

1.0 Cover Page

NSW DEPARTMENT OF
PRIMARY INDUSTRIES

REGIONAL WEED MANAGEMENT PLAN

1.1 Plan Title: *Riverina Silverleaf Nightshade Management Plan* as revised in 2009

1.2 Plan Proponents / Applicant Contact Details

Regional Weeds Advisory Committee: Eastern & Western Riverina Noxious Weeds Advisory Groups

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Signature: Eastern Group Representative: Date:

Signature: Western Group Representative: Date:

1.3 Name of Plant(s)

WONS - No

Botanical name: *Solanum elaeagnifolium*

Common name: Silverleaf nightshade

1.4 Plan Period

Starting date: 01/07/09

Completion date: 30/06/2014

1.5 Area of Operation:

Region 5: extending from Tumut in the east to Wentworth/S.A border in the west and Carrathool in the north to the Murray River in the south. The Local Control Authorities and Livestock Health & Pest Authorities this region encompasses are all representatives of the Eastern and Western Riverina Noxious Weeds Advisory Groups (**ERNWAG & WRNWAG**). The Region extends across 4 Catchment Management Authority (CMA) areas, being Lachlan, Lower Murray Darling, Murray and the Murrumbidgee.

1.6 Aim:

To contain and control Silverleaf nightshade infestations preventing further spread across the Riverina.

1.7 Objectives:

- a. Minimise spread by controlling new infestations before seed set.
- b. Prevent further spread of all rare & isolated infestations.
- c. Contain and prevent the spread of marginal infestations.
- d. Contain core infestations and limit the spread into un-infested areas.
- e. All land managers given the opportunity to attain identification skills and an understanding of Integrated Weed Management principles and practices to minimise further infestations of Silverleaf nightshade across the Riverina.
- f. Increase support for research into biological control programs.

2.0 STAKEHOLDERS

2.1 Signatories

The following Local Control Authority (**LCA**) and Livestock Health & Pest Authority (**LHPA**) members of the Eastern & Western Riverina Noxious Weeds Advisory Groups (**E/WRNWAG**): Albury City, Balranald Shire, Bland Shire, Carrathool Shire, Central Murray County Council, Coolamon Shire, Cootamundra Shire, Corowa Shire, Greater Hume Shire, Griffith City, Gundagai Shire, Hay Shire, Jerilderie Shire, Junee Shire, Leeton Shire, Lockhart Shire, Murrumbidgee Shire, Narrandera Shire, Temora Shire, Tumbarumba Shire, Tumut Shire, Urana Shire, Wagga Wagga City, Wakool Shire, Wentworth Shire, Hume LHPA, Riverina LHPA and Western LHPA.

2.2 Other Stakeholders

The Noxious Weeds Advisory Committee (**NWAC**), NSW Department of Primary Industries (**NSW DPI**), Department of Lands (**DoL**), Lower Murray Darling, Lachlan, Murray and Murrumbidgee Catchment Management Authorities (**CMAs**), Australian Rail Track Corporation (**ARTC**), NSW National Parks & Wildlife Service (**DEC**), Forests NSW (**FNSW**), Roads & Traffic Authority (**RTA**), Ungarie Silver-Leaf Nightshade Group and other land managers.

3.0 BACKGROUND AND JUSTIFICATION

3.1 Plan Justification and Description of the Problem.

Silverleaf nightshade (*Solanum elaeagnifolium*) is a deep-rooted perennial weed from the tomato family. Being first introduced into New South Wales from North America in 1901, it wasn't considered important until 1960 when it's spread into agricultural areas caused concern. Silverleaf nightshade (SLN) is one of the most widespread and damaging weeds of the NSW wheat-belt, infesting in excess of 140,000ha of land.

Silverleaf nightshade is a weed of regional significance in the Riverina because it seriously reduces crop and pasture production. Its vast root system (up to 2m in depth – and reported up to as much as 5m) enables it to compete with summer crops and pastures, removing water and nutrients from a large volume of soil over summer leaving it depleted for following winter crops. It is also said to exude plant inhibitors, interfere with harvesting and may be toxic to stock. The occurrence of this weed on farming land will result in productivity losses through competition. Additionally, it is very difficult to kill - resulting in extensive control costs.

There is no doubt that a planned regional response is necessary to ensure all stakeholders remain proactive in reducing the spread of this persistent weed. Once established, Silverleaf nightshade is extremely difficult to manage.

Within the Riverina there are significant dense infestations both on roadside and private property. At present these core infestations are mostly restricted to the Leeton and Griffith Local Government Areas LGAs. Within these LGAs, managing current infestations are beyond the resources of many. Therefore land managers efforts are directed to preventing further spread in to clean areas.

The Ungarie Silverleaf nightshade group was formed in 1996, comprising local farmers, the District Agronomist and the Bland Shire Noxious Weeds Officer. The main issues they have attempted to address are inadequate control methods, lack of research funding and awareness. Locally they have

held field days; are carrying out trial work; formed a technical contact network; lobbied for funding; and initiated an awareness campaign.

3.2 The “Do Nothing” Option

Without this plan and a consistent and coordinated approach, Silverleaf nightshade has the potential to spread into all Riverina Shires and cause considerable impact to biodiversity and agricultural production – decreasing land values. Should continuing action by land managers be withdrawn, SLN will spread potentially creating larger more damaging dense infestations throughout the Riverina. With this in mind concern exists amongst primary producers, who, in many instances are aware of the problems it can cause and wish to minimise its effects on horticultural, viticultural, grazing and cropping activities before it has the chance to spread further, possibly alienating large tracts of land.

3.3 Distribution of Infestations

Refer to Appendix 1. for distribution of Silverleaf nightshade in the Riverina.

3.4 Weed Biology

Silverleaf nightshade is an erect, herbaceous / shrub-like, multi-stemmed, summer growing, perennial to 1m tall with an extensive underground root system. Its seeds germinate in autumn with much root growth in the first few months. New shoots emerge from lateral roots each spring.

It tends to most often occur in regions with an annual average rainfall between 250 to 600 mm, which are considered as being warm temperate zones. It appears to grow on most soil types and may prefer lighter soils. It may be found colonising roadsides, stockyards, channel banks, orchards, cropping or grazing land, vineyards and stockyards.

3.5 Method and Rate of Spread

Spread is via root segments and seed. Cultivation is a major cause of spread. New shoots can develop from root pieces as small as 1cm in length. Contaminated machinery, water, birds and livestock are reported as being vectors for the dispersal of seed. Seeds have been reported as remaining viable following digestion by stock, and can take many days to pass through the animal, thus stock movement following ingestion may be another vector for the spread of seed.

3.6 Species Management

For specific details on control techniques refer to Primefact 237 Silverleaf nightshade, June 2007 (NSW DPI).

- Silverleaf nightshade is very difficult to kill, so it is important to keep it out of clean areas by treating isolated plants and small patches as soon as they appear.
- Keep stock off fruiting plants as this can lead to increased seed dispersal.
- Stock leaving infested properties should be quarantined to empty out.
- Vehicles and machinery should be thoroughly cleaned upon leaving infested paddocks.
- Spray during early flowering and before berry-set
- Use herbicides and competitive pastures for better control.

3.7 Key Land Managers

All land managers listed below are critical in the success or failure of this plan. If Silverleaf nightshade were to be left untouched due to the lack of awareness of its potential distribution, the Riverina could end up with severe infestations that could cost the community enormously.

Roads and Traffic Authority, Forests NSW, Department of lands, Australian Rail Track Corporation, Livestock Health & Pest Authority, Local Control Authorities and Landholders/managers.

4.0 LEGISLATIVE AND REGULATORY SITUATION

4.1 Current Declaration

Silverleaf Nightshade is currently declared as a Class 4 weed in the following Local Government Areas: Albury, Bland, Carrathool, Central Murray County, Coolamon, Cootamundra, Corowa, Greater Hume, Griffith, Hay, Jerilderie, Junee, Leeton, Lockhart, Murrumbidgee, Narrandera, Temora, Tumut, Urana, Wagga Wagga and Wakool

Class 4 – **Locally Controlled Weeds** – the growth and the spread of the plant must be controlled according to the measures specified in the management plan published by the local control authority.

See Appendix 2 for individual LCA control measures.

4.2 Declaration Changes

None required at this stage

5.0 CONSIDERATIONS AND OPPORTUNITIES

5.1 Financial Support to carry out the plan

The main opportunity to be exploited under this plan is the adoption of a coordinated approach to the management of Silverleaf nightshade utilising the expertise and knowledge of stakeholders. As the plan progresses, opportunities may arise to obtain funding for preservation / enhancement works on remnants or vegetation restoration works, on private lands, through cooperation with Catchment Management Authorities (CMAs). Extension activities will require cooperation between plan stakeholders.

Eastern and Western Riverina Noxious Weeds Advisory Groups have been supporting NSW DPI's SLN trials being undertaken at the EH Graham Centre for Agricultural Innovation. The positive outcomes coming out of these trials are giving hope to all land managers tackling the SLN (nightmare) on their properties. It is just hoped that the trials, that may lead to a means of eradicating SLN, continue to be funded.

Extension and education activities are key components of weed management plans and as such they should ensure client ownership of the problem and participation in the development and implementation of solutions. If people are unable to identify Silverleaf nightshade, are unaware of the potential problems it can cause, and lack an understanding of management options, then they are unlikely to act. Extension activities will address these issues and be delivered through field days,

workshops, media releases, personal contact during inspections and through the provision of printed material to the general public. The Ungarie SLN group has organised a number of forums in their area and will continue to do so to update everyone on new developments from the national committee.

5.2 Links to other Strategies

~ **Australian Weed Strategy.** Addressing:

- Goal 1: Prevent new weed problems
 - 1.3: Reduce the spread of new weeds to new areas within Australia.
- Goal 2: Reduce the impact of existing priority weed problems

~ **NSW Invasive Species Plan** (and NSW Incursion Plan for Invasive Plant Species). Addressing:

- Goals 2 (eradicate or contain) & 3 (effectively manage).

~ **Regional Weed Strategy - Lower Murray Darling Catchment.** SLN is recognised as a 'Priority Category B' weed in this catchment: meaning the weed is present with limited distribution, several small infestations in the Catchment.

~ **Regional Weed Strategy – Murray Catchment.** SLN is recognised as a 'Category B or C' weed in the subregions of this catchment: meaning the weed ranges from 'present with limited distribution, several small infestations in the subregion' through to being 'present with moderate distribution in the subregion, numerous to large partially dispersed infestations'.

~ **Regional Weed Strategy – Murrumbidgee Catchment.** SLN is recognised as a 'Priority Category B or C' weed in this catchment. Meaning the weed ranges from 'present with limited distribution, several small infestations in the sub regions' through to being 'present with moderate distribution in the subregions, numerous to large partially dispersed infestations'.

The above mentioned Strategies can be downloaded from our website: www.riverinaweeds.org.au.

~ **Regional Weed Strategy – Lachlan Catchment (Draft).**

~ **Murray, Murrumbidgee, Lower Murray Darling Catchment Action Plans.**

5.3 Barriers and Contingencies

The following barriers will delay or obstruct the operation of this Silverleaf nightshade regional plan.

- Lack of recognition that contaminated livestock and machinery may act as vectors in spread
- Ignorance of the potential of SLN
- Some landholders may still not recognise SLN – confusion with Quena
- Ignorance of control options
- Lack of effective control (herbicide) options
- Spread by earthmoving machinery etc. Local and government associated road works in proximity to existing infestations (slashing, grading or realignment works). Machinery hygiene.
- Lack of knowledge of SLN biology – Roadside grazing when plant is flowering and setting seed.

The following contingencies may delay or obstruct the operation of this SLN regional plan.

- Drought conditions
- Flood conditions
- Landowner inability to finance control options

6.0 PERFORMANCE INDICATORS AND ACTIONS

Objective a: Limit spread by controlling new infestations before seed set.		
ACTIONS	PERFORMANCE INDICATORS	RESPONSIBILITY
1 Inspect for Silverleaf nightshade as part of routine property inspection program.	Property inspection program implemented.	LCAs
2 Control new infestations prior to seed set and before the root systems fully develop.	Infestations controlled before onset of berries.	LCAs, LHPAs, landholders
3 New infestations located and mapped.	Map developed and regularly updated	LCAs and LHPAs
4 Recommend new isolated infestations marked (star picket) / mapped so they can be easily located and avoided.	Sites staked / mapped and monitored for reinfestation.	Landholders, LHPAs, LCAs
5 Field staff and landholders encouraged to report new infestations.	Map updated as infestations are located.	Landholders, LHPAs, LCAs
Objective b: Prevent further spread of all rare and isolated infestations.		
ACTIONS	PERFORMANCE INDICATORS	RESPONSIBILITY
1 All infested properties / roadsides are to be inspected annually.	100% of infested properties / roadsides inspected.	LCAs
2 Develop control measures (plan) based on IWM principles for infested properties.	All affected properties over 2ha have plans in place by the end of the plan period.	LCAs with Land managers
3 Treat existing infestations on LCA/LHPA land annually in early flower before the onset of berries.	Infestations treated and are reducing	LCAs, LHPAs
Objective c: Contain and prevent the spread of marginal infestations.		
ACTIONS	PERFORMANCE INDICATORS	RESPONSIBILITY
1 All infested areas are to be inspected annually.	100% of infested areas inspected.	LCAs
2 Develop control measures (plan) based on IWM principles for infested properties	All affected properties over 2ha have plans in place by the end of the plan period.	LCAs with Land managers
3 Treat existing infestations on LCA/LHPA land annually in early flower before the onset of berries.	Infestations treated and are reducing.	LCAs, LHPAs
Objective d: Contain core infestations and limit the spread into un-infested areas.		
ACTIONS	PERFORMANCE INDICATORS	RESPONSIBILITY
1 All infested areas are to be inspected annually.	100% of infested areas inspected.	LCAs
2 LCAs in conjunction with land managers develop control measures (plan).	Control measures developed and all land managers with core infestations have a property plan.	LCAs, Land managers.

3	Treat core infestations annually in early flower before the onset of berries.	Infestations contained – prevented from seeding.	LCAs, Land managers.
Objective e: All land managers in affected areas given the chance to gain identification and appropriate management / control skills so as to effect desired reductions in Silverleaf nightshade infestations by the end of the plan period.			
	ACTIONS	PERFORMANCE INDICATORS	RESPONSIBILITY
1	Run extension program targeted at relevant land managers, industries and the general public; based on outlining the problems this weed can cause; its recognition and; identified IWM options.	<ul style="list-style-type: none"> - 2 specific workshops / field days run within the region over the plan period. - 3 regional field days / year - Four media releases run over the plan period. - Personal contact made with each Land manager during inspections where possible. 	LCAs, LHPAs, ERNWAG & WRNWAG
Objective f: Increase support for research into biological control programs (If and when a bio-control agent becomes available).			
	ACTIONS	PERFORMANCE INDICATORS	RESPONSIBILITY
1	Establish bio-control sites in core areas.	Bio-control released in core areas as it is developed.	LCAs, LHPAs, ERNWAG & WRNWAG
2	Maintain a working relationship with the National SLN management committee to monitor development of bio –agents.	Participation and support at field days.	ERNWAG & WRNWAG, Ungarie SLN Group.

7.0 MONITOR AND REVIEW PROCESS

Plan participants meet each autumn (eg mid March) to review previous years activities, check are on track to meet this plans overall aim / objectives / performance indicators. All stakeholders' local plans / worksheets to be presented at this meeting to ensure they are achieving performance indicators outlined in these plans. Should they not be met, without an appropriate explanation, group pressure may be applied to encourage them to be met in future years. Go over planned activities for upcoming season, arrange resource sharing and familiarise each other as to what activities are to be conducted (especially adjoining LCAs). Where appropriate renew plan commitment and discuss Regional Group Project Funding Application for this weed so that it can be developed in time for the May 1st deadline.

8.0 BENEFITS

This plan aims to protect and thus benefit the following regional endeavours / assets:

- ◆ Primary industries such as agriculture (e.g. grazing winter and summer cropping), horticulture and viticulture. As Silverleaf nightshade infestations reduce in size through the use of appropriate IWM practices, agricultural, horticultural and viticulture land should become more productive as a result of reduced weed competition. Additionally, potential stock health issues associated with this weed should decline resulting in enhanced animal production. Minimising the spread of Silverleaf nightshade should also protect these industries in other parts of the region, state and country, currently unaffected by infestations, from the negative effects of this weed.
- ◆ The general environment and recreational areas where infestations may reduce biodiversity, inhibit regeneration of native vegetation and result in increased maintenance costs for roadsides, parks and gardens. Additionally, infestation in these areas could influence tourism, e.g. visitors may prefer to experience a more pristine environment free of weeds.
- ◆ The local economy through flow on effects of reduced control costs and enhanced productivity of industries previously affected by Silverleaf nightshade.

It also aims to improve networks between stakeholders within the Riverina. Benefits will accrue as a result of this plan bringing together people with a common interest in the management of Silverleaf nightshade.

Cost savings through preventing this weed from spreading further, although difficult to quantify, will be significant.

9.0 RESOURCES

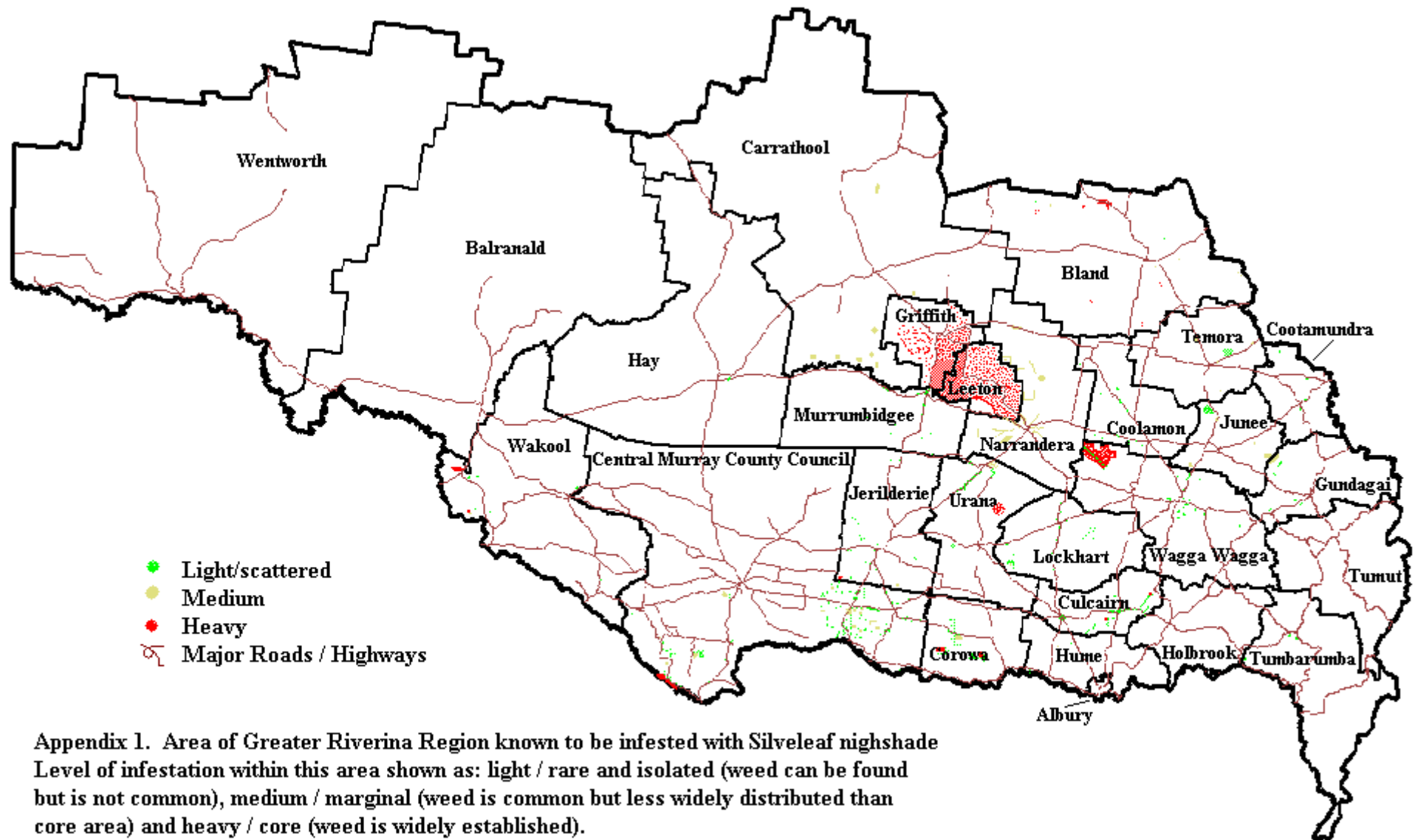
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DISCLAIMER

Any recommendations / comments contained in this document or referred literature do not necessarily represent the plan proponents, participants / stakeholders, authors, coordinators or NSW DPI policies or specific views. No person or organisation should act on the basis of the contents of this document or referred literature, whether as to matters of fact or opinion or other content, without first obtaining specific, independent professional advice which confirms the information contained in this document or referred literature.



Appendix 1. Area of Greater Riverina Region known to be infested with Silveleaf nightshade
 Level of infestation within this area shown as: light / rare and isolated (weed can be found but is not common), medium / marginal (weed is common but less widely distributed than core area) and heavy / core (weed is widely established).

Note: Base map derived from data provided by and copyright of Land and Property Information New South Wales. Road data is copyright of the Australian Land Information Group (AUSLIG). This general image determined by the regions, LCA Weeds Officers (WO) and RLPB Rangers (R). Generally, weed distribution remains similar on LCA and RLPB managed lands.

Declaration/classification of Silverleaf Nightshade in the Riverina. As of 1/3/06 (Order 19)

The following LCAs have Silverleaf nightshade declared as a Class 4 - see below for the individual LCA control measures as per their Class 4 mgt plans:

LCA	Weed	Control measures	Distribution
Albury	<i>Solanum elaeagnifolium</i>	Silverleaf nightshade must be prevented from setting seed. Acceptable control options include: <ul style="list-style-type: none"> ▪ Chemical control ▪ Council approved property weed management plan 	Isolated infestations.
Bland	<i>Solanum elaeagnifolium</i>	Unknown at time of collation	
Carrathool	<i>Solanum elaeagnifolium</i>	Reduce existing infestations and prevent spread. Acceptable control options include: <ul style="list-style-type: none"> ▪ Chemical control at flowering ▪ Quarantine infestations ▪ 3 metre buffer zone ▪ Council approved property management plan 	Scattered Individual infestations. Locations include roadsides, private and public property
CMCC	<i>Solanum elaeagnifolium</i>	<ul style="list-style-type: none"> ▪ Reduce infestations and prevent spread ▪ Cultivation not effective because of root system, encourage good pasture growth ▪ Timely chemical application ▪ Quarantine isolated infestations ▪ 3m buffer zone around existing infestations ▪ Approved Council management plan 	Restricted mainly to roadsides and isolated outbreaks with core infestations around the Perricoota Station area of the Murray Shire and properties in the Berrigan Shire
Coolamon	<i>Solanum elaeagnifolium</i>	Reduce existing infestations and prevent spread. Acceptable control options include: <ul style="list-style-type: none"> ▪ Chemical control at flowering/berry onset ▪ Quarantine infestations ▪ Establish 3mtr clean buffer around perimeter of established infestations. ▪ Council approved property weed management plan 	Isolated infestations, West and North West of Shire
Cootamundra	<i>Solanum elaeagnifolium</i>	Reduce existing infestations and prevent spread. Acceptable control options include: <ul style="list-style-type: none"> ▪ Chemical control at flowering ▪ Quarantine infestations ▪ 3 metre buffer zone around existing infestation 	Recommend Class 3
Corowa	<i>Solanum elaeagnifolium</i>	Council approved property weed management plan	Widespread throughout the Corowa Shire, specifically Mulwala Railway Line to Wongamong. Property Infestations
GHS	<i>Solanum elaeagnifolium</i>	Treat all Silverleaf Nightshade with a herbicide registered for control in the manner according to the label or any permit for that herbicide. Approved individual property management plan, subject to consultation between the owner/occupier and the LCA.	

Griffith	<i>Solanum elaeagnifolium</i>	Reduce existing infestations and prevent spread. Acceptable control options include: <ul style="list-style-type: none"> ▪ Chemical control prior to flowering/seed drop ▪ 3 metre buffer zone ▪ Council approved property weed management plan 	Widespread Scattered Individual infestation
Hay	<i>Solanum elaeagnifolium</i>	Reduce existing infestations and prevent spread. Acceptable control options include: <ul style="list-style-type: none"> ▪ Chemical control prior to flowering/seed drop ▪ Spraying of boundaries to prevent spread into neighbouring properties ▪ Quarantine Infestations ▪ Avoid knowingly spreading through the movement of machinery or the sale of fodder and grain. 	Widespread Scattered Individual infestation
Jerilderie	<i>Solanum elaeagnifolium</i>	The growth and spread of the plant must be controlled in accordance with the measures specified in the management plan published by the LCA and the plant must not be sold, propagated or knowingly distributed.	
Junee	<i>Solanum elaeagnifolium</i>	Reduce existing infestations and prevent spread. Acceptable control options include: <ul style="list-style-type: none"> ▪ Chemical control at flowering/berry onset ▪ Quarantine infestations ▪ Establish 3mtr clean buffer around perimeter of established infestations. ▪ Council approved property weed management plan 	Isolated infestations, Western side of Shire
Leeton	<i>Solanum elaeagnifolium</i>	Reduce existing infestations and prevent spread. Acceptable control options include, <ul style="list-style-type: none"> ▪ Chemical control during flowering (treat all infestations of this weed with a herbicide registered for its control in the manner according to the label). ▪ Leeton Shire Council approved Property Weed Management Plan. 	Most of Shire heavily infested. Common along roadside areas & channel reserves.
Lockhart	<i>Solanum elaeagnifolium</i>	Reduce existing infestations and prevent spread. Acceptable control options include: <ul style="list-style-type: none"> ▪ Chemical control at flowering ▪ Quarantine infestations ▪ Create a buffer zone around existing infestation ▪ Council approved property weed management plan 	Isolated infestations throughout the shire
Murrumbidgee Shire	<i>Solanum elaeagnifolium</i>	Reduce existing infestations and prevent spread. The plant may not be sold, propagated or knowingly distributed Acceptable control options include: <ul style="list-style-type: none"> ▪ Chemical control at flowering ▪ Quarantine infestations ▪ Council approved property weed management plan 	Infestations found growing around shire in small isolated patches.

Narrandera	<i>Solanum elaeagnifolium</i>	Reduce existing infestations and prevent spread. Acceptable control options include: <ul style="list-style-type: none"> ▪ Chemical control during flowering ▪ Implementation of 3 metre buffer zone around existing infestations ▪ Narrandera Shire Council approved Property Weed Management Plan 	Common along roadside areas. Individual infestations across the Shire. Scattered locations across the Shire.
Temora	<i>Solanum elaeagnifolium</i>	Reduce existing infestations and prevent spread. Acceptable control options include: <ul style="list-style-type: none"> ▪ Chemical control at flowering/berry onset ▪ Quarantine infestations ▪ Establish 3mtr clean buffer around perimeter of established infestations. ▪ Council approved property weed management plan 	Main area of infestation between Young Rd and Bundawarra Rd.
Tumut	<i>Solanum elaeagnifolium</i>	Unknown at time of collation	
Urana	<i>Solanum elaeagnifolium</i>	Treat all Silverleaf Nightshade with a herbicide registered for control in the manner according to the label or any permit for that herbicide. A Council approved property management plan may be developed providing more specific control measures.	
Wakool	<i>Solanum elaeagnifolium</i>	Reduce existing infestations and prevent spread. Acceptable control options include: <ul style="list-style-type: none"> ▪ Chemical control using approved Herbicide, following all instructions on label. ▪ Spraying of boundaries to prevent spread into neighbouring properties. ▪ Quarantine infestations ▪ Avoid knowingly spreading through the movement of machinery or the sale of fodder & grain 	
Wagga Wagga	<i>Solanum elaeagnifolium</i>	<ul style="list-style-type: none"> ▪ Reduce infestations and prevent spread ▪ Treat with a herbicide registered for control in the manner according to the label or any permit for that herbicide. ▪ A Council approved property management plan may be developed providing more specific control measures. 	