

1.0 Cover Page



REGIONAL WEED MANAGEMENT PLAN

1.1 Plan Title: Riverina Sagittaria Management Plan No. XXX

1.2 Plan Proponents / Applicant Contact Details

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

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Signature: Eastern Group Chairman:..... Date:.....

Signature: Western Group Secretary:..... Date:.....

1.3 Name of Plant(s) WONS - No

Scientific name: Sagittaria graminea Common name: Sagittaria

1.4 Plan Period

Starting date: 01/07/2004 Completion date: 30/06/2009

1.5 Area of Operation:

Region 5 (NSW), 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 Rural Land Protection Boards this region encompasses are all representatives of the Eastern and Western Riverina Noxious Weeds Advisory Groups (E/WRNWAG).

Victoria, the following catchments bordering on the Murray River: North Central, Goulburn Broken and North East Catchments.

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. Obtain information about the biology and control of sagittaria, with the aim of developing more effective control methods.
e. 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**): Balranald Shire, Carrathool Shire, Central Murray County, Corowa Shire, Griffith Shire, Hay Shire, Jerilderie Shire, Leeton Shire, Murrumbidgee Shire and Wakool Shire.

2.2 Other Stakeholders

LCA and RLPB members of the Eastern and Western Riverina Noxious Weeds Advisory Groups (**E/WRNWAG**). NSW Agriculture (**NSW Ag**), Department of Primary Industries (**DPI**), Murray Irrigation Limited (**MIL**), Goulburn-Murray Water (**G-MW**), Murrumbidgee Irrigation (**MI**), State Forests of NSW (**SF**), NSW Farmers (**NSWF**), Department of Infrastructure Planning and Natural Resources (**DIPNR**), Animal and Plant Control Commission (**APCC S.A**) and Riverland Animal Plant Control Board (**RAPCB**).

3.0 BACKGROUND AND GENERAL FACTS

3.1 Reason for Plan

Sagittaria (*Sagittaria 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.

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 uninfested 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 this serious aquatic weed is still available for retail purchase by the general public.

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.

3.3 Distribution of Infestation

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 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.

The first infestation in the Murray Irrigation area was found twelve years ago. Refer to Appendix 1. for distribution in the Murray catchment.

3.4 Weed Biology/ Ecology

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 Roles and Responsibilities of 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 Agriculture, Department of Primary Industries, Goulburn-Murray Water, Murrumbidgee Irrigation, Murray Irrigation Ltd, State Forests of NSW, NSW Farmers, Department of Infrastructure Planning and Natural Resources, and Animal and Plant Control Commission South Australia.

4.0 LEGISLATIVE AND REGULATORY SITUATION

4.1 Current Declaration

Sagittaria is not currently declared anywhere in NSW or Victoria, however listed as new and emerging in North-central weed Action Plan.

It is presently being sold in nurseries and pet shops as an aquarium or pond plant. W4f declaration in NSW will prevent this activity and minimise the risk of outbreaks outside the known infestations area.

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.

Sagittaria cannot currently be declared any higher than W4f as there is no effective control.

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

4.2 Declaration Changes

Look into declaring *Sagittaria graminea* as W4f in the following Councils:

Albury City	Hay Shire
Balranald Shire	Hume Shire
Carrathool Shire	Jerilderie Shire
Central Murray County	Leeton Shire
Corowa Shire	Murrumbidgee Shire
Griffith Shire	Wakool Shire

5.0 CONSIDERATIONS AND OPPORTUNITIES

5.1 Opportunities to be exploited

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, being sold as an aquarium plant. A W4f declaration along with an extensive awareness campaign will raise the profile of sagittaria and prevent further sales.

External funding opportunities exist through NHT, catchment authorities, Landcare and other fund sources that could significantly accelerate implementation of this plan.

A cross border liaison committee has been established to look into weed and seed transfer across the border as well as increase our resources and knowledge on best management practices.

Research is currently being undertaken by Giles Flower, senior plant physiologist, with Goulburn-Murray Water at Tatura, Victoria. Chemical trials, seed viability and spread, plant types/forms, and variables such as water levels and structures are all being investigated.

5.2 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.

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.

5.3 Extension and Education

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 recently. A follow-up campaign is planned and will include footage of sagittaria to further increase awareness of this new aquatic weed.

5.4 Links to other Strategies

- ❖ The National Weeds Strategy (Australia).
- ❖ The New South Wales Weeds Strategy.
- ❖ The NWAC Strategy – Noxious Weed Control Extension
- ❖ The Victorian Pest Management Framework
- ❖ The Goulburn Broken and North Central Weed Action Plans.

5.5 Barriers and Contingencies

The following are potential barriers / constraints that exist that may result in reduced performance during the plan period. Possible solutions, contingencies are also given.

POTENTIAL BARRIERS / CONSTRAINTS	POSSIBLE SOLUTION, CONTINGENCIES
Legislation - Pollution prevention - it is an offence to allow herbicides to enter any waterway under the Clean Waters Act.	Consult the EPA for a permit.
Lack of control options.	Research currently being conducted by G-M W.
Sagittaria available through retail trade outlets	Declare as W4f.
Lack of awareness of environmental and agricultural impacts of sagittaria.	Increase awareness through the media, handouts and field days.
Water levels can restrict treatment options.	Liaise with water boards to find out optimal times for treatment.
Land managers not prepared to implement control measures. Lack of enforcement.	Through extension, increase awareness of environmental and agricultural impacts.
Lack of identification	Develop information handout, conduct media campaign
Roles and responsibility along Murray River.	Define and seek agreement on areas of responsibility

6.0 PERFORMANCE INDICATORS AND ACTIONS

OBJECTIVE	ACTION	PERFORMANCE INDICATOR	BY WHOM
a. Prevent the sale of sagittaria.	<ol style="list-style-type: none"> 1. Submit application to declare sagittaria W4f across the Riverina. 2. Submit application to declare sagittaria as a restricted weed in Victoria. 3. Notify retail outlets of declaration change. 4. Retail outlets inspected annually to ensure sagittaria isn't being sold, propagated or distributed. 	<ol style="list-style-type: none"> 1. Sagittaria declared W4f by December 2004. 2. Sagittaria declared as a restricted weed by December 2003. 3. Retail outlets notified. Declaration publicised. 4. Retail outlets free of sagittaria. 	<ol style="list-style-type: none"> 1. RNWPO and, LCA's. 2. DPI 3. LCA's & DPI 4. LCA's & DPI
b. Determine the extent of infestations.	<ol style="list-style-type: none"> 1. Map (GPS) high priority sagittaria infestations in the Murrumbidgee Irrigation Area (MI) and CMCC. 2. Map (GPS) new infestations in Wakool and Balranald Shires. 3. Update current maps, Victorian infestations already mapped (GPS). 4. Encourage landholders to report or bring in unusual weeds. 5. Undertake specific surveys for potential sagittaria sites - downstream from infested areas. 6. All field staff and landholders to report any new sightings of sagittaria. 	<ol style="list-style-type: none"> 1. Map developed by December 2003 and updated regularly. 2. Map created and updated as new infestations are found. 3. Map updated as new infestations are found. 4. Unusual plants identified when brought in. 5. Sagittaria surveys completed annually. 6. New sightings being reported by landholders and field staff. 	<ol style="list-style-type: none"> 1. CMCC & MI 2. Balranald & Wakool LCA's. 3. DPI & G-M Water 4. LCA's, DPI & GMW 5. LCA's and landholders 6. LCA's, DPI & GMW

<p>c. Treat high priority sagittaria infestations, preventing infestation of clean areas.</p>	<ol style="list-style-type: none"> 1. MIL to target lower parts of drains currently not infested. 2. Murrumbidgee Irrigation to treat all infestations in areas under their control as required. 3. Central Murray County Council to minimise seed spread of sagittaria between Lake Mulwala and Shire boundary. 4. CMCC to treat current infestations on council land. 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. 6. Victoria to treat all infestations in the Torrumbarry, Pyramid-Boort and Gunbower-lagoon systems. 7. Source funding through all avenues. 	<ol style="list-style-type: none"> 1. Lower parts of drains free of sagittaria. 2. All infestations treated. 3. Seed spread minimised along the Murray River. 4. All current infestations on LCA lands treated. 5. Surveys completed annually. New infestations treated. 6. All infestations treated. 7. Co-operative treatment program 	<ol style="list-style-type: none"> 1. MIL 2. MI 3. CMCC 4. CMCC 5. Wakool Shire 6. DPI & GMW 7. GMW, DPI, CMCC
<p>d. Obtain information about the biology and control of sagittaria, with the aim of developing more effective control methods.</p>	<ol style="list-style-type: none"> 1. Best practices for herbicide application with respect to timing, concentration, type of herbicide to be investigated. 2. Information on sagittaria biology (temperature, depth and other effects on germination and growth) to be investigated. 3. Survey of the extent of sagittaria in the Murray River to be undertaken over a 4-5 year period. 	<ol style="list-style-type: none"> 1. List of herbicide practices for best management of sagittaria to be produced by March 2004 2. Extensive description of the biology of sagittaria to be produced by March 2004 3. Surveys undertaken in 2000, 2001, 2002, 2003 and 2004 	<ol style="list-style-type: none"> 1. GMW 2. GMW 3. GMW

	<p>4. Mechanical control methods investigated (eg cutting, flower removal, mechanical removal)</p> <p>5. IWM strategy for sagittaria using aspects of the above information to be produced</p>	<p>4. Recommendations on mechanical control measures made by March 2004</p> <p>5. IWM strategy produced by March 2004.</p>	<p>4. GMW</p> <p>5. GMW</p>
<p>e. 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.</p>	<p>1. Run extension program targeted at relevant land managers, industries and the public. The following actions will take place:</p> <ul style="list-style-type: none"> • 4 field days run per year • Media releases produced as required. • Investigate the creation of an Aquatic Weed Ad. • Distribute information leaflets in high priority areas. <p>2. Internal extension and education</p> <ul style="list-style-type: none"> • Aquatic weed Identification training 	<p>1. Field days take place as required. Media releases distributed. Advertisement produced. High priority areas kept well informed of potential risks.</p> <p>2. All field staff trained and able to identify sagittaria in the field.</p>	<p>1. NSW Ag, LCA's, DPI, State Forests, MI, GMW, RNWPO and MIL</p> <p>2. LCA's, NSW Ag, DPI, S.F, MI, MIL, GMW</p>

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 LCA's). 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

♦ References and Further Readings

Parsons, W.T. & Cuthbertson E.G. (2001). *Noxious weeds of Australia*. CSIRO Publishing.

Anon (1999). Noxious Weeds Act 1993. Order No 14, August 1999.

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Sainty, G.R. & Jacobs S. (1994). *Waterplants in Australia - A Field guide*. South China Printing Co. (1988) Ltd.

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DISCLAIMER

Any recommendations/comments contained in this document or referred literature do not necessarily represent the plan proponents, stakeholders, authors, coordinators or NSW Agriculture's 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.**SAGITTARIA TASKFORCE.**
Committee members and Associates

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Jim Wilding	Goulburn-Murray Water
Geoff Portbury	Jerilderie Shire Council
Steve Lugsdin	Hay Shire Council
Steve Battenally	Wakool Shire Council
Alan Lodge	Balranald Shire Council
Kevin Woods	Carrathool Shire Council
Ray Mitchell	Carrathool Shire Council
Pat Spence	Murrumbidgee Irrigation
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Malcolm Taylor	Agropraisals Pty Ltd
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