Mannum Swamps Baseline Vegetation Survey

Final Technical Report to the Mid Murray Local Action Planning Association

J.T. Weedon, J.M. Nicol and A. Doonan

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Executive Summary

Mannum Swamps is a permanent wetland of 197.8 ha located adjacent to the township of Mannum. A baseline vegetation survey of Mannum Swamps wetland was undertaken in October 2005 by SARDI Aquatic Sciences for the Mid Murray Local Action Planning Association to determine the current distribution and abundance of plant species in the wetland to aid in the future management of the system.

Quantitative surveys were undertaken on the inundated and riparian areas of the wetland. The remainder of the floodplain vegetation was mapped using ground-truthed aerial photography. A species list for the system was also compiled.

A total of 24 plant species were recorded including five exotics and *Ceratophyllum demersum* , which is listed as rare in South Australia. Five different vegetation communities in the inundated and riparian areas were identified.

Recommendations for management of the system include willow removal, weed control along the roadside, protection of diverse riparian hotspots and protection of areas of *Ceratophyllum demersum*.

1. Background and Aims

This survey aimed to provide baseline data on the vegetation of Mannum Swamps wetland to help identify management objectives, assess temporal trends via continued monitoring and evaluate the response of the vegetation to future management. The methods used were repeatable and statistically robust. Importantly they were also straightforward to enable future implementation by community groups and non-specialists, who have minimal technical assistance.

Mannum Swamps wetland is a permanent wetland of 197.8ha located at the northern edge of the township of Mannum (pop. ≈ 2000) (Jensen *et al.* 1996). Water levels are maintained at Murray River pool level by numerous wide connections to the main river channel. Thompson (1986) classified the wetland as being of high conservation significance because of the large number of waterbirds present, a rating supported in its listing in the Wetland Atlas of the South Australian Murray Valley (Jensen *et al.* 1996).

The present survey focussed on the vegetation of the Mannum Swamps wetland with a particular emphasis on the aquatic and riparian zones. These areas are most likely to be affected by changes in wetland hydrology, either by direct management actions or changes to regional flow regimes.

2. Methods

The survey was conducted in October 2005 and consisted of two components:

- quantitative vegetation survey;
- vegetation mapping and generation of a species list.

All methods were the same as those used for the vegetation component of the 2005 River Murray Wetland Baseline Survey (Nicol *et al.* 2006).

2.1. Quantitative Vegetation Survey

The quantitative vegetation survey was conducted in areas of the wetland that have the potential to be managed under regulated conditions. These areas were selected according to the disparate plant communities initially identified from aerial photographs and ground truthed in the field. Three randomly located quadrats (n = 3) were surveyed within each plant community. The northern section of the lagoon was not surveyed due to access restrictions.

Quadrats were oriented parallel to the nearest shoreline and had the dimensions of 1 x 15 m. This quadrat shape was appropriate for sampling riparian and submerged vegetation due to the

small-scale zonation of vegetation along depth gradients (Yamasaki and Tange 1981; Spence 1982; Wilson and Keddy 1985; Leck and Simpson 1994; Lenssen *et al.* 1999; Casanova and Brock 2000; Seabloom and van der Valk 2003; Fortney *et al.* 2004).

Cover and abundance of each species present in the quadrat were estimated using the method outlined in Heard and Channon (1997) except that N and T were replaced by 0.1 and 0.5 to enable future statistical analyses (Table 1).

Table 1. Modified Braun-Blanquet (1932) scale estimating cover/abundance as per Heard and Channon (1997).

Score	Description
N	Not many, 1-10 individuals
T	Sparsely or very sparsely present; cover very small (less than 5%)
1	Plentiful but of small cover (less than 5%)
2	Any number of individuals covering 5-25% of the area
3	Any number of individuals covering 25-50% of the area
4	Any number of individuals covering 50-75% of the area
5	Covering more than 75% of the area

The location of the central point in each quadrat was marked by GPS so the same 1 x 15 m area can be re-surveyed in the future.

2.2. Vegetation Mapping and Species Lists

It was not possible to detect every plant species using quadrat data alone and so all species encountered in the survey area (to the 1956 flood level) were recorded. This provided a much more comprehensive species list and increased the chances of detecting species of conservation significance over the whole floodplain, not just the wetland.

Areas with different plant communities that were not quantitatively surveyed were mapped using ground-truthed, aerial photography (areas that were quantitatively surveyed were also included on the vegetation map). Polygons were then drawn on the aerial photographs and a GIS layer of the major vegetation communities produced.

Areas of interest in the survey area (e.g. an infestation of weeds or an area that is more species rich than the surrounding areas) that were too small to fit three quadrats were noted. A list of the species in the area was recorded, the location marked by GPS and the information incorporated into the vegetation map and wetland description.

Plants were identified using keys in Jessop and Tolken (1986), Cunningham *et al.* (1981) and Sainty and Jacobs (1981; 1994). Nomenclature follows Jessop (1993). The terminology used to

describe different vegetation associations (e.g. herbland, shrubland and woodland) follows that of the 2004 Baseline Survey (Holt *et al.* 2005).

3. Results

Twenty-four species were observed in the survey area including 5 exotics and one species listed as rare in South Australia i.e. *Ceratophyllum demersum* (Table 2).

The western shoreline of the lagoon was dominated by *Phragmites australis*. Occasional stands of *Schoenoplectus validus* and *Typha* sp. were also common and scattered individuals of *Muehlenbeckia florulenta, Eucalyptus camaldulensis* var. *camaldulensis* and *Salix babylonica* were recorded (Figure 1). The upper riparian edge, towards the roadside tended to be dominated by *Pennisetum clandestinum* grasslands (Figure 1). This reflects the highly modified nature of this part of the wetland.

The peninsula and islands that form the eastern border of the wetlands were dominated by alternating *Salix babylonica* and *Eucalyptus camaldulensis* var. *camaldulensis* woodlands (Figure 1). The demarcation between the two was often not strong, and in many places there was a shoreline dominated by closed stands of *Salix babylonica* with an adjacent upper riparian zone dominated by *Eucalyptus camaldulensis* var. *camaldulensis* (Figure 1). Stands of *Phragmites australis* and *Schoenoplectus validus* were also common, and *Muehlenbeckia florulenta, Eleocharis acuta, Triglochin procerum* and *Salix ?matsudana* "Tortuosa" were also observed in this area (Figure 1).

In the southern part of the lagoon there were some scattered stands of *Schoenoplectus validus* emergent sedgelands (Figure 1). Aquatic vegetation in the lagoon was dominated by patches of *Vallisneria spiralis* with *Azolla filiculoides, Potamogeton crispus* and *Ludwigia peploides* ssp. *montevidensis* also present (Figure 1). The state-listed rare species *Ceratophyllum demersum* was also observed in the southern part of the lagoon.

A small patch of diverse swampy herbland was observed in the riparian zone near the caravan park at the southwestern extreme of the wetland (Figure 1). This small area contained many native species including *Triglochin procerum, Typha* sp., *Phragmites australis, Persicaria lapathifolium, Hydrocotyle verticillata, Rumex bidens, Parahebe decorosa, Eleocharis acuta* and *Schoenoplectus validus,* as well as the exotic *Pennisetum clandestinum* at higher elevations (Figure 1).

3.1. Surveyed quadrats

Five different vegetation associations were quantitatively surveyed:

1) *Salix babylonica* closed woodland on "willow islands"
2) *Typha* sp. sedgeland on edge of lagoon
3) *Vallisneria spiralis* submerged herbland in lagoon
4) *Schoenoplectus validus* sedgeland on edge of lagoon
5) *Phragmites australis* grassland on edge of lagoon

Table 2. Species list for Mannum Swamps (includes opportunistic observations not surveyed in quadrats) (*denotes exotic species).

		Association Number				
Species	**Common Name**	**1**	**2**	**3**	**4**	**5**
Asperula gemenifolia	Twin-leaf bedstraw					x
*Avena barbata**	Bearded oat					
Azolla filiculoides	Pacific Azolla		x		x	
Ceratophyllum demersum	Hornwort		x		x	
*Cynodon dactylon**	Couch grass					x
Eleocharis acuta	Common spike-rush					
Eucalyptus camaldulensis var. *camaldulensis*	River Red Gum					
*Foeniculum vulgare**	Fennel					
Hydrocotyle verticillata	Shield Pennywort					
Ludwigia peploides ssp. *montevidensis*	Water primrose				x	
Mimulus repens	Creeping Monkey-flower					
Muehlenbeckia florulenta	Lignum					
Parahebe decorosa	Parahebe					x
*Pennisetum clandestinum**	Kikuyu					x
Persicaria lapathifolium	Slender knotweed					
Phragmites australis	Common reed				x	x
Potamogeton crispus	Curly pondweed					
Rumex bidens	Mud dock					
*Salix babylonica**	Weeping Willow	x				
Salix ?matsudana "Tortuosa"*	Tortured Willow					
Schoenoplectus validus	River Club-rush		x		x	
Triglochin procerum	Water Ribbons					x
Typha sp.	Bulrush		x			
Vallisneria spiralis	Ribbon weed	x	x	x	x	
TOTAL		**2**	**5**	**1**	**6**	**6**

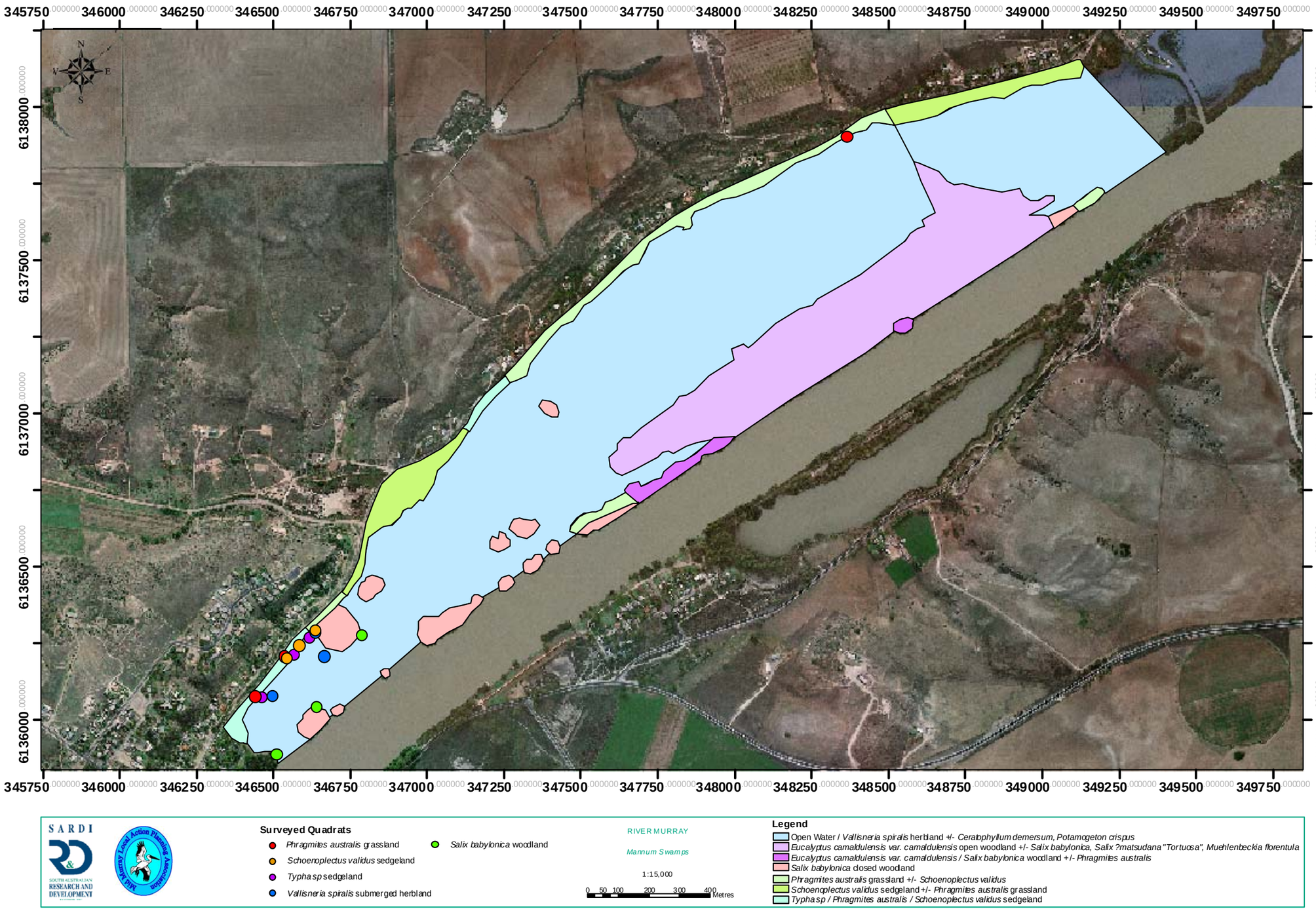

Figure 1. Vegetation map of Mannum Swamps showing quantitatively surveyed quadrats.

4. Implications of the data

The lagoon has a high abundance and diversity of native aquatic plants. As such changes to the current hydrological regime are not recommended. Of particular importance is the population of *Ceratophyllum demersum*, a species that is listed as rare in South Australia. More detailed surveys of the distribution and abundance of this species within the wetland would aid in its conservation.

The large areas of willows (*Salix* spp.) on the peninsula and islands are candidates for eradication or control. Given the dominance of willow in some areas, revegetation with appropriate native species should be undertaken alongside any removal or spraying programs.

The areas alongside the main road contain a number of species that have the potential to invade the riparian edge of the lagoon. A weed control strategy for these areas should be developed.

The high diversity patch at the end of the lagoon near the caravan park is an important hotspot of diversity within the wetland. Current management practices should continue to maintain it in its present state. There is the potential to create similar areas in other parts of the wetland by removing *Typha* sp. and/or *Phragmites australis* from locations with shallow bank slopes. Any removal of these species should be preceded by fauna surveys as these areas may provide important habitat for animals, in particular cryptic bird species (Holt *et al.* in prep.). There is also a risk that the disturbance associated with vegetation removal may create opportunities for weed invasion.

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