

## Across borders and basins: reducing the risk of aquatic weed spread in Australia's Murray-Darling River system

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**Summary** Aquatic weeds can severely impact production and environmental assets. *Sagittaria (Sagittaria platyphylla)* (Engelm.) J.G.Sm.) management in the eastern reaches of Australia's Murray River system can exceed \$2 million per year. This excludes the significant costs of controlling this weed in conservation areas. Water from the Murray River is intensively managed and delivered to users for production and environmental needs. Without effective coordination and planning between cross-tenure, cross-border partners, water delivery initiatives may create opportunities for aquatic weed spread. We discuss a collaborative project that engages with water delivery managers to reduce the risk of high priority aquatic weed spread by building local-to-national partnerships and information sharing networks, and developing a whole-of-Basin risk management toolkit that proposes actions and effective strategies to minimise the impact of aquatic weeds to this iconic Australian river system.

**Keywords** Aquatic Weeds of National Significance, weed management, water delivery, Murray Darling Basin.

### INTRODUCTION

Invasive aquatic plants cause severe impacts in waterways and wetland systems globally. In Australia, the waterways of the Murray Darling Basin (MDB) support vital agricultural and environmental systems across four states: Queensland, New South Wales (NSW), Victoria and South Australia. Water movement in the MDB is intensively managed at national and state levels for irrigation and environmental purposes. Protecting the MDB from invasive plants is a high priority (Low 2009). Two aquatic weeds currently causing impacts in the MBD are *sagittaria*, which is restricted to the southeast Basin, and water hyacinth (*Eichhornia crassipes* (Mart.) Solms), which occurs in the northern MDB. These species, along with cabomba (*Cabomba caroliniana* A.Gray), salvinia (*Salvinia molesta* D.S.Mitch.) and alligator weed (*Alternanthera philoxeroides* (Mart.) Griseb.), are invasive aquatic plants recognised as Weeds of National Significance (WoNS) due to their significant impacts,

ability to spread and invasiveness (AWC 2012, Verbeek 2009).

The WoNS initiative is a collaborative effort among all States and Territories and the Commonwealth Government to prevent spread and reduce the impacts of some of the most significant weeds in Australia. All WoNS have national strategic plans that were developed jointly with affected stakeholders and contain agreed priority actions to reduce the spread and impact of each weed. Strategic plans are based on the principles outlined in the Australian Weeds Strategy, including that prevention and early intervention are the most cost-effective techniques for managing weeds (NRMCC 2006).

WoNS strategic plans recognise local, regional and state priorities, and contain management actions that are relevant and achievable at local and regional levels. Aquatic WoNS share many similar issues and management needs with other priority aquatic weeds in Australia, and many actions in the WoNS plans have broader benefits for other aquatic weeds (AWC 2012). For example, aquatic weeds training packages and surveillance protocols developed under the aquatic WoNS program (Petroeschovsky and Moran 2010) are applicable to most aquatic weeds. In addition, each aquatic WoNS plan contains targeted actions to prevent spread in nationally important waterways, such as the MDB. This paper discusses a project that is using the implementation of WoNS management actions as a driver to improve prevention and risk management for a range of high risk aquatic weeds across the MDB.

**The impetus: *Sagittaria* impacts in the MBD** *Sagittaria* causes significant impacts to irrigation channels, waterways and wetlands in the southern MDB (AWC 2012). Severe infestations block irrigation channels and drains, restrict flows and increase silt accumulation. Infestations choke wetlands and waterways, adversely affecting biodiversity and impacting on recreational activities. *Sagittaria* is difficult and expensive to control: Annual control costs to irrigation managers alone can exceed \$2 million (AWC 2012). Significant infestations are currently restricted to north

central Victoria and south eastern NSW, however these have potential to spread further west in those states, and south to the lower reaches of the river in South Australia. Continued spread of sagittaria threatens additional irrigation assets and important wetlands, including RAMSAR sites such as the Kerang wetlands and Gunbower forest in Victoria and the Chowilla floodplain in South Australia.

In response to this threat, a Tri-State Taskforce (New South Wales, South Australia and Victoria) was established in 2004. The taskforce developed the Sagittaria Tri-State Plan to encourage coordinated control programs and support for research on sagittaria biological and chemical control. Information and research collated in this plan supported a national effort which saw sagittaria successfully listed as a WoNS in 2012. The Tri-State Plan also formed a foundation for the national WoNS Sagittaria Plan, which solidifies support for local and regional priority actions within the national plan.

One such high priority action was to identify risks posed by MDB water delivery initiatives in creating pathways of spread for sagittaria and other high-risk aquatic weeds. Without effective coordination and planning between weed managers and water managers, water delivery for irrigation or environmental purposes may create aquatic weed dispersal opportunities. While water managers are aware of invasive species issues, there is not always sufficient, timely or relevant information available to them on aquatic weed risk (e.g. weed identification or distribution data). Thus there is the chance that water containing weeds or weed propagules may be accidentally moved into uninvaded areas as part of water delivery.

**Expanding and implementing actions** Given the high priority for action, the national aquatic WoNS coordinator developed a project, in conjunction with regional weed managers in the NSW and Victorian MDB, to investigate potential sagittaria risks and spread pathways via water delivery initiatives. While sagittaria was the impetus for the project, it was expanded to include other priority aquatic weeds that pose a high risk to the MDB. Four other weeds, water hyacinth, alligator weed, cabomba and Mexican water lily (*Nymphaea mexicana* Zucc.) were also included, as these were determined to be high priority threats in risk assessments (Champion *et al.* 2008), and have potential to spread from their current, small infestations in the MDB. The project also focuses on assisting water managers, policy makers and planners to understand existing aquatic weed threats and to provide them with tools and information to reduce the risk of spread, including linking with weed manager

networks to gain assistance in controlling high risk species before they spread.

In 2013, the Western Riverina Noxious Weeds Advisory Group (WRNWAG) received funding from the NSW Weeds Action Program (WAP) to undertake the initial stages of the project. WRNWAG is a regional group consisting of a variety of weed management stakeholders from all tenures (e.g. local government, state land, etc) across the western Riverina region of NSW. This region contains several hundred kilometres of MDB waterways, only a few of which are impacted by sagittaria or alligator weed. These weed managers recognised the significant threat, and were highly motivated to assist with the project.

WRNWAG partnered with the NSW Office of Environment and Heritage (OEH), which hosted a project officer in their Pests and Weeds Team. OEH is also the lead agency managing environmental water in NSW, thus the project officer was able to engage with NSW water planners very effectively. The project officer analysed existing environmental water delivery plans and mechanisms within NSW and Victoria, as well as overarching national MDB plans. While invasive species were recognised as a threat in some plans, these are typically high-level documents that do not detail specific threats or contain mechanisms to abate or reduce threats like invasive weed spread. In addition, while most environmental water managers were aware of the threat of invasive weeds, this was typically in a general sense or with regard to terrestrial weeds. However all managers were keen to receive information and guidance on how to incorporate risk management strategies for aquatic weeds into their programs. Thus, there was a key role for this project in developing and distributing this information.

The majority of plans analysed provided information on the range of stakeholders involved in water delivery. This, together with information provided by regional and state groups, allowed the development of a contact list of water planners and managers, to target for engagement. This list was later expanded to include all key weed managers and is an extremely useful tool to allow weed and water managers to find and contact each other (many were not aware of the other, or of how they could assist each other). Project partners intend to maintain and update this list as a key component of a weed and water managers toolkit, discussed further below.

To promote engagement in the project through existing water networks, the project officer worked closely with regional Natural Resource Management (NRM) officers. This helped bridge communication gaps, especially in Victoria where water managers are hosted by NRM regions. NRM bodies also host

many of the community-based water advisory groups that are an established and widespread mechanism for engagement in MDB water delivery and planning. These groups typically include representatives from key water stakeholders such as: the irrigation industry, state and Commonwealth water agencies, NRM groups, research organisations, private landholders, and non-government organisations. Thus, these groups are an excellent mechanism to engage with water managers and planners. A vast network of water planners, advisors and managers already exists across the MBD and by engaging through their networks, the project officer was able to raise the profile of aquatic weed risk, provide and seek information, and determine what further tools were needed to assist water managers with understanding and abating the risk.

Engagement activities focused on delivering presentations and resources to water advisory group meetings (which often occur three or four times a year), visiting irrigation companies and talking with regional and field staff, and site visits to key surveillance areas with state water officers (in Victoria these are NRM based, while in NSW they are state agency-based). The most commonly requested information from water planners and managers was: 1) aquatic weed identification and training resources, 2) current and accessible high-risk weed distribution information, 3) contact information for weed experts, and 4) advice on how to prevent spread via water delivery. Project partners are now developing tools and mechanisms to provide this information.

**Tools for the future** A key output of the project will be a Murray-Darling Basin Aquatic Weed Risk Management Toolkit that contains: information on high risk aquatic weeds; maps of high priority infestations and environmental assets at risk; priority areas where strategic weed management or water delivery is required to prevent further spread; potential management strategies to reduce spread (e.g. control programs prior to water delivery); and a MDB-wide weed and water managers contact list. The toolkit will aggregate existing weed management priority actions, information and research. It will be a 'living document' that can be used by weed and water managers and other stakeholders across the Basin to influence the development of MDB-related water plans or other plans that should include risk abatement of invasive aquatic weeds. The toolkit will be communicated via a project officer initially, and then via NRM regions and weed officer networks. This will enable engagement with a wide range of regional, state and national groups to improve understanding of the risks and impacts of aquatic weeds in the MDB, and encourage groups to

include relevant actions from existing plans into their plans or activities.

Sustained partnerships and communication between Basin-wide weed and water managers is also a key to the project. There is currently no existing platform for information sharing between the target stakeholder groups. The WRNWAG, with support from the Murray Local Land Services (LLS), are developing a webpage to act as a communication platform, which will host the toolkit, including the weed and water managers contact list. It is hoped the page will support and encourage basin-wide partnerships and sharing of information between weed managers and water delivery agencies (and other relevant groups) that will be self-sustaining into the future. The webpage will also support work done by the WoNS National Aquatic Weed Management Group by providing existing resources and links, as well as acting as a central point for all aquatic weed managers to share information. The toolkit is hoped to be completed by late 2014 and will be made available, along with other aquatic weed resources, on the WRNWAG website: <http://www.riverinaweeds.org.au>.

The toolkit and website will provide critical baseline information and resources that will allow the risk of aquatic weeds to be addressed more effectively in future water delivery initiatives. Support for a project officer in future would allow further Basin-wide communication of information and resources, and additional work to ensure weed risk management is integrated as a core element of environmental and agricultural water delivery plans into the future.

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#### REFERENCES

- AWC (Australian Weeds Committee) (2012). Weeds of National Significance, *Sagittaria (Sagittaria platyphylla)* Strategic Plan. (Australian Weeds Committee, Canberra).
- Champion, P.D., Burnett, D.A. and Petroeschovsky, A. (2008). 'Risk assessment of tradable aquatic plant species in Australia'. (NIWA, O'Connor, Western Australia).
- NRMMC (Natural Resource Management Ministerial Council). (2006). 'Australian Weeds Strategy – a

- national strategy for weed management in Australia'. (Australian Government Department of Environment and Water Resources, Canberra).
- Low, T. (2009). 'Climate change and weeds and pests in the Murray-Darling basin: a report for the Murray-Darling Basin Authority'. (Brisbane, Queensland, <http://www.mdba.gov.au/kid/files/2264-ClimateChangeWeedsPestsMDB1.pdf> accessed 14 May 2014).
- Petroeshevsky, A. and Moran, P.L. (2010). National aquatic weeds program – the journey. Proceedings of the 17th Australasian Weeds Conference, ed. S.M. Zydenbos, pp. 325-8. (New Zealand Plant Protection Society, Christchurch).
- Verbeek, M. (2009). Implementation of the aquatic weeds of national significance strategic plans—progress report: 2003–2008. (New South Wales Department of Primary Industries, Orange).