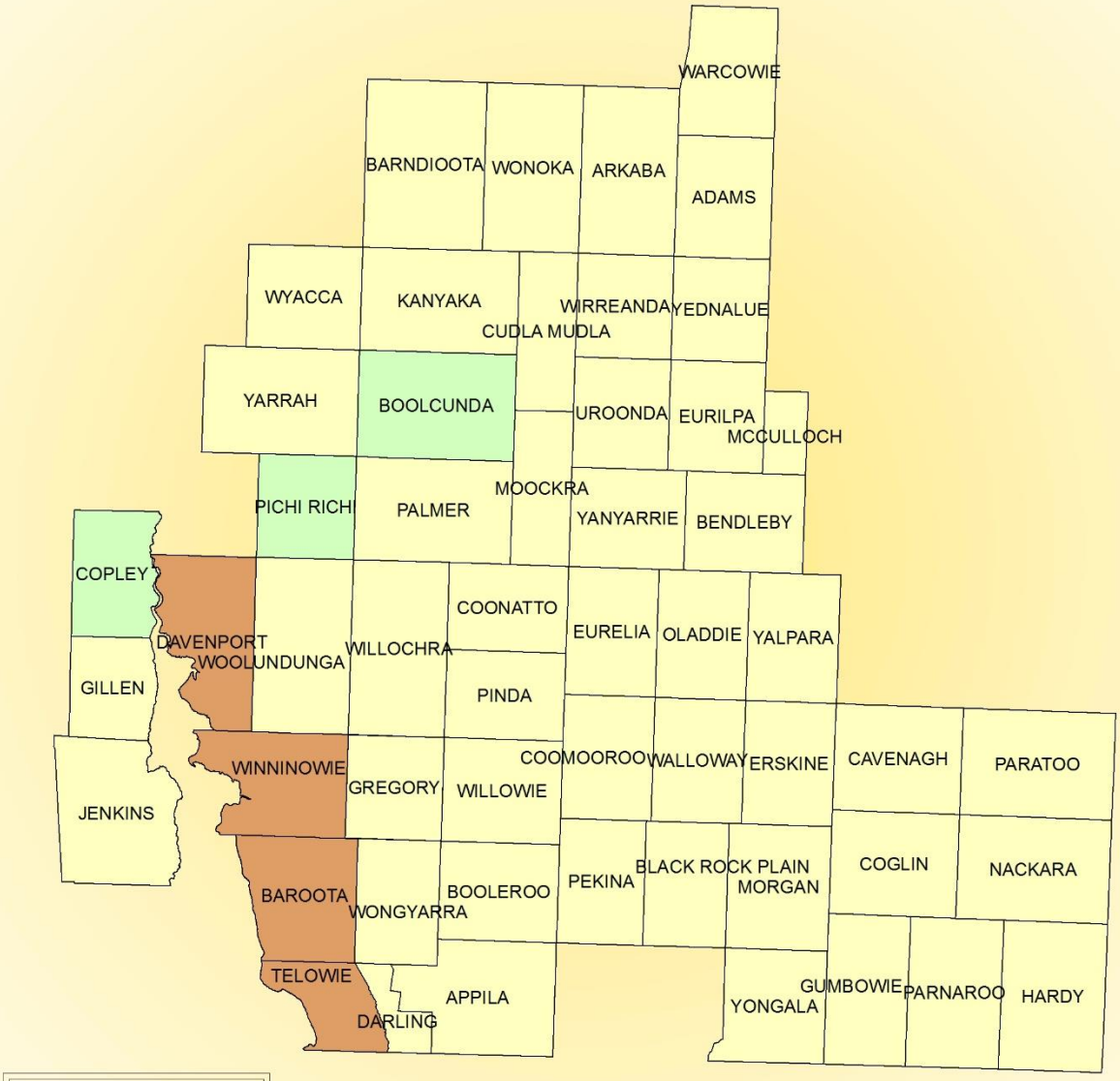
N&Y NRM Policy:	Declarations under the NRM Act: 175(1), 175(2), 177(1), 177(2), 182(2), 185

SFUN District Action Plan

Justification for Action:
The SFUN District in line with South Australia Buffel Grass Strategic Plan, N&Y Region Policy and management strategy is to Manage Weed and Priority sites infested with Buffel grass with the aim to maintain economic, environmental and/or social values of key sites/assets through improved management of Buffel Grass.

- Focus control on creating a buffer zone around parks
- Monitor and Control known recorded sites of Buffel Grass along travel ways and apply adequate resourcing to manage outbreaks of Buffel Grass
- Educate landholders on their responsibilities for control of Buffel Grass
- Refer to CAP priority listing for funding proposals to conduct on-ground works.

Southern Flinders Upper North
Buffel grass Densities 2019



Khaki weed

(Alternanthera pungens)		
Common name(s):	Khaki weed	
Plant description:	Khaki weed is a prostrate summer-growing perennial with spiny burrs.	
Weed Risk Assessment Rating:	Urban	Eradicate/alert

Threats and Impacts

Invasiveness	Khaki weed has high seed production. Seed is carried in prickly burrs are easily moved and transported. This weed colonises bare or disturbed areas and occasionally establishes in unsown dryland pastures. Infestations also increase in size through the long prostrate stems rooting at the nodes.
Impacts	The major problems currently caused by khaki weed are due to its spiny burrs. It establishes in parks, lawns and ovals especially if these are watered in summer, reducing their amenity value. The burrs cause mechanical damage to the feet and mouths of stock; they are recorded as vegetable fault in wool and have been associated with dermatitis in humans. However, the land use at greatest risk is irrigated pasture.
Persistence	Khaki weed is a difficult plant to control as it is deep-rooted, the tap root also allowing it to survive periods of drought. It also forms a soil seedbank under infestations, with seed surviving for more than 5 years.

Current Distribution

State and N&Y NRM region	Increasing number of infestation in the Lower Mid-North and Southern Flinders Upper North Districts associated with vehicle and people movements.
SFUN District	Localised along roadsides and rest areas, and disturbed areas such as pipelines
Potential distribution	Khaki weed is native to tropical and subtropical regions of Central and South America. In Australia it is recorded as a weed in similar climates and mainly on light soils in areas. Although growth is proportional to summer rainfall, experience shows khaki weed can establish anywhere across the agricultural zone of SA and in the Adelaide area.

Policy

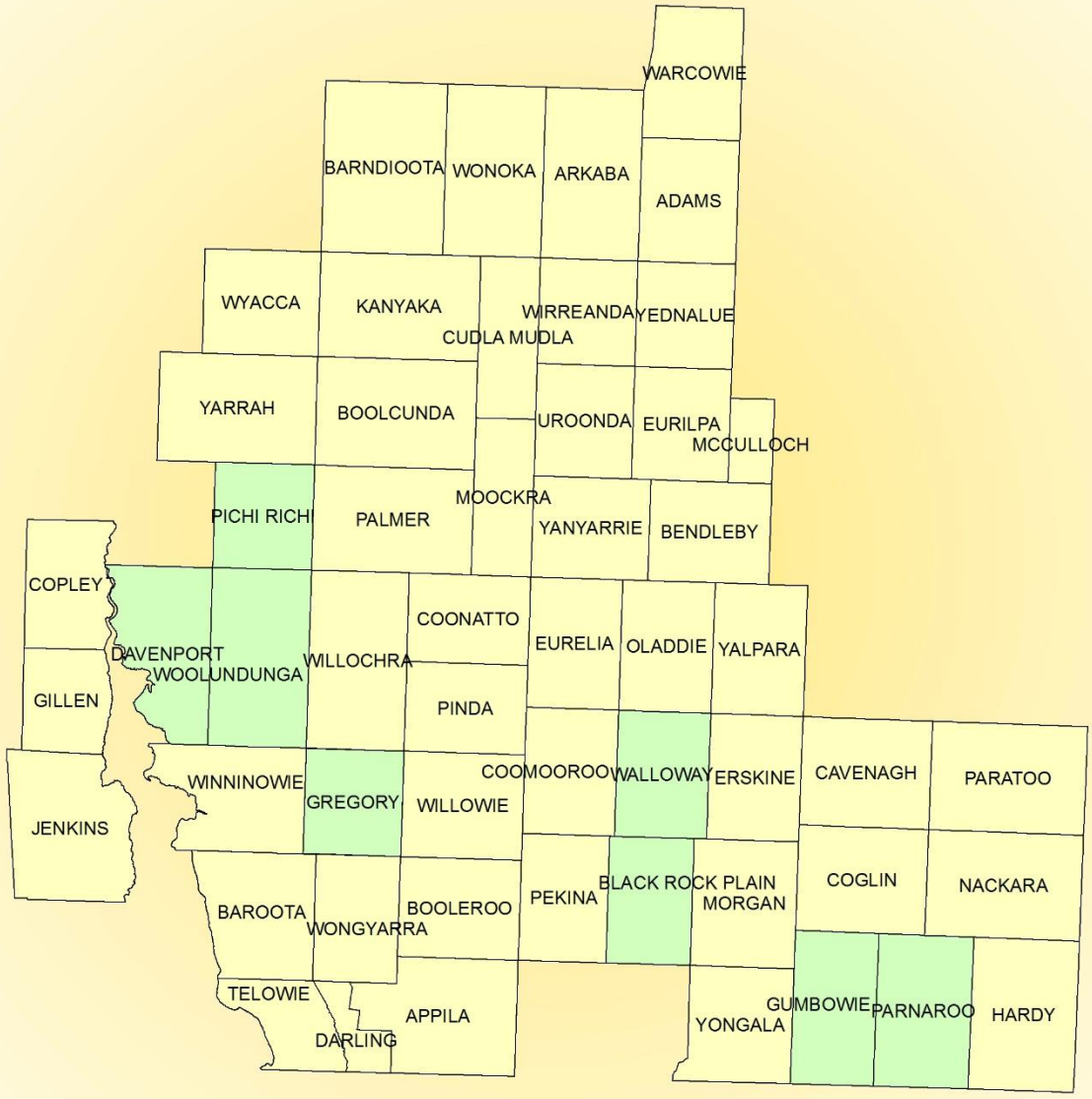
N&Y NRM Policy:	Declarations under the NRM Act: 175(1), 175(2), 177(1), 177(2), 180, 182(1), 185

SFUN District Action Plan

Justification for Action:
The SFUN has low known infestations of Khaki weed, in locations that can be specifically targeted for control. Given the infestations have been identified in high traffic areas e.g. roadside rest areas it is critical that Khaki weed be eradicated to prevent further infestations. As most infestations are linked to public amenities, road maintenance activities and traveller rest areas will be the focus of inspections and education will centre upon these linkages.

- Promote awareness of alert weeds including khaki weed.
    - Minimum of one media release per year.
    - Ensure that council staff are familiar with the plant.
- Landowners to report infestations.
    - District staff to record data and notify NRM Biosecurity of new infestations.
- Regularly inspect and promote weed hygiene in public areas of infestations throughout the year:
    - Caravan parks, camping grounds and parking bays
    - Parks and gardens
    - Ovals and School Ovals
    - Roadhouses
- Landholders to destroy infestations growing on land they occupy.
- Staff to ensure all infestations on public or private land are destroyed.
    - Known infestation sites to be monitored.
    - Urban properties to be surveyed that are in proximity to recorded infestation.
- Infestations on road reserves to be destroyed:
    - Road reserves to be inspected for new infestations.
    - Known sites to be inspected and treated as required.
- Infestations size and densities to be mapped.

Southern Flinders Upper North
Khaki weed Densities 2019



Legend

- Not Recorded
- Low
- Medium
- High

N

0 5 10 20 30 40 Kilometers

Wheel Cactus

(Opuntia robusta)

Common Name(s):	Wheel cactus	
Plant description:	Succulent, shrubby perennials. Stems flattened pad-shaped segments, leafless with large surface spines. Produce large flowers of carious colours, with large fleshy fruits.	
Weed Risk Assessment Rating:	Non-arable grazing/cropping	Manage weed
	Native veg	Manage weed
	Urban	Manage weed

Threats and Impacts

Invasiveness	Wheel Cactus is commonly cultivated as a garden plant and where established as a weed have originated from abandoned local gardens. In some localities wheel cactus has spread from the original plantings to become a nuisance over large areas. The fruit of wheel cactus is eaten by birds, which effectively disperse the seed of some species over wider areas. Infestations can also start when pads are dumped with garden waste. Foxes and other animals can also disperse seed.
Impacts	Wheel cactus is a weed of bushland and rough pastoral land rather than of arable land. They are covered in spines that hinder human and animal movement through infested areas. Larger stands impede the growth and regeneration of native plants.
Persistence	Wheel cactus grows well in both exposed and semi shaded positions, in semi-arid, warm temperate to subtropical and tropical regions. It has potential to grow in almost all areas of the NY region.

Current Distribution

State and N&Y NRM region	Present in large areas of the state, especially western Eyre Peninsula, SYP and the Upper North.
SFUN District	Major infestations occur in the pastoral lands near Peterborough and Port Augusta, with isolated plants found across the district.
Potential distribution	Wheel cactus grows well in both exposed and semi shaded positions, in semi-arid, warm temperate to subtropical and tropical regions. It has potential to grow in almost all areas of the NY region.

Policy

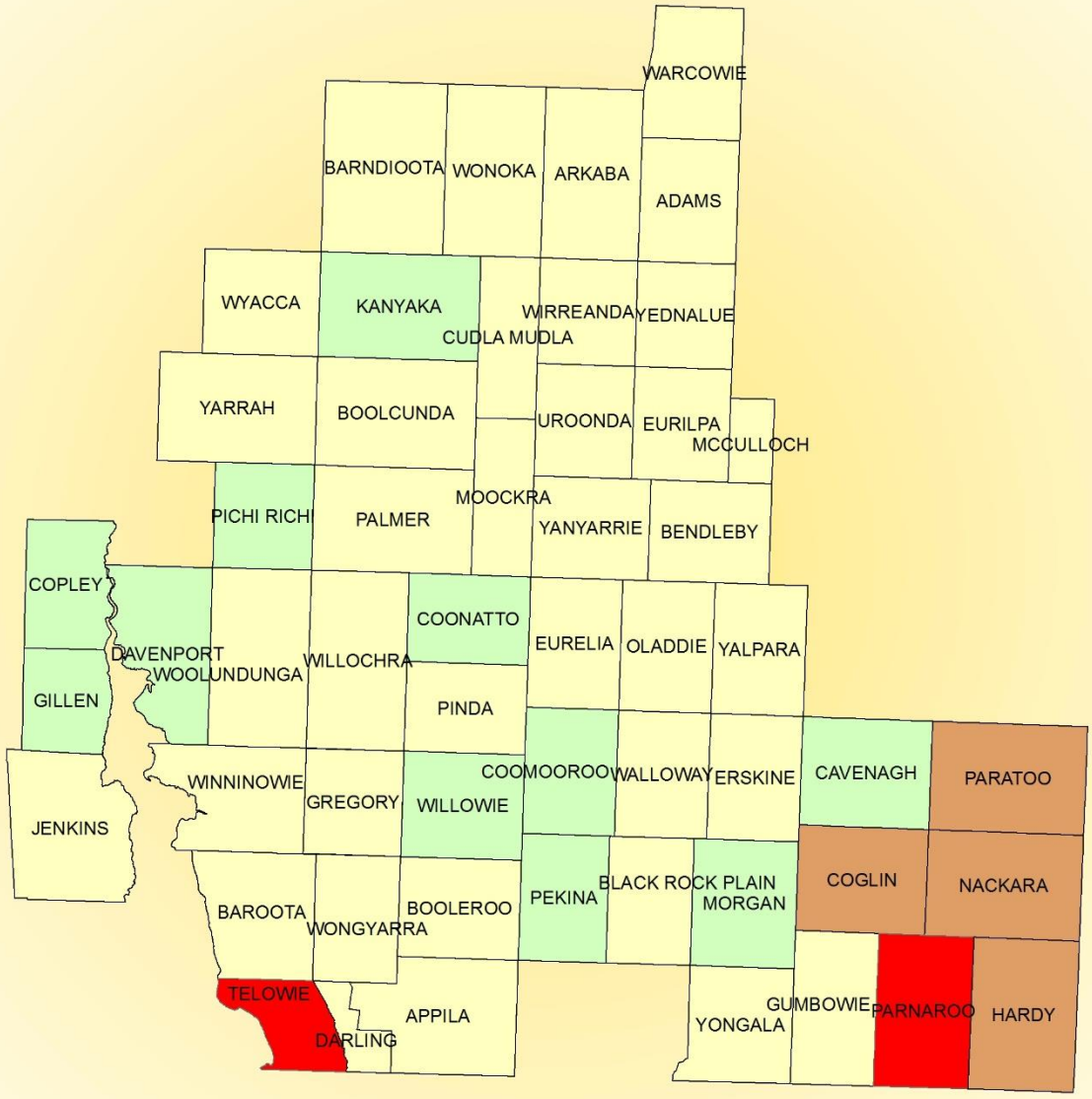
N&Y NRM Policy:	Declarations under the NRM Act: 175(2), 177(1), 177(2), 182(2), 185

SFUN District Action Plan

Justification for Action:
The SFUN District in line with N&Y Region Policy and management strategy is to Manage infestations of wheel cactus using integrated weed management (IWM) with the aim to maintain economic, environmental and/or social values of key sites/assets through improved management of Wheel Cactus.

- Educate landholders on their responsibilities for control of Wheel Cactus
- Encourage landholders to monitor responses to improved weed management.
- As per CAP priorities utilise economic control options

Southern Flinders Upper North Wheel cactus Densities 2019



Rope Cactus

(Cylindropuntia imbricate)

Common Name(s):	Rope cactus, Devil's Rope,	
Plant description:	Range from low growing shrubs to erect trees up to 8m tall, usually around 0.5m to 2m tall and are covered with spines. Some have small or large club-shaped segments, some have smaller cylindrical segments that look like ropes, all are covered with spines 1cm to 5cm long. Flower colour varies from red or pink to yellow.	
Weed Risk Assessment Rating:	Non-arable grazing/cropping	Eradicate
	Urban	Eradicate

Threats and Impacts

Invasiveness	Rope Cactus is commonly cultivated as a garden plant and where established as a weed have originated from abandoned local gardens. In some localities rope cactus has spread from the original plantings to become a nuisance over large areas. The fruit of rope cactus is eaten by birds, which effectively disperse the seed of some species over wider areas. Infestations can also start when pads are dumped with garden waste. Foxes and other animals can also disperse seed.
Impacts	Rope cactus is a weed of bushland and rough pastoral land rather than of arable land. They are covered in spines that hinder human and animal movement through infested areas. Larger stands impede the growth and regeneration of native plants.
Persistence	Rope cactus grows well in both exposed and semi shaded positions, in semi-arid, warm temperate to subtropical and tropical regions. It has potential to grow in almost all areas of the NY region.

Current Distribution

State and N&Y NRM region	Present in large areas of the state, especially western Eyre Peninsula, SYP and the Upper North.
SFUN District	Few isolated plants on roadsides and in some grazing land.
Potential distribution	Rope cactus grows well in both exposed and semi shaded positions, in semi-arid, warm temperate to subtropical and tropical regions. It has potential to grow in almost all areas of the NY region.

Policy

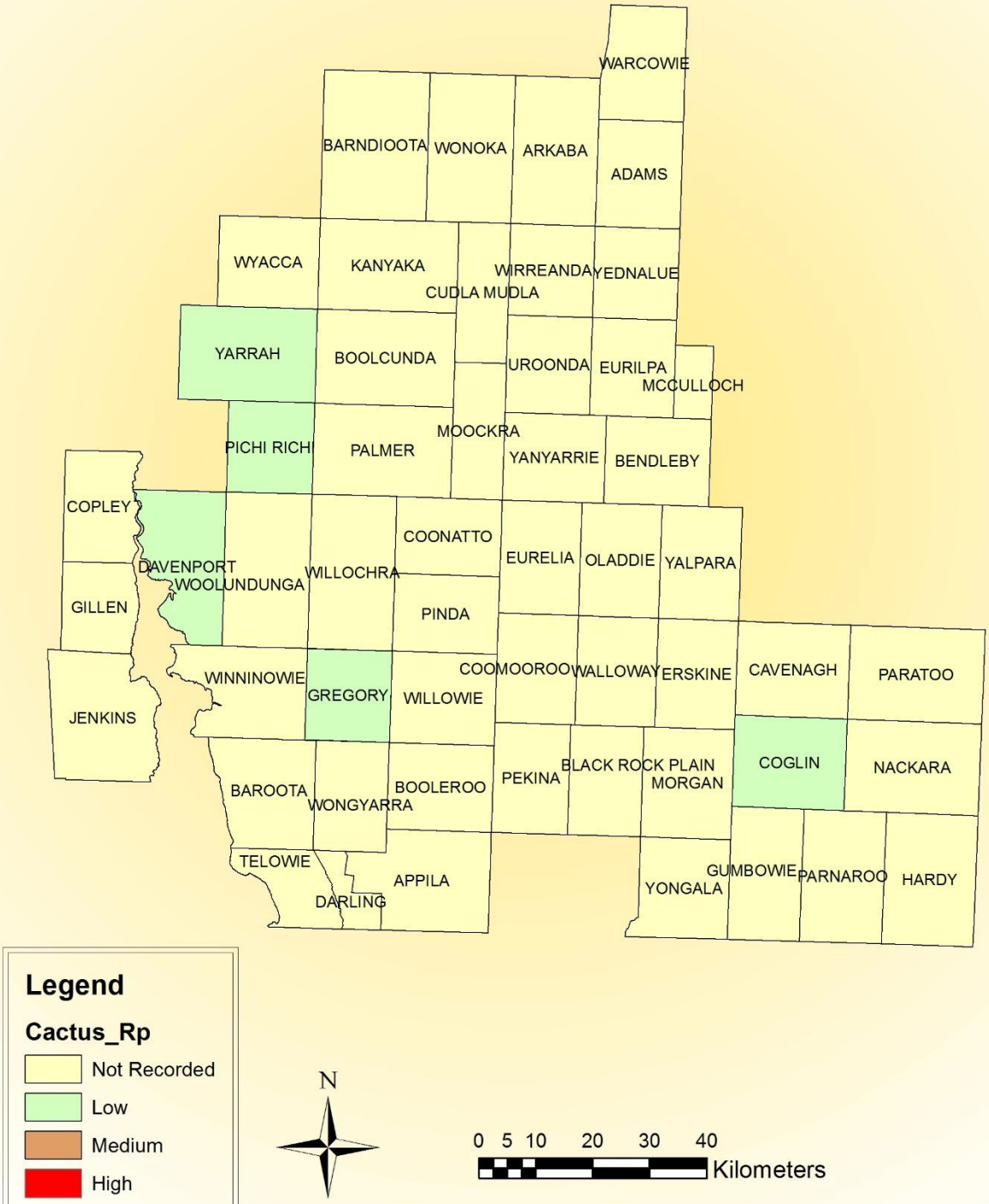
N&Y NRM Policy:	Declarations under the NRM Act: 175(2), 177(1), 177(2), 182(2), 185

SFUN District Action Plan

Justification for Action:
The SFUN District in line with N&Y Region Policy and management strategy is to Eradicate rope cactus while there are so few occurrences within the district with the aim to maintain economic, environmental and/or social values of key sites/assets through improved management of Rope Cactus.

- Educate landholders on their responsibilities for control of Rope Cactus
- As per CAP priorities utilise economic control options

Southern Flinders Upper North
Rope cactus Densities 2019



Silverleaf Nightshade

(Solanum elaeagnifolium)		
Common name(s):	Bull nettle, white horse nettle, tomato weed, bitter apple and satansbos	
Plant description:	Silverleaf nightshade is an erect summer perennial herb growing to a height of 80 cm. Stems of silverleaf nightshade are erect with many branches and densely covered with fine star-shaped (stellate) hairs which give them a silver-white appearance. They also usually have numerous slender, yellow to red prickles 2-4 mm long. Leaves are silvery white due to a dense covering of stellate hairs and denser on the under surface. Alternate, lanceolate to oblong, growing to 15 cm long (usually about 6-10 cm) and 1-2 cm wide. Stalked, often with prickles on the underside of veins with undulating margins and often scalloped. Silverleaf nightshade flowers November through to February and are purple to violet or occasionally white and grow to 3.5 cm in diameter. They consist of five fused petals with five yellow, long and tapering anthers. The fruit of silverleaf nightshade is a smooth globular berry.	
Weed Risk Assessment Rating:	Non-arable Grazing/cropping	Manage weed
	Native veg	Alert/report
	Urban	Manage weed

Threats and Impacts

Invasiveness	Silverleaf nightshade will easily establish among existing plants under suitable conditions, which usually occur in years with an unusually high summer rainfall. Its initially small seedlings are vulnerable to drought until they get roots down to the subsoil. Seed is most commonly spread by the movement of livestock but can also be dispersed by wind, water, agricultural machinery and tools, as well as in feed, some grains and vehicles. Wind can also blow mature plants with attached berries along the ground. Within a paddock, root fragments can be spread by cultivation and form new infestations.
Impacts	Silverleaf nightshade impacts significantly on cropping and pastures, by reducing yield and carrying capacity, and sometimes land values. It competes directly with summer crops and indirectly with winter crops by reducing available moisture and nutrients. Annual winter pastures are affected through delayed autumn emergence and lower productivity, resulting in reduced carrying capacity. On the Eyre Peninsula, yield losses range from 5-15% in heavy red clays to 30-50% in light sandy soils. When infestations are heavy in pastures, the closed canopy cover restricts available light for other vegetation, and restricts access of stock to the feed below. Infestations of silverleaf nightshade increase production costs through control requirements and reduce return and productivity of land. All parts of the plant, but particularly the berries, are potentially toxic to animals but poisoning rarely occurs in South Australia.
Persistence	Established plants are adapted to a wide range of habitats, are highly resistant to drought and tolerant of saline conditions but are sensitive to frost and water logging. Regeneration from dormant buds on established roots is the most important method of multiplication. Root fragments can regenerate even buried up to 20 cm deep and from pieces as small as 0.5 cm long when soil moisture conditions are suitable. Removing aerial parts of the plant encourages sprouting, and seedlings as young as 10 days old can regenerate. Seeds may last up to 10 years in the soil. High numbers of seedlings are only occasionally observed, as seeds have specific moisture and temperature requirements for germination that usually occur in late spring to early autumn. Seed germination is thought to be enhanced by passage through the gastrointestinal tract of animals. As germination is infrequent, extensive viable seed banks may quickly build up.

Current Distribution

State and N&Y NRM region	Silverleaf nightshade occurs in all regions of the State. It is most widespread in the agricultural areas of the Mid North (in excess of 100,000 ha),
SFUN District	Large infestations in Southern Flinders area compared to upper north
Potential distribution	Silverleaf nightshade has the potential to grow across most of the cropping and grazing land uses in the State, especially those areas with a cool, wet winter and hot dry summer. It thrives

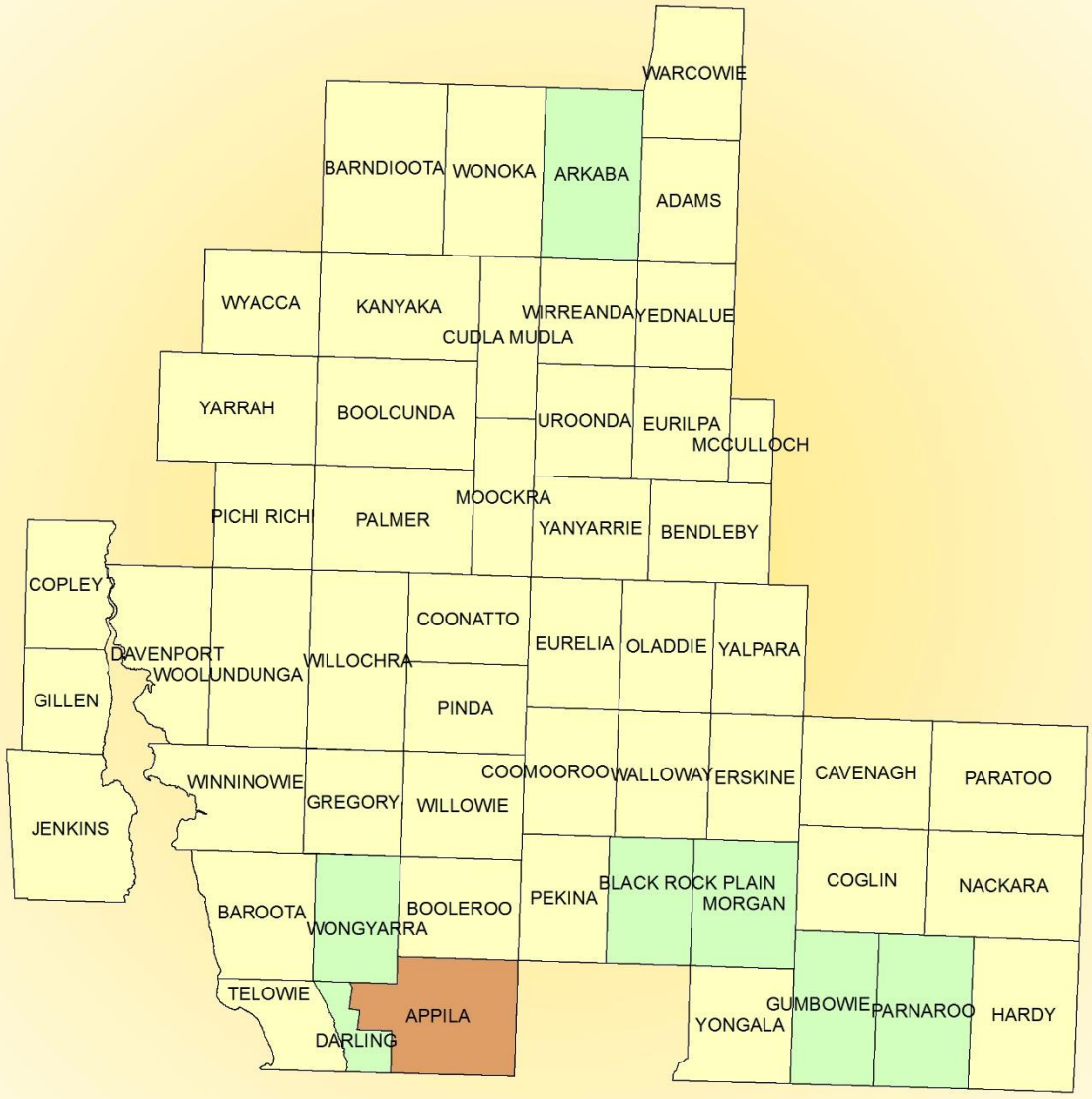
	on disturbed land and will inhabit warm temperate regions in areas with 250-600 mm annual rainfall.

Policy

N&Y NRM Policy:	Declarations under the NRM Act: 175(2), 177(1), 177(2), 182(2), 185

SFUN District Action Plan
Justification for Action: The SFUN District in line with N&Y Region Policy and management strategy is to Contain and control Priority sites infested with Silverleaf nightshade with the aim to maintain economic, environmental and/or social values of key sites/assets through improved management of Silverleaf nightshade. • Establish a containment line as area of control between heavily infested areas and non-infested areas – containment line • Monitor high value native veg for incursions • Educate landholders on their responsibilities for control of Silverleaf nightshade

Southern Flinders Upper North
Silverleaf nightshade Densities 2019



Legend

- Not Recorded
- Low
- Medium
- High

N

0 5 10 20 30 40 Kilometers

Bibliography and References

- African Boxthorn WoNS Best Practice Manual - http://weeds.ala.org.au/WoNS/africanboxthorn/docs/African_boxthorn-national_best_practice_manual.pdf

- Buffel Grass Strategic Plan - http://www.pir.sa.gov.au/__data/assets/pdf_file/0019/237340/SA_Buffel_Grass_Strategic_Plan.pdf
  Buffel Grass PIRSA Website - http://www.pir.sa.gov.au/biosecurity/weeds_and_pest_animals/weeds_in_sa/weed_id/plant_id_notes/buffel_grass

- Declared Plant Policy Salvation Jane - http://www.pir.sa.gov.au/biosecurity/weeds_and_pest_animals/weeds_in_sa/plant_policies/pest_weed_policies/declared_plants_2/salvation_Jane.pdf

- Eyre Peninsula NRM Weed Management Plans - http://www.naturalresources.sa.gov.au/eyrepeninsula/plants-and-animals/pest-plants-and-animals/pest-plants

- Horehound Best Practice Management Guide - https://dpipwe.tas.gov.au/Documents/Horehound_CRC_bpmg.pdf

- SAAL District Weed Plans and Strategies - http://www.naturalresources.sa.gov.au/aridlands/plants-and-animals/pest-plants-and-animals/pest-plants

- Silverleaf Nightshade WoNS Strategic Plan - http://weeds.ala.org.au/WoNS/silverleafnightshade/docs/SLN_Strategic_Plan_030613.pdf

- PIRSA Weed Wisk Management Guide (2008) - http://pir.sa.gov.au/data/assets/pdf_file/0016/254221/sa_weed_risk_management_guide.pdf

- Northern and Yorke NRM Board's Operational Process for Achieving Sustainable Natural Resource Management in the Region (Foundation – Information and Incentives – Voluntary Remediation – Compliance System); http://directorates.ishare.env.sa.gov.au/sites/ADM135/TRIM Records/NY-FNY2009-00021/NY IIC PMS.docx rec_43546.DOCX

- SFUN Project Concept Roadside Vegetation Management and Education Plan –

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