

1.0 Cover Page

NSW DEPARTMENT OF
PRIMARY INDUSTRIES

REGIONAL WEED MANAGEMENT PLAN

1.1 Plan Title:	<i>Riverina Sagittaria Management Plan</i>	as revised in 2009
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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

Scientific name: Sagittaria platyphylla / graminea Common name: Sagittaria

1.4 Plan Period

Starting date: 01/07/2009

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 (**E&WRNWAG**). The Region extends across 4 Catchment Management Authority (CMA) areas, being Lachlan, Lower Murray Darling, Murray and the Murrumbidgee.

1.6 Aim:

To reduce and prevent the spread of sagittaria throughout the Murrumbidgee, Coleambally and Murray Irrigation Areas (NSW), the Northern Irrigation Areas (Victoria) and Riverina Rivers and Wetlands.

1.7 Objectives:

- a. Prevent the sale of sagittaria.
- b. Determine the extent of infestations.
- c. Treat high priority sagittaria infestations, preventing infestation of clean areas.
- d. All land managers, including government agencies and the general public, given the opportunity to attain identification and management skills of sagittaria as well as an understanding of its potential economic and environmental impacts.

2.0 STAKEHOLDERS

2.1 Signatories

The following Local Control Authority (**LCA**) members of the Eastern and Western Riverina Noxious Weeds Advisory Groups (**E&WRNWAG**): Albury City, Balranald Shire, Carrathool Shire, Central Murray County, Corowa Shire, Greater Hume Shire, Griffith City, Hay Shire, Jerilderie Shire, Leeton Shire, Murrumbidgee Shire, Urana Shire, Wakool Shire and Wentworth Shire.

2.2 Other Stakeholders

LCA and LHPA members of the Eastern and Western Riverina Noxious Weeds Advisory Groups (**E&WRNWAG**). NSW Department of Primary Industries (**NSW DPI**), Department of Primary Industries Victoria (**DPI**), Murray Irrigation Limited (**MIL**), Goulburn-Murray Water (**G-MW**), Murrumbidgee Irrigation (**MI**), Forests NSW (**FNSW**), NSW Farmers (**NSWF**), Department of Lands (**DoL**), South Australia and other land managers.

3.0 BACKGROUND AND JUSTIFICATION

3.1 Plan Justification and Description of the Problem

Sagittaria (*Sagittaria platyphylla* / *graminea*) an aquatic plant, is becoming an increasingly serious problem in the Riverina. It was first discovered in the Riverina in 1990 having been established in Victoria since 1962. It spreads rapidly, blocking irrigation channels and greatly reducing the effectiveness of the water distribution systems. *Sagittaria* has very high environmental impacts with the potential to choke out watercourses and wetlands, adversely affecting biodiversity.

Sagittaria is currently found scattered along the Murray River from Lake Mulwala to the Torrumbarry weir. 250 wetting and drying wetlands in South Australia are currently at risk of severe infestation. It is also found scattered along irrigation channels within the Murray Irrigation District.

At present this weed is not readily known in New South Wales but it is having a huge agricultural and environmental impact in Victoria, where it is blocking up irrigation channels and slowly creeping along the Murray River. In the Murray Valley and Shepparton Irrigation Districts this weed is well established. Awareness of this weed is widespread due to the impact on the community; however in irrigation areas further northwest the profile needs to be raised. An objective of this plan is to work closely with weed and water management agencies from Victoria and South Australia to prevent further spread throughout the Murray Darling Basin.

Extension and education are key components of this plan. If people are unable to identify *sagittaria*, are unaware of its potential impacts and lack an understanding of management options, then they are unlikely to act. Extension activities will address these issues and information will be delivered through field days, workshops, media releases and personal contact during field inspections. An information leaflet will be developed for the Riverina and distributed to irrigators and water managers.

An identification field day will be held in the MIA to increase general awareness of *sagittaria* in those shires not directly bordering with Victoria.

A television advertising campaign “Weeds don't have borders” was aired in southern Riverina and northern Victoria. Any future campaigns will include footage of sagittaria to further increase awareness of this new aquatic weed.

3.2 The “Do Nothing” Option

Murrumbidgee Irrigation has located six isolated infestations since first identifying sagittaria in the Murrumbidgee Irrigation Area in 1990. If nothing is done with these isolated infestations, the irrigation supply system is in danger of choking up, limiting the ability to supply water to irrigators. The currently un-infested Murrumbidgee, Darling and Lachlan Rivers are also at high risk if these infestations are not contained. Once in these rivers sagittaria will spread rapidly throughout irrigation areas - being pumped out of the river and introduced into local farm channels. Another concern is that retailers are still bringing this serious aquatic weed (now noxious) across the border (VIC/NSW) and trying to sell it (illegally).

3.3 Distribution of Infestations

Sagittaria is currently found along the Murray River from Corowa through to Torrumbarry weir (600 sites have been recorded by GMW). The majority of infestations are being treated at least twice per year. Sagittaria is also spreading along the Mulwala canal and Murray Irrigation channel system and is present on several properties within Central Murray County Council.

Sagittaria was first noticed growing in a small drainage channel within the city limits of Griffith in the MIA twelve years ago. Some drainage channels are currently infested with up to a 10km gap between infested channels. The lengths of infestations continue to grow. The largest infestation is currently 1.5km in length, with others approximately 500m. In the last 12 months the majority of infested channels were handed back to Griffith City Council to manage.

The first infestation in the Murray Irrigation area was found twelve years ago. A detailed map of sagittaria infestations in South Eastern Australia is currently being collated by DPI Victoria.

3.4 Weed Biology

Sagittaria is an emergent, erect plant, growing up to one metre high when mature. Stems are triangular in cross-section. It grows in a number of forms:

- The most recognisable form has lance-shaped or arrow-shaped leaves which are a distinctive green colour.
- The next most prominent form has long, narrow, straplike leaves. These are often more yellow in colour and can grow adjacent to or separate from the lance-shaped plants.
- The least prominent form grows under water. Its leaves are also straplike but much shorter, and grow in a rosette arrangement, up to 50cm long and almost flat against the soil.

Flowers are white, 3cm in diameter and are always found below leaf height.

3.5 Method and Rate of Spread

Sagittaria spreads rapidly due to its many methods of reproduction. Spread can occur when rhizomes and tubers extend the area of existing colonies. It occasionally forms floating mats that break away from the parent body and move in stream flow to take root wherever they come to rest.

The plant also spreads efficiently by seed. Most seeds drop within the parent colony but many will float downstream for up to three weeks. If seed is eaten by ducks, it is believed to be viable when excreted. Each plant produces more than 10,000 seeds.

3.6 Species Management

Current methods of sagittaria control are not effective in the long-term. Chemicals registered for use in waterways for the control of sagittaria do not kill the rhizome of the plant, and tend only to kill top growth. These rhizomes, if not exhausted, are then able to re-shoot when conditions are favourable. Residual herbicides that may be able to control the rhizome of sagittaria are not currently registered for use in waterways or irrigation water.

CMCC currently has an APVMA permit (Permit 10712) for chemical application above current pesticide label rates. Directions for Use: Spot spraying of *Sagittaria* spp. growing on waters edge and in mud flats along streams and rivers in the Central Murray County Council area.

The mechanical control of the weed is restricted for several reasons. Such operations are labour-intensive, and therefore costly. Some mechanical control methods, such as the removal of infestations with an excavator can damage the structure of channels and drains and make them less efficient. These mechanical methods can also release fragments of the plant into the waterway, and these fragments may be able to move with the current and establish new infestations elsewhere.

To properly manage this weed, more information is required on the biology of the weed, along with information on the best practice in herbicide application in an effort to establish an integrated weed management approach.

3.7 Key Land Managers

All land managers listed below are critical to the success or failure of this plan, being active members of the Sagittaria Task Force. If sagittaria were to be left untouched due to a lack of awareness of its potential distribution, the Riverina will end up with severe infestations throughout waterways that would cost the community greatly.

Local Control Authorities, NSW Department of Primary Industries, DPI Victoria, Goulburn-Murray Water, Murrumbidgee Irrigation, Murray Irrigation Ltd, Forests NSW, NSW Farmers, Department of Lands, and Animal and Plant Control Commission South Australia.

4.0 LEGISLATIVE AND REGULATORY SITUATION

4.1 Current Declaration

A direct outcome of our first Sagittaria Regional Plan was its declaration across the Riverina region as a Class 4 noxious weed in the following Local Government Areas: Albury City, Balranald Shire, Carrathool Shire, Central Murray County, Corowa Shire, Greater Hume Shire, Griffith City, Hay Shire, Jerilderie Shire, Leeton Shire, Murrumbidgee Shire, Wakool Shire and Wentworth Shire.

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.

Sagittaria is also declared a class 5 noxious weed State-wide. Even with this coming in to force in 2006 – a Riverina nursery has still managed to bring plants over the NSW/VIC border and sell them in 2007/2008.

Class 5 - **Restricted Plants** – must not be sold, purchased or scattered.

It is not currently declared in Victoria, but discussions with the nursery industry are currently underway in an effort to restrict the plant from retail sale. A recommendation out of the tri-state Sagittaria Strategic plan – *That the tri-state Sagittaria Taskforce makes a submission to the Noxious Weeds Review recommending that Sagittaria graminea be classified as a Regionally Prohibited weed in all areas of Victoria.*

South Australia enforces control and eradication along with nil sales or transportation of the plant.

4.2 Declaration Changes

None required at this stage.

5.0 CONSIDERATIONS AND OPPORTUNITIES

5.1 Financial support to carry out the plan

Sagittaria only infests a small portion of the Riverina's catchments. There is a significant opportunity to prevent further spread as sagittaria has the potential to infest all waterways in the Riverina. At present this aquatic weed is not commonly recognised as a problem, still being sold as an aquarium plant. Its recent declaration along with an extensive awareness campaign will raise the profile of sagittaria and prevent further sales.

External funding opportunities exist through the Caring for our Country, Catchment Management Authorities and other fund sources that could significantly accelerate implementation of this plan.

A tri-state liaison committee was formed to look into weed and seed transfer across both the Victorian and South Australian borders. This will improve communication across the border increasing our resources and knowledge on best management practices. ERNWAG and WRNWAG members and the RNWPO will continue to be active participants on this committee as well as the Sagittaria Taskforce.

Sagittaria Taskforce: Feehan Consulting P/L has been contracted by Goulburn Murray Water and Goulburn Broken CMA to:

- Provide secretariat services
- Ensure appropriate coordination and liaison occurs
- Coordinate action on the Sagittaria Strategic Plan.

The latest update from GMW on the River Murray project – “All reaches within the base of the Hume weir downstream to Koondrook/Barham will be mapped and treated at least twice this control season (November 2008-May 2009). Seeking recurrent funding for these works from the Murray Darling Basin Authority is an on-going issue.”

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.** Sagittaria is recognised as a 'Priority Category A' weed in this catchment: meaning the weed is not currently present in the Catchment.

~ **Regional Weed Strategy – Murray Catchment.** Sagittaria is recognised as a 'Category A, B, C or D' weed in the subregions of this catchment: meaning the weed ranges from not currently present in the subregion through to being widespread throughout the subregion.

~ **Regional Weed Strategy – Murrumbidgee Catchment.** Sagittaria is recognised as a 'Priority Category B' weed in this catchment. Meaning the weed is present with limited distribution, several small infestations in the sub regions.

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.**

~ **North Central and Goulburn Broken Weed Action Plans.**

~ **Victorian Pest Management Framework**

~ **Tri-state Sagittaria Taskforce – Sagittaria Strategic Plan 2009.**

Key Outcomes from this Strategy:

1. By December 2008 there will be an agreed strategy between the relevant tri-state departments and water supply organisations and catchment Boards.
2. By December 2009 Sagittaria will be declared a Weed of National Significance.
3. By December 2009 there will be no net expansion of Sagittaria (measured in terms of total occurrences and total area).
4. By December 2009 Sagittaria graminea platyphylla will have similar status as a noxious weed in all states and territories.

5.3 Barriers and Contingencies

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

- Lack of awareness of environmental and agricultural impacts of sagittaria.
- Some landholders may still not recognise Sagittaria
- Lack of effective control (herbicide) options
- Legislation - Pollution prevention - it is an offence to allow herbicides to enter any waterway under the Clean Waters Act.
- Roles and Responsibility and land ownership along the Murray River.
- Lack of identification.
- Water levels can restrict treatment options.

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

- Drought conditions
- Flood conditions
- Landowner inability to finance control options
- Lack of landholder support

6.0 PERFORMANCE INDICATORS AND ACTIONS

Objective a: Prevent the sale of sagittaria.		
ACTIONS	PERFORMANCE INDICATORS	RESPONSIBILITY
1. Retail outlets inspected annually to ensure sagittaria isn't being sold, propagated or distributed.	Retail outlets free of sagittaria.	LCAs & DPI
Objective b: Determine the extent of infestations.		
ACTIONS	PERFORMANCE INDICATORS	RESPONSIBILITY
1. Map (GPS) high priority sagittaria infestations in the Murrumbidgee Irrigation Area (MI) and CMCC.	Map developed and updated as new infestations are found.	CMCC & MI
2. Map (GPS) new infestations in Wakool and Balranald Shires.	Map created and updated as new infestations are found.	Balranald & Wakool LCAs.
3. Update current maps, Victorian infestations already mapped (GPS).	Map updated as new infestations are found.	DPI & G-M Water
4. Encourage landholders to report or bring in unusual weeds.	Unusual plants identified when brought in.	LCAs, DPI & GMW
5. Undertake specific surveys for potential sagittaria sites - downstream from infested areas.	Sagittaria surveys completed annually.	LCAs and landholders
6. All field staff and landholders to report any new sightings of sagittaria.	New sightings being reported by landholders and field staff.	LCAs, DPI & GMW
Objective c: Treat high priority sagittaria infestations, preventing infestation of clean areas.		
ACTIONS	PERFORMANCE INDICATORS	RESPONSIBILITY
1. MIL to target lower parts of drains currently not infested.	Lower parts of drains free of sagittaria.	MIL
2. Murrumbidgee Irrigation to treat all infestations in areas under their control as required.	All infestations treated.	MI
3. Central Murray County Council to minimise seed spread of sagittaria between within Council area.	Seed spread minimised along the Murray River.	CMCC
4. CMCC to treat current infestations on council land.	All current infestations on LCA lands treated.	CMCC
5. Wakool shire to undertake specific surveys for potential sagittaria sites along the Murray River from the Shire boundary to the Wakool Junction. Treat any plants found.	Surveys completed annually. New infestations treated.	Wakool Shire
6. Victoria to treat all infestations in the Torrumbarry, Pyramid-Boort and Gunbower-lagoon systems.	All infestations treated.	DPI & GMW
7. Source funding through all avenues.	Co-operative treatment program	GMW, DPI, CMCC

Objective d: All land managers, including government agencies and the general public, given the opportunity to attain identification and management skills of sagittaria as well as an understanding of its potential economic and environmental impacts.

ACTIONS	PERFORMANCE INDICATORS	RESPONSIBILITY
1. Run extension program targeted at relevant land managers, industries and the public. The following actions will take place: <ul style="list-style-type: none"> • 4 field days run per year • Media releases produced as required. • Develop and distribute Sagittaria factsheet • Distribute information leaflets in high priority areas. 	1. Field days take place as required. Media releases distributed. High priority areas kept well informed of potential risks.	1. NSW DPI, LCAs, DPI, State Forests, MI, GMW, RNWPO and MIL
2. NSW active participant on cross border Sagittaria Taskforce	2. NSW representatives attend and participate on the Sagittaria taskforce attending meetings as required.	2. RNWPO, LCAs and NSW DPI

7.0 MONITOR AND REVIEW PROCESS

Members of the sagittaria taskforce will review the progress of the five year plan during the quarterly meetings. The previous year's activities and achievements will be reviewed in relation to the overall aims and objectives of the plan. All stakeholders' worksheets to be presented and measured against performance indicators outlined in these plans. Activities for the upcoming season will be planned, resource sharing will be arranged and all participants will familiarise themselves with the activities to be conducted (especially adjoining LCAs). Plan commitment will be renewed where appropriate.

8.0 BENEFITS

This plan aims to reduce existing infestations and prevent further spread of sagittaria by working in conjunction with all stakeholders.

By implementing the plan, the following stakeholders will derive significant benefits:

- Primary industries such as agriculture/horticulture. Major beneficiaries through the maintenance or restoration of water distribution efficiency.
- Local economies. Through flow on effects of reduced control costs & enhanced productivity of industries previously affected by sagittaria.
- The environment. Through enhanced biodiversity in wetlands and major water courses across the Riverina. Also through increased recreational amenity and aesthetic values.

The plan aims to improve networks between stakeholders across state borders. Benefits will accrue as a result of this plan bringing together people with a common interest in management of sagittaria. Cost savings through prevention of new sagittaria infestations, although difficult to quantify, will be significant.

9.0 RESOURCES

- Australian Weeds Strategy – A national strategy for weed management in Australia. Natural Resource Management Ministerial Council (2006), Australian Government Department of the Environment and Water Resources, Canberra ACT.
- New South Wales *Invasive Species Plan 2008-2015* (2008), NSW DPI, Orange.
- Verbeek & Ash (2006). *Regional Weed Strategy Lower Murray Darling Catchment 2nd Edition*. Thomson's Graphipress, Albury.
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- Anon (1999). *Noxious Weeds Act 1993*. Order No 14, August 1999.
- The Western and Eastern Riverina Noxious Weeds Advisory Groups, *Noxious Weeds Guide Brochures* (1999).
- Ensbey, R. & Johnson A. (2007) *Noxious and Environmental Weed Control Handbook - A guide to weed control in non-crop, aquatic and bushland situations*. 3rd ed, Agdex 647, NSW DPI. Original by Hugh Milvain (1999).

- Sainty, G.R. & Jacobs S. (1994). Waterplants in Australia - A Field guide. South China Printing Co. (1988) Ltd.
- Goulburn-Murray Water (2001). Arrowhead - Weed info sheet.
- Tri-state Sagittaria Taskforce (2009) – Sagittaria Strategic Plan 2009.
- Murrumbidgee Irrigation (2002). The facts - Sagittaria graminea.
- ERNWAG & WRNWAG (2008). Sagittaria platyphylla – The facts.
- ERNWAG & WRNWAG (2007), Weeds of the Riverina – a guide to identification and control. Excel Printing, Pambula.

ACKNOWLEDGEMENTS

The authors wish to thank the stakeholders who assisted in the production of this document. Their contributions have enriched this regional weed management plan.

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 2.

Declaration/classification of Sagittaria in NSW & the Riverina. As of 1/3/06 (Order 19)*Sagittaria platyphylla* (previously known as *Sagittaria graminea*)

All of NSW	Class 5	Restricted Plants: must not be sold, purchased or scattered.
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The following LCAs have sagittaria 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 City	<i>Sagittaria platyphylla</i>	Sagittaria must be prevented from setting seed. Acceptable control options include: <ul style="list-style-type: none"> • Chemical control • Mechanical control • Council approved property weed management plan 	No known infestations.
Balranald	<i>Sagittaria</i>	unknown at time of collation	No known infestations.
CMCC	<i>Sagittaria graminea</i>	Reduce existing infestations and prevent spread Acceptable control options include: Chemical control Mechanical control where possible	Prevalent in irrigation systems and large areas of the Murray and Edward river systems and tributaries
Carrathool	<i>Sagittaria graminea</i>	Reduce existing infestations and prevent spread. Acceptable control options include: Chemical control Mechanical removal Council approved property management plan	Single known infestation in the Wah Wah Irrigation Area.
Corowa	<i>Sagittaria platyphylla</i>	Sagittaria must be prevented from setting seed: Acceptable control options include: <ul style="list-style-type: none"> • treat with herbicide registered for control in the manner according to the label for that herbicide - chemical control • mechanical control • any regrowth that occurs after initial treatment will require additional control with herbicide 	few isolated infestations along the Murray River floodplain and Lake Mulwala.
GHS	<i>Sagittaria graminea</i>	<ul style="list-style-type: none"> • Treat all <i>Sagittaria graminea</i> with a herbicide registered or permitted for control in the manner according to the label or any permit for that herbicide • Physical removal. Destroy all plant material in an appropriate manner once removed in order to reduce the opportunity for reinfestation • Cultivation. Maintain hygiene practices with all mechanical equipment to prevent further spread. 	
Griffith	<i>Sagittaria graminea</i>	Chemical control Mechanical removal Council approved management plan Biological control	Individual infestation

LCA	Weed	Control measures	Distribution
Hay	<i>Sagittaria graminea</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. • mechanical removal through the winter months after channels have been drained. 	
Jerilderie	<i>Sagittaria graminea</i>	Must be prevented from seeding and have their numbers reduced by one or a combination of the following methods: <ul style="list-style-type: none"> • treatment with a suitably registered herbicide at label rates • mechanical removal • the use of biological control agents where available • the plant must be prevented from spreading to neighbouring lands by maintaining a 20 metre buffer zone free of the plant around the perimeter of the property. • developing approved property weed management plans may be required to provide additional control measures 	
Leeton	<i>Sagittaria graminea</i>	Reduce existing infestations and prevent spread. Acceptable control options include: <ul style="list-style-type: none"> • Chemical control (treat all infestations of this weed with a herbicide registered for its control in the manner according to the label). • Mechanical removal • Manual removal • Leeton shire council approved property weed management plan. 	No known infestations of this weed.
Murrumbidgee	<i>Sagittaria platyphylla</i>	Reduce any infestations and prevent spread. The plant may not be sold, propagated or knowingly distributed. Acceptable control options include: <ul style="list-style-type: none"> • Mechanical removal 	No plants have been discovered in the shire
Wakool	<i>Sagittaria graminea</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. • Mechanical removal through the winter months after channels have been drained. 	One known infestation
Wentworth	<i>Sagittaria</i>	unknown at time of collation	No known infestations.