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Mapping Large Emergent Plant Communities in Lakes Alexandrina and Albert - Data Summary and Recommendations

Jason Nicol, Susan Gehrig and Arron Strawbridge

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EXECUTIVE SUMMARY

There is no information regarding the landscape scale distribution and abundance of large emergent macrophytes (*Schoenoplectus validus, Typha domingensis, Phragmites australis, Duma florulenta* and *Salix babylonica*) in lakes Alexandrina and Albert. This information is required when planning future planting of *Schoenoplectus validus* to control erosion and provide sheltered areas for aquatic species to recruit and persist around the shorelines of the Lower Lakes. Furthermore, this information is required to identify areas where *Schoenoplectus validus* is abundant and could be used as sources of plants for future plantings.

The distribution and abundance of large emergent macrophytes in lakes Alexandrina and Albert and Goolwa Channel was mapped by boat. Stretches of shoreline with distinct emergent plant communities were identified, each end marked using a handheld GPS and the percentage cover of *Schoenoplectus validus, Typha domingensis, Phragmites australis, Duma florulenta*, *Salix babylonica,* modified shoreline and area of shoreline without large emergent macrophytes was visually estimated. Clustering and indicator species analysis were used to compare the large plant communities and identify different communities, which were mapped. In addition, the distribution and abundance of *Schoenoplectus validus* and areas where large emergent species were absent were also mapped.

Phragmites australis was the most common large emergent species in the Lower Lakes, with this species often forming dense monospecific stands. *Typha domingensis* also tended to form dense monospecific stands; however, this species was less common than *Phragmites australis*. *Schoenoplectus validus* was widespread throughout the Lower Lakes but locally abundant in Goolwa Channel and the western shorelines of lakes Alexandrina and Albert. Shorelines where large emergent species were absent or uncommon were also widespread but more abundant on the northern and eastern shorelines of lakes Alexandrina and Albert.

The dominance of *Phragmites australis* and, to a lesser extent, *Typha domingensis* were probably due to the relatively stable water levels in the Lower Lakes. The elevated stable water levels probably also contributed to erosion particularly on lee shorelines, where large emergent species were often absent or uncommon. Future planting of *Schoenoplectus validus* should concentrate on the northern and eastern shorelines of Lake Alexandrina and the eastern shoreline of Lake Albert. Potential sources for *Schoenoplectus validus* for future planting are in

Goolwa Channel (especially areas around private jetties and boat ramps, where it may be seen as a pest) and the western shoreline of Lake Albert.

1. INTRODUCTION

1.1. Background

Schoenoplectus validus is a large, native, perennial, rhizomatous sedge that grows 2–3 m in height (up to 5 m in favourable conditions) in water up to 1.5 m deep (Cunningham *et al.* 1992; Sainty and Jacobs 2003). Ecosystem services provided by *Schoenoplectus validus* include erosion control, waterbird habitat, fish habitat, sediment and water column aeration and water quality improvement (Sainty and Jacobs 2003). It is a common emergent species around the edges of lakes Alexandrina and Albert, but unlike the other two large emergent species present in the Lower Lakes, *Phragmites australis* and *Typha domingensis*, it tends not to form dense monospecific stands (Frahn *et al.* 2014; Nicol *et al.* 2014). *Schoenoplectus validus* usually grows in deeper water than *Typha domingensis* and *Phragmites australis* (Sainty and Jacobs 2003) and is often associated with submergent taxa such as *Myriophyllum* spp., *Potamogeton* spp., *Ceratophyllum demersum* and *Vallisneria australis* in the Lower Lakes (Gehrig *et al.* 2011; 2012; Frahn *et al.* 2013; Nicol *et al.* 2013; 2014).

The ability of *Schoenoplectus validus* to tolerate wave action has resulted in it being planted extensively around the edges of lakes Alexandrina and Albert in water depths up to 1 m, primarily to control shoreline erosion (Goolwa to Wellington Local Action Planning Board *et al.* no date). Furthermore, there was evidence that plantings benefited the aquatic plant community by providing a sheltered area where submergent and less robust emergent species could establish (Nicol *et al.* 2013; 2014).

The program monitoring stand performance of planted *Schoenoplectus validus* and the benefits of the planted stands for the aquatic plant community have provided information regarding the survivorship, stem density, stand width, stem height and compared the plant community between planted and control sites (Nicol *et al.* 2013; 2014). However, there is no current information regarding the distribution and abundance of *Schoenoplectus validus* or other large emergent macrophytes in the Lower Lakes at the landscape scale with the only recent available information collected as part of the *Schoenoplectus validus* monitoring programs undertaken in autumn 2013 and 2014 (Frahn *et al.* 2014; Nicol *et al.* 2014). Information collected as part of these programs was designed to detect changes in the plant community through time and in response to management actions; hence, it was collected at a small spatial scale with replication to provide sufficient statistical power to detect change. Information regarding the distribution and abundance of large emergent macrophytes at the landscape scale is required to plan future planting programs and inform where planting *Schoenoplectus validus* in lakes Alexandrina and Albert will have the greatest benefit and identify potential sources of plants for future planting.

1.2. Objectives

The main objective of this project was to map the distribution of large emergent (*Schoenoplectus validus, Typha domingensis, Phragmites australis, Duma florulenta* and *Salix babylonica*) plant communities in lakes Alexandrina and Albert. In addition, areas where there was sparse or absent cover of large emergent species were also recorded. This information will be used to inform which areas will benefit most from future planting, where plants can be sourced for future planting programs and provide baseline information regarding the distribution of emergent plants around the shorelines of lakes Alexandrina and Albert.

2. METHODS

2.1. Vegetation Mapping Protocol

Emergent vegetation stands around the edges of lakes Alexandrina and Albert and Goolwa Channel were mapped by boat using a hand held GPS. The ends of a section of shoreline, which had a distinct emergent plant community, were marked and the percentage cover of *Schoenoplectus validus, Phragmites australis, Typha domingensis, Duma florulenta, Salix babylonica,* modified shoreline (e.g. jetties, wharves, boat ramps) and bare soil (areas not occupied by the aforementioned species) were visually estimated. Additional characteristics of each site, such as whether there was evidence of erosion or whether planted *Schoenoplectus validus* was present were also recorded.

2.2. Data Analysis

The emergent plant community at each site was compared using Group Average Clustering (McCune *et al.* 2002), with Bray-Curtis (1957) similarities used to construct the similarity matrix. At a similarity of 25%, five groups from the dendrogram were identified and Indicator Species Analysis (Dufrene and Legendre 1997) was used to determine the species that characterised each group. All multivariate statistical analyses were undertaken using the package PCOrd version 5.12 (McCune and Mefford 2006). The spatial distribution of each group identified by the dendrogram was mapped using Google Earth. In addition, the percentage cover of *Schoenoplectus validus* and bare soil at each site was classified into six categories (0%, 1–5%, 6–25%, 26–50%, 51–75% and >75%) and the spatial distribution of each of the categories was mapped using Google Earth.

3. RESULTS

Cluster analysis comparing the emergent plant community between sites detected five different groups at a similarity of 25% (Figure 1). Indicator Species Analysis detected one significant indicator for each group, which was used to name each group (Figure 1). The largest number of sites was dominated by *Phragmites australis*, followed by sites where large emergent macrophytes were absent or uncommon (Figure 1). Sites dominated by *Schoenoplectus validus* were numerically the lowest (Figure 1); however, this species was often associated with other emergent species.

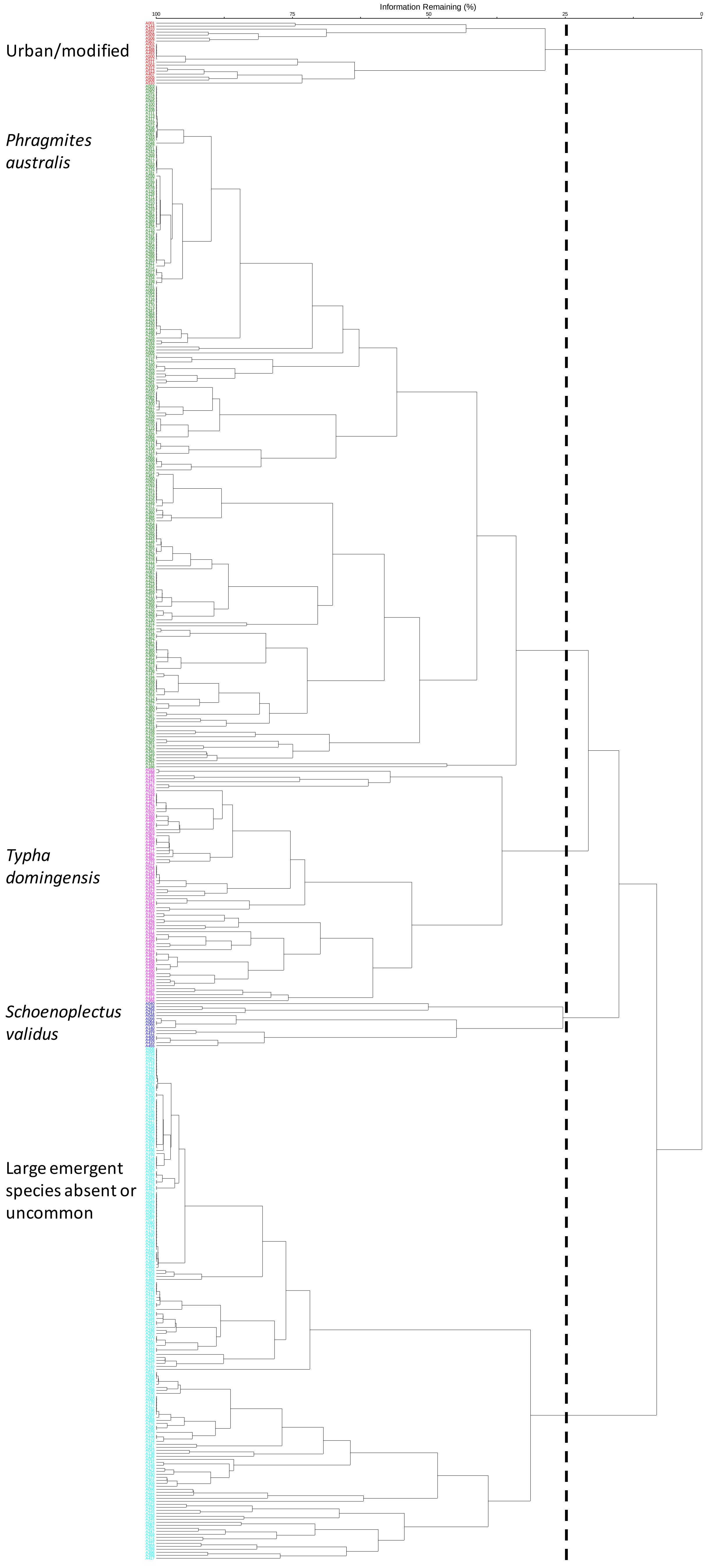

Figure 1: Cluster dendrogram comparing the large emergent plant community on the shorelines of lakes Alexandrina and Albert.

Sites classified in the group “large emergent species absent or uncommon” were generally widespread in lakes Alexandrina and Albert; however, they were more common in areas exposed to wave action (especially the northern and eastern shorelines of both lakes) (Figure 2). Sites classified in the “*Phragmites australis*” group were widespread throughout the lakes and Goolwa Channel, except the northern shorelines of lakes Alexandrina and Albert (Figure 2). Sites classified in the “*Typha domingensis*” group were dominant throughout Goolwa Channel but also present in lakes Alexandrina and Albert, generally in sheltered areas (Figure 2). Sites classified in the “urban/modified” group were dominant around the two main population centres of Goolwa and Meningie (Figure 2).

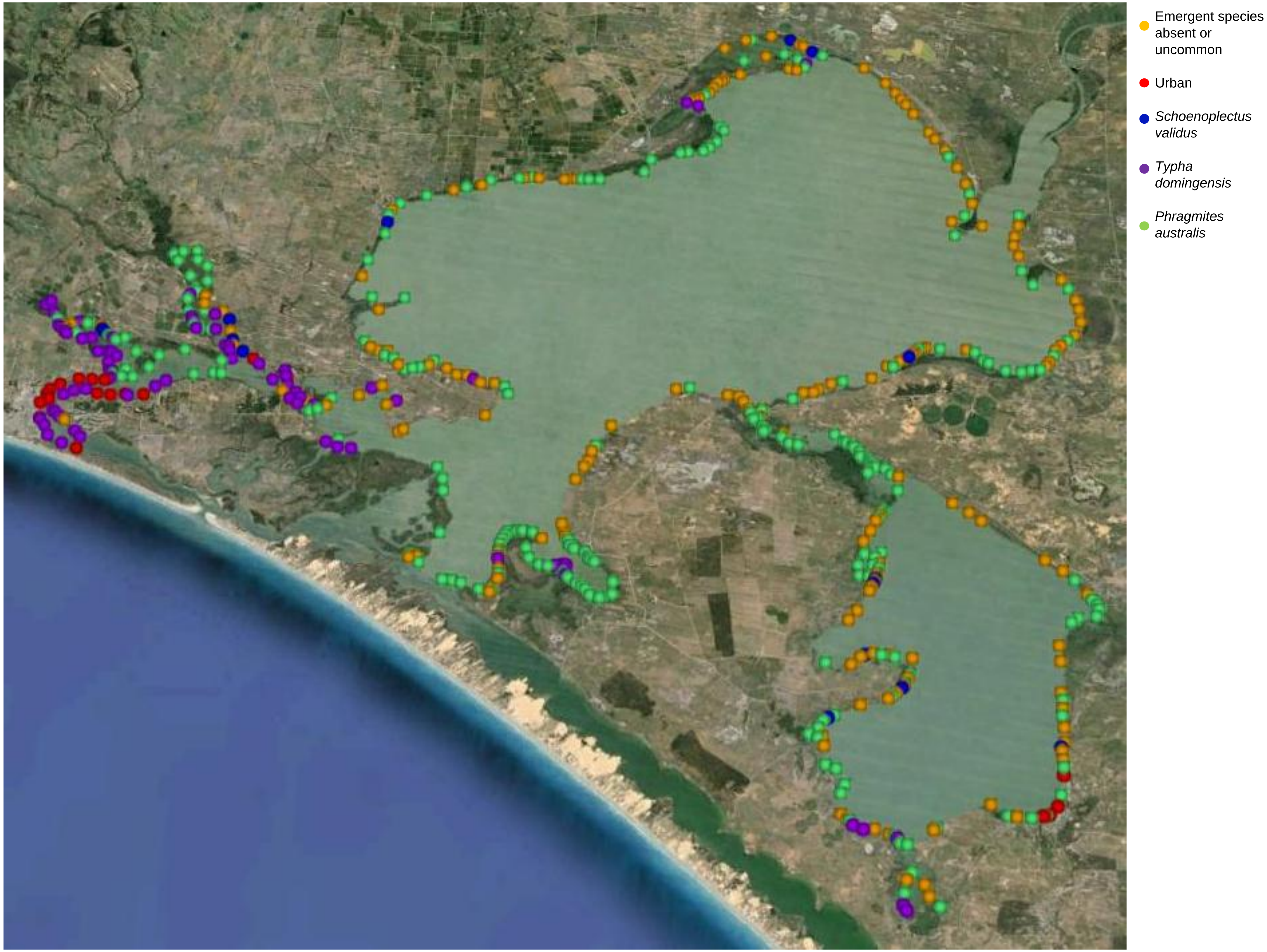

Figure 2: Aerial photo of lakes Alexandrina and Albert showing the spatial distribution of the different dendrogram groups (Figure 1, Appendix 1).

Only 15 sites were classified into the "*Schoenoplectus validus*" group, which were scattered throughout both lakes and Goolwa Channel (Figure 2). Sites classified in this group tended to have a high percentage cover of *Schoenoplectus validus* and no other species present. However, a total of 71 sites of the 513 sites surveyed contained *Schoenoplectus validus* with a cover score of greater than 25% and a further 94 sites with a cover score between 6% and 25% (Appendix 1). These sites were widespread throughout the Lower Lakes and Goolwa Channel, except on the northern shorelines of lakes Alexandrina and Albert (Figure 3).

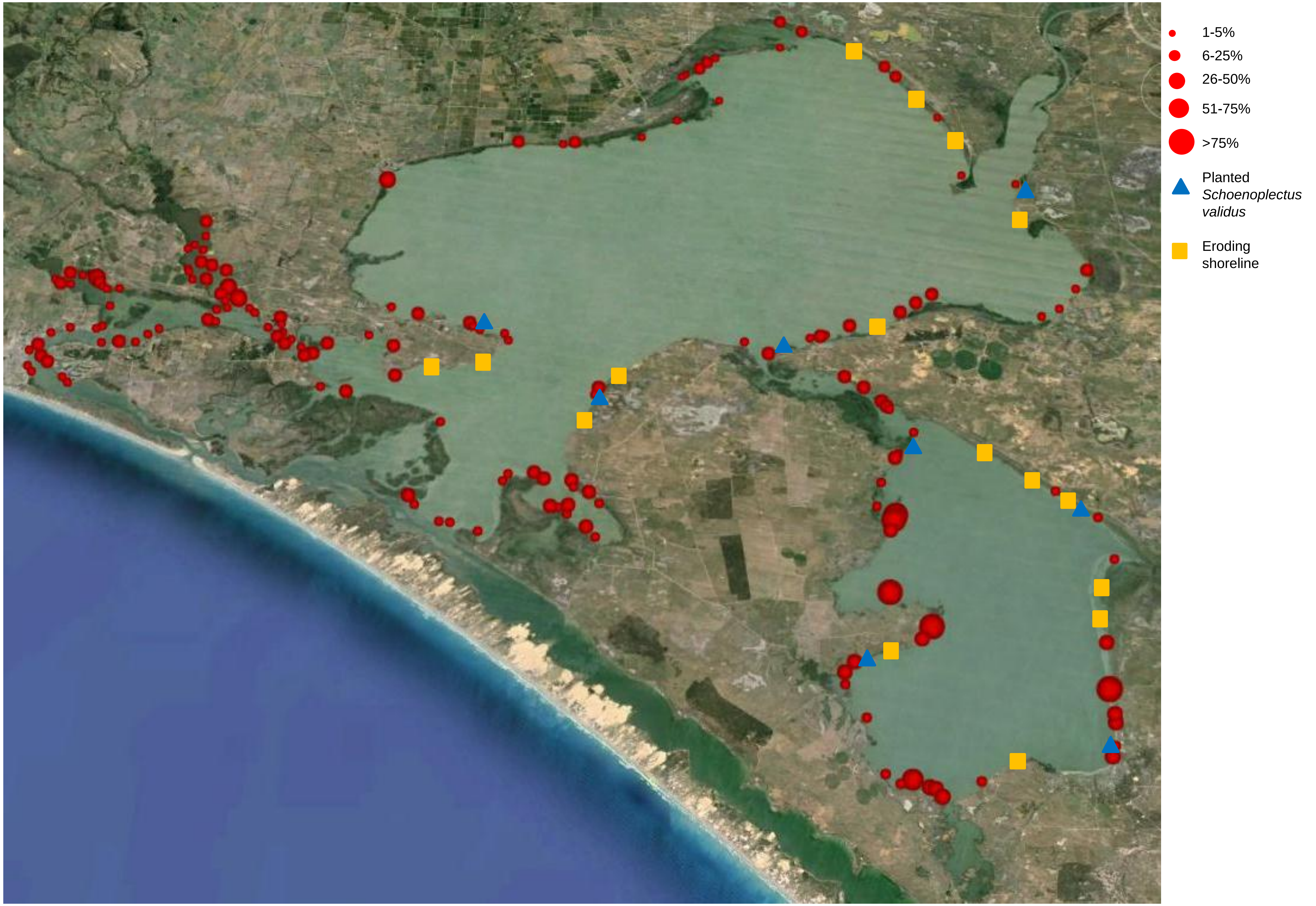

Figure 3: Aerial photo of lakes Alexandrina and Albert showing the distribution and abundance of *Schoenoplectus validus*, areas planted with *Schoenoplectus validus* and eroding shorelines (Appendix 1).

A total of 171 sites were classified in the “large emergent species absent or uncommon” group (Figure 1) and at 179 sites the percentage cover where large emergent species were absent was greater than 25% (Appendix 1). Furthermore, at 95 sites the percentage cover where large emergent species were absent was greater than 75% (Appendix 1). These sites were widespread but were more common on the northern shorelines of lakes Alexandrina and Albert (Figure 4).

Figure 4: Map of lakes Alexandrina and Albert showing the distribution of areas without large emergent species (Appendix 1).

4. DISCUSSION AND RECOMMENDATIONS

Results showed that a large proportion of the shorelines of lakes Alexandrina and Albert were densely vegetated with emergent species, particularly *Phragmites australis* that often formed dense monospecific stands. *Typha domingensis* also formed dense monospecific stands; however, this species was less prevalent than *Phragmites australis*. This is probably a legacy of historic water level management because these species are adapted to stable water levels (Walker *et al.* 1994; Blanch *et al.* 1999; 2000).

Schoenoplectus validus was widespread throughout the Lower Lakes and Goolwa Channel, especially on the western shorelines of lakes Alexandrina and Albert and in Goolwa Channel. Using cluster analysis combined with Indicator Species Analysis to identify sites where species are common can lead to underestimating the distribution and abundance of a species such as *Schoenoplectus validus*. A total of 15 sites were classified in the group where *Schoenoplectus validus* was a significant indicator; however, there were a much larger number of sites where this species was abundant (Appendix 1). This was due to *Schoenoplectus validus* generally not forming monospecific stands and often co-occurring with other species in the Lower Lakes (Nicol *et al.* 2013; 2014; Frahn *et al.* 2014). There were several sites on the western shoreline of Lake Albert where *Schoenoplectus validus* was abundant that have potential to be source sites for future planting. In addition, sites in Goolwa Channel that are adjacent to private boat ramps and wharves may be potential donor sites because *Schoenoplectus validus* may be considered a nuisance and block access.

Sites where large emergent species were absent or uncommon were widespread throughout the Lower Lakes, but in contrast to sites where *Schoenoplectus validus* was present, clustering and Indicator Species Analysis generally identified these sites. There were large stretches of shoreline where large emergent species were scarce or absent on the northern and eastern shorelines of lakes Alexandrina and Albert. There was evidence of erosion on these shorelines and it is recommended that planting *Schoenoplectus validus* be undertaken along these shorelines. *Schoenoplectus validus* has been planted along some of the northern shoreline of Lake Albert and has established; however, in autumn 2014 this particular site had the lowest stem density and stand width of all planted sites (Nicol *et al.* 2014). Furthermore, this site showed the lowest increase in stand density and stand width between autumn 2013 and autumn 2014 of all planted sites (Nicol *et al.* 2014). This was probably due to the shoreline being exposed to winds from the southerly quarter which, are exposed to south westerly winds during the passage of fronts and sea breezes and south easterly winds that are prevalent during late summer and autumn (Bureau of Meteorology 2014). If *Schoenoplectus validus* was to be planted along the northern shoreline of Lake Alexandrina it is expected that expansion of the stand would be at a similar rate or slower (due to the large size of Lake Alexandrina and potential for larger waves) to the rate measured along the northern shoreline of Lake Albert. This may be overcome by higher initial planting densities, which could be trialed at several locations during future planting seasons. In addition, different planting patterns could be trialed and monitored in areas with varying degrees of wave energy to determine the best planting strategies for different locations.

Planting *Schoenoplectus validus* along shorelines where there are problems with erosion is recommended; however, shorelines where emergent and submergent species are sparse or absent may play important roles in the landscape. Such areas may be habitats for pelagic fish or foraging areas for water birds and excessive planting of *Schoenoplectus validus* may reduce the abundance of these habitats. However, with the current rate of planting being undertaken and with planting concentrated on shorelines with erosion problems, it is highly unlikely this would occur and planting *Schoenoplectus validus* is likely to improve habitat diversity in the Lower Lakes at the landscape scale in the short to medium-term.

REFERENCES

Blanch, S.J., Ganf, G.G. and Walker, K.F. (1999). Tolerance of riverine plants to flooding and exposure by water regime. *Regulated Rivers: Research and Management* **15**: 43-62.

Blanch, S.J., Walker, K.F. and Ganf, G.G. (2000). Water regimes and littoral plants in four weir pools of the River Murray, Australia. *Regulated Rivers Research and Management* **16**: 445-456.

Bray, J.R. and Curtis, J.T. (1957). An ordination of the upland forest communities of southern Wisconsin. *Ecological Monographs* **27**: 325-349.

Bureau of Meteorology (2014). Climate statistics for Meningie 1964 to 2014. http://www.bom.gov.au/climate/averages/tables/cw_024518.shtml

Cunningham, G.M., Mulham, W.E., Milthorpe, P.L. and Leigh, J.H. (1992). 'Plants of Western New South Wales.' (CSIRO Publishing: Collingwood).

Dufrene, M. and Legendre, P. (1997). Species assemblages and indicator species: the need for a flexible asymmetrical approach. *Ecological Monographs* **67**: 345-366.

Frahn, K., Gehrig, S., Nicol, J. and Marsland, K. (2014). Lower Lakes Vegetation Condition Monitoring – 2013/2014. South Australian Research and Development Institute (Aquatic Sciences), SARDI Publication No. F2009/000370-6, Adelaide.

Frahn, K.A., Gehrig, S.L., Nicol, J.M. and Marsland, K.B. (2013). Lower Lakes vegetation condition monitoring – 2012/2013. South Australian Research and Development Institute (Aquatic Sciences), SARDI Publication No. F2009/000370-5, Adelaide.

Gehrig, S.L., Nicol, J.M., Frahn, K.A. and Marsland, K.B. (2012). Lower Lakes vegetation condition monitoring – 2011/2012. South Australian Research and Development Institute (Aquatic Sciences), SARDI Publication No. F2010/000370-4, Adelaide.

Gehrig, S.L., Nicol, J.M. and Marsland, K.B. (2011). Lower Lakes vegetation condition monitoring – 2010/2011. South Australian Research and Development Institute (Aquatic Sciences), F2009/000370-3, Adelaide.

McCune, B., Grace, J.B. and Urban, D.L. (2002). 'Analysis of Ecological Communities.' (MjM Software Design: Gleneden Beach, Oregon).

McCune, B. and Mefford, M.J. (2006). PC-ORD. Multivariate Analysis of Ecological Data, Version 5.12. In. (MjM Software Design: Glenden Beach, Oregon, USA).

Nicol, J.M., Gehrig, S.L. and Frahn, K.A. (2013). Establishment success and benefits to the aquatic plant community of planting *Schoenoplectus validus* around the shorelines of Lakes Alexandrina and Albert-data and methods report. South Australian Research and Development Institute (Aquatic Sciences), SARDI Publication No. F2013/000414-1, Adelaide.

Nicol, J.M., Gehrig, S.L. and Frahn, K.A. (2014). Establishment success and benefits to the aquatic plant community of planting *Schoenoplectus validus* around the shorelines of lakes Alexandrina and Albert-2014. South Australian Research and Development Institute (Aquatic Sciences), SARDI Publication No. F2013/000414-2, Adelaide.

Sainty, G.R. and Jacobs, S.W.L. (2003). 'Waterplants in Australia.' (Sainty and Associates: Darlinghurst, N.S.W., Australia).

Walker, K.F., Boulton, A.J., Thoms, M.C. and Sheldon, F. (1994). Effects of water-level changes induced by weirs on the distribution of littoral plants along the River Murray, South Australia. *Australian Journal of Marine and Freshwater Research* **45**: 1421-1438.

APPENDICES

Appendix 1: Start and finish GPS coordinates (map datum WGS 84; UTM format) for each mapped shoreline section in lakes Alexandrina and Albert. Site name refers to the cluster dendrogram Figure 1; the cluster dendrogram group denotes which group the site was classified in by the cluster analysis. Percentage cover in each site of *Schoenoplectus validus* and percentage cover without large emergent species is also reported.

	Start Coordinates		**Finish Coordinates**					
Site Name	**Easting**	**Northing**	**Easting**	**Northing**	**Cluster Dendrogram Group**	**% cover of *Schoenoplectus validus***	**% cover without large emergent species**	**Comments**
A001	349119	6082467	348708	6082460	Urban/modified	26 to 50%	0%	Planted *Schoenoplectus validus*?
A002	348708	6082460	348509	6082456	Urban/modified	0%	0%	
A003	348509	6082456	348418	6082455	*Phragmites australis*	0%	0%	
A004	348418	6082455	347850	6082445	Urban/modified	0%	0%	
A005	347850	6082445	347163	6082434	*Phragmites australis*	0%	0%	
A006	347163	6082434	346759	6082427	Bare	0%	>75%	
A007	346759	6082427	345982	6082413	*Phragmites australis*	0%	1 to 5%	
A008	345982	6082413	343374	6082368	Bare	0%	>75%	
A009	343374	6082368	343227	6082366	*Phragmites australis*	6 to 25%	6 to 25%	
A010	343227	6082366	341957	6082344	Bare	1 to 5%	>75%	
A011	341957	6082344	342659	6082356	*Phragmites australis*	0%	1 to 5%	
A012	342659	6082356	342852	6082359	Bare	0%	>75%	
A013	342852	6082359	343328	6082368	Bare	0%	26 to 50%	
A014	343328	6082368	341772	6082340	*Phragmites australis*	0%	6 to 25%	
A015	341772	6082340	341628	6082338	*Typha domingensis*	0%	51 to 75%	
A016	341628	6082338	341712	6082339	*Typha domingensis*	0%	6 to 25%	
A017	341712	6082339	341846	6082342	*Phragmites australis*	0%	1 to 5%	
A018	341846	6082342	342108	6082346	Bare	0%	26 to 50%	
A019	342108	6082346	341631	6082338	*Phragmites australis*	0%	1 to 5%	
A020	341631	6082338	341504	6082336	*Phragmites australis*	26 to 50%	0%	
A021	341504	6082336	341382	6082333	*Typha domingensis*	0%	0%	
A022	341382	6082333	341142	6082329	*Phragmites australis*	26 to 50%	0%	
A023	341142	6082329	340452	6082317	Bare	26 to 50%	51 to 75%	
A024	340452	6082317	339926	6082308	Bare	51 to 75%	26 to 50%	
A025	339926	6082308	339456	6082299	*Typha domingensis*	6 to 25%	0%	
A026	339456	6082299	339324	6082297	*Typha domingensis*	0%	0%	
A027	339324	6082297	339204	6082295	*Phragmites australis*	6 to 25%	0%	
A028	339204	6082295	338920	6082290	Bare	0%	>75%	
A029	338920	6082290	338943	6082290	Bare	0%	>75%	
A030	338943	6082290	339142	6082294	*Phragmites australis*	0%	0%	
A031	339142	6082294	338758	6082287	*Phragmites australis*	0%	0%	
A032	338758	6082287	338266	6082278	*Phragmites australis*	6 to 25%	0%	
A033	338266	6082278	338219	6082277	*Phragmites australis*	0%	1 to 5%	
A034	338219	6082277	338168	6082276	Bare	0%	>75%	
A035	338168	6082276	337952	6082272	Bare	0%	>75%	
A036	337952	6082272	337532	6082265	*Phragmites australis*	6 to 25%	0%	
A037	337532	6082265	337988	6082273	*Phragmites australis*	0%	0%	
A038	337988	6082273	338233	6082277	*Phragmites australis*	26 to 50%	0%	
A039	338233	6082277	338461	6082281	*Phragmites australis*	0%	0%	
A040	338461	6082281	338783	6082287	*Schoenoplectus validus*	26 to 50%	0%	
A041	338783	6082287	340044	6082310	*Phragmites australis*	0%	0%	
A042	340044	6082310	341390	6082334	Bare	0%	>75%	
A043	341390	6082334	341573	6082337	Bare	0%	26 to 50%	
A044	341573	6082337	341772	6082340	*Phragmites australis*	26 to 50%	6 to 25%	
A045	341772	6082340	342071	6082346	Bare	0%	>75%	
A046	342071	6082346	342198	6082348	*Schoenoplectus validus*	>75%	6 to 25%	
A047	342198	6082348	342266	6082349	Bare	0%	>75%	
A048	342266	6082349	342397	6082351	*Phragmites australis*	0%	6 to 25%	
A049	342397	6082351	342499	6082353	Bare	0%	>75%	
A050	342499	6082353	342653	6082356	*Phragmites australis*	0%	0%	
A051	342653	6082356	341800	6082341	Bare	0%	51 to 75%	
A052	341800	6082341	341605	6082337	*Phragmites australis*	0%	0%	
A053	341605	6082337	341153	6082329	Bare	0%	>75%	
A054	341153	6082329	340777	6082323	*Phragmites australis*	0%	0%	
A055	340777	6082323	340365	6082315	Bare	1 to 5%	>75%	
A056	340365	6082315	340149	6082312	*Schoenoplectus validus*	>75%	1 to 5%	
A057	340149	6082312	339669	6082303	Bare	1 to 5%	>75%	
A058	339669	6082303	338434	6082281	Bare	0%	26 to 50%	
A059	338434	6082281	339636	6082302	*Phragmites australis*	0%	6 to 25%	
A060	339636	6082302	340079	6082310	Bare	0%	26 to 50%	
A061	340079	6082310	340718	6082322	Bare	0%	>75%	
A062	340718	6082322	340817	6082323	Bare	26 to 50%	26 to 50%	
A063	340817	6082323	340916	6082325	Bare	0%	>75%	Severe erosion
A064	340916	6082325	340997	6082327	*Schoenoplectus validus*	>75%	6 to 25%	Planted *Schoenoplectus validus*?
A065	340997	6082327	341034	6082327	Bare	0%	>75%	Severe erosion
A066	341034	6082327	341056	6082328	*Schoenoplectus validus*	>75%	6 to 25%	Planted *Schoenoplectus validus*?
A067	341056	6082328	341103	6082328	Bare	0%	>75%	Severe erosion
A068	341103	6082328	341157	6082329	*Phragmites australis*	26 to 50%	0%	
A069	341157	6082329	341245	6082331	Bare	0%	>75%	
A070	341245	6082331	341269	6082331	*Phragmites australis*	6 to 25%	0%	
A071	341269	6082331	341398	6082334	Bare	0%	>75%	
A072	341398	6082334	341057	6082328	*Phragmites australis*	0%	0%	
A073	341057	6082328	340951	6082326	*Phragmites australis*	0%	26 to 50%	
A074	340951	6082326	340712	6082322	*Phragmites australis*	0%	0%	
A075	340712	6082322	340251	6082313	*Phragmites australis*	6 to 25%	0%	
A076	340251	6082313	340208	6082313	*Phragmites australis*	0%	0%	
A077	340208	6082313	340552	6082319	*Phragmites australis*	6 to 25%	0%	
A078	340552	6082319	340531	6082318	*Phragmites australis*	0%	0%	
A079	340531	6082318	340910	6082325	Bare	6 to 25%	26 to 50%	
A080	340910	6082325	341197	6082330	Bare	0%	>75%	Severe erosion
A081	341197	6082330	341324	6082332	Bare	1 to 5%	26 to 50%	Nurra Nurra Control Site
A082	341324	6082332	341438	6082334	*Phragmites australis*	26 to 50%	0%	Nurra Nurra Planted new site
A083	341438	6082334	341515	6082336	Bare	0%	26 to 50%	
A084	341515	6082336	341625	6082338	*Phragmites australis*	6 to 25%	6 to 25%	Nurra Nurra Planted old site
A085	341625	6082338	342373	6082351	*Phragmites australis*	0%	0%	
A086	342373	6082351	340913	6082325	*Phragmites australis*	6 to 25%	0%	

	Start Coordinates		Finish Coordinates					
Site Name	**Easting**	**Northing**	**Easting**	**Northing**	**Cluster Dendrogram Group**	**% cover of *Schoenoplectus validus***	**% cover without large emergent species**	**Comments**
A087	340913	6082325	340556	6082319	*Phragmites australis*	0%	0%	
A088	340556	6082319	337428	6082263	*Phragmites australis*	0%	0%	
A089	337428	6082263	336987	6082255	*Phragmites australis*	0%	0%	
A090	336987	6082255	336607	6082248	*Phragmites australis*	0%	0%	
A091	336607	6082248	335701	6082231	*Phragmites australis*	0%	0%	
A092	335701	6082231	335206	6082222	*Phragmites australis*	0%	0%	
A093	335206	6082222	335051	6082219	*Phragmites australis*	0%	0%	
A094	335051	6082219	334983	6082218	*Phragmites australis*	0%	0%	
A095	334983	6082218	334706	6082213	Bare	0%	>75%	
A096	334706	6082213	334476	6082209	Bare	0%	26 to 50%	
A097	334476	6082209	335668	6082231	Bare	6 to 25%	>75%	
A098	335668	6082231	335639	6082230	Bare	6 to 25%	>75%	
A099	335639	6082230	335611	6082230	*Phragmites australis*	26 to 50%	0%	
A100	335611	6082230	335507	6082228	*Phragmites australis*	0%	0%	
A101	335507	6082228	335402	6082226	Bare	0%	>75%	
A102	335402	6082226	335642	6082230	*Phragmites australis*	0%	0%	
A103	335642	6082230	335786	6082233	*Phragmites australis*	0%	0%	
A104	335786	6082233	336705	6082250	*Phragmites australis*	0%	0%	
A105	336705	6082250	339307	6082296	Bare	0%	>75%	
A106	339307	6082296	339755	6082304	*Phragmites australis*	26 to 50%	0%	
A107	339755	6082304	339888	6082307	*Phragmites australis*	0%	0%	
A108	339888	6082307	340188	6082312	*Phragmites australis*	0%	0%	
A109	340188	6082312	340258	6082313	*Phragmites australis*	26 to 50%	0%	
A110	340258	6082313	340539	6082318	*Phragmites australis*	0%	0%	
A111	340539	6082318	340987	6082326	*Phragmites australis*	0%	0%	Very dense and tall *Phragmites australis*
A112	340987	6082326	341098	6082328	*Phragmites australis*	26 to 50%	0%	
A113	341098	6082328	341207	6082330	*Phragmites australis*	0%	0%	
A114	341207	6082330	341323	6082332	*Phragmites australis*	26 to 50%	0%	
A115	341323	6082332	341780	6082340	*Phragmites australis*	6 to 25%	0%	
A116	341780	6082340	342080	6082346	*Phragmites australis*	0%	0%	
A117	342080	6082346	342428	6082352	*Phragmites australis*	0%	0%	
A118	342428	6082352	345077	6082398	Bare	0%	>75%	
A119	345077	6082398	345867	6082411	Bare	0%	51 to 75%	
A120	345867	6082411	346443	6082421	Bare	0%	>75%	
A121	346443	6082421	349476	6082473	Bare	0%	>75%	
A122	349476	6082473	350311	6082487	Bare	1 to 5%	>75%	Lake Albert Rd planted site
A123	350311	6082487	350856	6082496	Bare	0%	>75%	
A124	350856	6082496	351416	6082505	*Phragmites australis*	0%	6 to 25%	
A125	351416	6082505	351634	6082509	Bare	0%	>75%	
A126	351634	6082509	351867	6082512	*Phragmites australis*	0%	0%	
A127	351867	6082512	351939	6082514	*Phragmites australis*	0%	0%	
A128	351939	6082514	351774	6082511	*Phragmites australis*	0%	0%	
A129	351774	6082511	350863	6082496	*Phragmites australis*	0%	0%	
A130	350863	6082496	350518	6082490	*Phragmites australis*	6 to 25%	0%	
A131	350518	6082490	349819	6082478	*Phragmites australis*	0%	0%	
A132	349819	6082478	349828	6082479	Bare	0%	26 to 50%	
A133	349828	6082479	349714	6082477	Bare	0%	>75%	
A134	349714	6082477	349779	6082478	Bare	0%	26 to 50%	
A135	349779	6082478	349736	6082477	*Phragmites australis*	26 to 50%	0%	
A136	349736	6082477	349683	6082476	Bare	0%	26 to 50%	
A137	349683	6082476	349732	6082477	*Phragmites australis*	0%	26 to 50%	
A138	349732	6082477	349690	6082476	Bare	0%	26 to 50%	
A139	349690	6082476	349506	6082473	Bare	0%	26 to 50%	
A140	349506	6082473	349535	6082474	*Schoenoplectus validus*	>75%	0%	
A141	349535	6082474	349558	6082474	Bare	0%	51 to 75%	
A142	349558	6082474	349556	6082474	Bare	0%	51 to 75%	
A143	349556	6082474	349521	6082473	*Phragmites australis*	26 to 50%	0%	
A144	349521	6082473	349327	6082470	Urban/modified	26 to 50%	0%	
A145	349327	6082470	349119	6082467	*Phragmites australis*	6 to 25%	6 to 25%	Meningie Foreshore planted site
A146	312767	6081782	312962	6081787	*Typha domingensis*	6 to 25%	26 to 50%	
A147	312962	6081787	313396	6081796	*Phragmites australis*	26 to 50%	0%	
A148	313396	6081796	313640	6081801	Bare	0%	>75%	
A149	313640	6081801	315022	6081829	*Phragmites australis*	26 to 50%	0%	
A150	315022	6081829	315666	6081842	Bare	0%	>75%	
A151	315666	6081842	316188	6081853	*Typha domingensis*	6 to 25%	6 to 25%	
A152	316188	6081853	316952	6081869	Bare	0%	>75%	
A153	316952	6081869	316462	6081859	*Typha domingensis*	26 to 50%	6 to 25%	
A154	316462	6081859	317148	6081873	Bare	1 to 5%	>75%	
A155	317148	6081873	317398	6081878	Bare	26 to 50%	51 to 75%	
A156	317398	6081878	321527	6081961	Bare	0%	>75%	
A157	321527	6081961	322665	6081983	Bare	0%	>75%	
A158	322665	6081983	322471	6081980	*Phragmites australis*	6 to 25%	6 to 25%	
A159	322471	6081980	321950	6081969	*Phragmites australis*	6 to 25%	26 to 50%	
A160	321950	6081969	321216	6081955	Bare	0%	>75%	
A161	321216	6081955	320857	6081947	Bare	6 to 25%	>75%	Planted *Schoenoplectus validus*
A162	320857	6081947	320705	6081944	*Typha domingensis*	6 to 25%	6 to 25%	Planted *Schoenoplectus validus*
A163	320705	6081944	320522	6081941	*Phragmites australis*	26 to 50%	0%	
A164	320522	6081941	319972	6081930	Bare	0%	>75%	
A165	319972	6081930	319455	6081919	Bare	1 to 5%	51 to 75%	Planted *Schoenoplectus validus*
A166	319455	6081919	318782	6081906	Bare	0%	>75%	
A167	318782	6081906	318529	6081901	*Phragmites australis*	0%	0%	
A168	318529	6081901	318062	6081891	Bare	0%	>75%	
A169	318062	6081891	317690	6081884	*Phragmites australis*	26 to 50%	0%	
A170	317690	6081884	317300	6081876	*Phragmites australis*	0%	0%	
A171	317300	6081876	316958	6081869	*Phragmites australis*	0%	0%	
A172	316958	6081869	316686	6081863	Bare	0%	>75%	
A173	316686	6081863	316370	6081857	*Phragmites australis*	6 to 25%	0%	
A174	316370	6081857	316221	6081854	Bare	0%	>75%	
A175	316221	6081854	315813	6081845	*Phragmites australis*	0%	26 to 50%	
A176	315813	6081845	315457	6081838	Bare	0%	>75%	
A177	315457	6081838	315144	6081832	Bare	0%	26 to 50%	
A178	315144	6081832	315768	6081845	*Phragmites australis*	0%	0%	
A179	315768	6081845	317064	6081871	Bare	0%	51 to 75%	

	Start Coordinates		Finish Coordinates					
Site Name	**Easting**	**Northing**	**Easting**	**Northing**	**Cluster Dendrogram Group**	**% cover of *Schoenoplectus validus***	**% cover without large emergent species**	**Comments**
A180	317064	6081871	315365	6081836	*Phragmites australis*	0%	6 to 25%	
A181	315365	6081836	314774	6081824	*Phragmites australis*	0%	1 to 5%	
A182	314774	6081824	315022	6081829	Bare	0%	51 to 75%	
A183	315022	6081829	315837	6081846	*Phragmites australis*	0%	0%	
A184	315837	6081846	315928	6081848	*Phragmites australis*	0%	1 to 5%	
A185	315928	6081848	315971	6081849	*Schoenoplectus validus*	51 to 75%	0%	
A186	315971	6081849	316121	6081852	*Phragmites australis*	0%	6 to 25%	
A187	316121	6081852	316538	6081860	Bare	0%	26 to 50%	
A188	316538	6081860	317934	6081889	*Phragmites australis*	0%	0%	
A189	317934	6081889	319364	6081918	*Phragmites australis*	0%	6 to 25%	
A190	319364	6081918	320038	6081931	Bare	0%	26 to 50%	
A191	320038	6081931	320857	6081947	*Phragmites australis*	0%	0%	
A192	320857	6081947	321324	6081957	Bare	0%	26 to 50%	
A193	321324	6081957	322866	6081987	*Phragmites australis*	0%	0%	
A194	322866	6081987	323132	6081993	*Phragmites australis*	26 to 50%	0%	
A195	323132	6081993	323436	6081999	Bare	0%	26 to 50%	
A196	323436	6081999	323555	6082001	*Phragmites australis*	0%	0%	
A197	323555	6082001	323924	6082008	*Phragmites australis*	0%	0%	
A198	323924	6082008	325286	6082035	Bare	0%	>75%	
A199	325286	6082035	325575	6082040	Bare	6 to 25%	26 to 50%	
A200	325575	6082040	325937	6082047	Bare	0%	>75%	
A201	325937	6082047	326221	6082053	Bare	26 to 50%	26 to 50%	
A202	326221	6082053	326601	6082060	*Phragmites australis*	0%	6 to 25%	
A203	326601	6082060	327199	6082072	*Phragmites australis*	1 to 5%	6 to 25%	
A204	327199	6082072	329583	6082117	*Phragmites australis*	0%	0%	
A205	329583	6082117	329950	6082124	*Phragmites australis*	6 to 25%	0%	
A206	329950	6082124	331541	6082154	*Phragmites australis*	0%	0%	
A207	331541	6082154	331973	6082162	*Phragmites australis*	6 to 25%	0%	
A208	331973	6082162	332787	6082177	*Phragmites australis*	0%	0%	
A209	332787	6082177	333130	6082184	*Phragmites australis*	0%	0%	
A210	333130	6082184	333533	6082191	*Phragmites australis*	0%	0%	
A211	333533	6082191	333927	6082199	*Phragmites australis*	0%	0%	
A212	333927	6082199	333705	6082195	*Phragmites australis*	6 to 25%	0%	
A213	333705	6082195	332522	6082173	*Phragmites australis*	0%	0%	
A214	332522	6082173	331910	6082161	*Typha domingensis*	0%	0%	
A215	331910	6082161	332119	6082165	*Typha domingensis*	6 to 25%	26 to 50%	
A216	332119	6082165	332353	6082169	Bare	6 to 25%	51 to 75%	
A217	332353	6082169	332586	6082174	Bare	0%	>75%	
A218	332586	6082174	332933	6082180	Bare	0%	>75%	
A219	332933	6082180	333168	6082185	*Phragmites australis*	26 to 50%	6 to 25%	
A220	333168	6082185	333383	6082189	Bare	0%	51 to 75%	
A221	333383	6082189	333640	6082193	Bare	26 to 50%	6 to 25%	
A222	333640	6082193	333862	6082197	Bare	0%	26 to 50%	
A223	333862	6082197	333998	6082200	Bare	6 to 25%	51 to 75%	
A224	333998	6082200	334867	6082216	Bare	0%	51 to 75%	
A225	334867	6082216	337568	6082265	Bare	0%	>75%	
A226	337568	6082265	337992	6082273	Bare	6 to 25%	>75%	
A227	337992	6082273	338437	6082281	Bare	0%	>75%	
A228	338437	6082281	338546	6082283	*Phragmites australis*	0%	0%	
A229	338546	6082283	338082	6082274	*Typha domingensis*	0%	0%	
A230	338082	6082274	337336	6082261	*Phragmites australis*	0%	0%	
A231	337336	6082261	336323	6082243	*Phragmites australis*	0%	0%	
A232	336323	6082243	335081	6082220	Bare	0%	>75%	
A233	335081	6082220	334029	6082201	*Phragmites australis*	0%	0%	
A234	334029	6082201	335218	6082222	Bare	0%	51 to 75%	
A235	335218	6082222	335557	6082229	Bare	0%	>75%	
A236	335557	6082229	336637	6082248	*Phragmites australis*	0%	0%	
A237	336637	6082248	337702	6082268	Bare	0%	51 to 75%	
A238	337702	6082268	338188	6082276	*Schoenoplectus validus*	26 to 50%	6 to 25%	
A239	338188	6082276	338404	6082280	Bare	0%	26 to 50%	
A240	338404	6082280	338893	6082289	Bare	0%	>75%	
A241	338893	6082289	339455	6082299	*Schoenoplectus validus*	26 to 50%	0%	
A242	339455	6082299	341726	6082339	*Phragmites australis*	0%	1 to 5%	
A243	341726	6082339	342864	6082359	Bare	0%	26 to 50%	
A244	342864	6082359	343369	6082368	Bare	0%	51 to 75%	
A245	343369	6082368	343686	6082374	Bare	26 to 50%	26 to 50%	
A246	343686	6082374	343918	6082378	Bare	0%	51 to 75%	
A247	343918	6082378	344304	6082385	Bare	26 to 50%	26 to 50%	
A248	344304	6082385	345084	6082398	Bare	0%	>75%	
A249	345084	6082398	345397	6082403	Bare	0%	51 to 75%	
A250	345397	6082403	345910	6082412	Bare	0%	>75%	
A251	345910	6082412	346052	6082415	Bare	6 to 25%	26 to 50%	
A252	346052	6082415	346496	6082422	*Phragmites australis*	0%	6 to 25%	
A253	346496	6082422	346883	6082429	Bare	0%	>75%	
A254	346883	6082429	347053	6082432	Bare	0%	51 to 75%	
A255	347053	6082432	347152	6082433	*Phragmites australis*	0%	6 to 25%	
A256	347152	6082433	346711	6082426	Bare	0%	>75%	
A257	346711	6082426	346001	6082414	*Phragmites australis*	6 to 25%	6 to 25%	
A258	346001	6082414	346109	6082416	Bare	0%	>75%	
A259	346109	6082416	347604	6082441	*Phragmites australis*	0%	1 to 5%	
A260	347604	6082441	349593	6082475	Bare	0%	0%	Open Water (river crossing)
A261	349593	6082475	349534	6082474	*Phragmites australis*	0%	6 to 25%	
A262	349534	6082474	349283	6082469	Bare	6 to 25%	26 to 50%	Planted *Schoenoplectus validus*
A263	349283	6082469	349184	6082468	Bare	1 to 5%	51 to 75%	Planted *Schoenoplectus validus*
A264	349184	6082468	349423	6082472	Bare	0%	>75%	
A265	349423	6082472	349505	6082473	Bare	0%	51 to 75%	
A266	349505	6082473	350048	6082482	*Phragmites australis*	0%	1 to 5%	
A267	350048	6082482	351571	6082508	*Phragmites australis*	0%	0%	
A268	351571	6082508	351893	6082513	Bare	0%	26 to 50%	
A269	351893	6082513	352209	6082518	*Phragmites australis*	0%	1 to 5%	
A270	352209	6082518	352339	6082520	Bare	0%	26 to 50%	
A271	352339	6082520	352374	6082521	Bare	0%	>75%	
A272	352374	6082521	352003	6082515	Bare	26 to 50%	26 to 50%	

	Start Coordinates		Finish Coordinates					
Site Name	Easting	Northing	Easting	Northing	Cluster Dendrogram Group	% cover of *Schoenoplectus validus*	% cover without large emergent species	Comments
A273	352003	6082515	351603	6082508	Bare	0%	51 to 75%	
A274	351603	6082508	351238	6082502	*Phragmites australis*	6 to 25%	6 to 25%	
A275	351238	6082502	350932	6082497	Bare	1 to 5%	>75%	
A276	350932	6082497	350805	6082495	Bare	0%	26 to 50%	
A277	350805	6082495	350563	6082491	*Phragmites australis*	0%	1 to 5%	
A278	350563	6082491	350379	6082488	Bare	6 to 25%	51 to 75%	
A279	350379	6082488	350059	6082482	Bare	0%	>75%	
A280	350059	6082482	349590	6082475	*Phragmites australis*	0%	0%	
A281	349590	6082475	349066	6082466	*Phragmites australis*	6 to 25%	6 to 25%	
A282	349066	6082466	348254	6082452	*Phragmites australis*	0%	0%	
A283	348254	6082452	347405	6082438	*Phragmites australis*	0%	0%	
A284	347405	6082438	347142	6082433	*Phragmites australis*	0%	0%	
A285	347142	6082433	346736	6082426	*Phragmites australis*	0%	0%	
A286	346736	6082426	346298	6082419	*Phragmites australis*	0%	0%	
A287	346298	6082419	344954	6082396	Bare	0%	>75%	
A288	344954	6082396	344192	6082383	*Phragmites australis*	0%	0%	
A289	344192	6082383	343976	6082379	Bare	26 to 50%	6 to 25%	
A290	343976	6082379	343827	6082376	Bare	0%	26 to 50%	
A291	343827	6082376	343639	6082373	*Phragmites australis*	0%	6 to 25%	
A292	343639	6082373	343508	6082371	Bare	0%	26 to 50%	
A293	343508	6082371	343313	6082367	Bare	0%	>75%	
A294	343313	6082367	343077	6082363	*Schoenoplectus validus*	26 to 50%	1 to 5%	
A295	343077	6082363	342828	6082359	Bare	0%	26 to 50%	
A296	342828	6082359	342458	6082352	Bare	0%	>75%	
A297	342458	6082352	342144	6082347	*Phragmites australis*	26 to 50%	0%	
A298	342144	6082347	341320	6082332	Bare	1 to 5%	26 to 50%	
A299	341320	6082332	339826	6082306	Bare	0%	>75%	
A300	339826	6082306	339224	6082295	*Phragmites australis*	26 to 50%	0%	
A301	339224	6082295	338564	6082283	Bare	0%	51 to 75%	
A302	338564	6082283	338303	6082278	Bare	6 to 25%	>75%	Planted *Schoenoplectus validus*
A303	338303	6082278	337777	6082269	Bare	26 to 50%	6 to 25%	
A304	337777	6082269	337220	6082259	Bare	6 to 25%	>75%	
A305	337220	6082259	333904	6082198	*Phragmites australis*	0%	0%	
A306	333904	6082198	331973	6082162	Bare	1 to 5%	>75%	
A307	331973	6082162	331260	6082149	*Phragmites australis*	1 to 5%	6 to 25%	
A308	331260	6082149	327959	6082086	Bare	0%	>75%	
A309	327959	6082086	303051	6081575	Bare	1 to 5%	51 to 75%	
A310	303051	6081575	303201	6081578	Urban/modified	6 to 25%	0%	
A311	303201	6081578	304007	6081596	*Typha domingensis*	26 to 50%	0%	
A312	304007	6081596	304558	6081608	Urban/modified	6 to 25%	0%	
A313	304558	6081608	305069	6081619	*Typha domingensis*	6 to 25%	0%	
A314	305069	6081619	306460	6081649	*Typha domingensis*	6 to 25%	0%	
A315	306460	6081649	307481	6081671	*Phragmites australis*	0%	0%	
A316	307481	6081671	307878	6081679	*Phragmites australis*	26 to 50%	0%	
A317	307878	6081679	311094	6081747	*Phragmites australis*	6 to 25%	0%	
A318	311094	6081747	311503	6081756	Bare	26 to 50%	26 to 50%	
A319	311503	6081756	311903	6081764	*Typha domingensis*	26 to 50%	6 to 25%	
A320	311903	6081764	312556	6081778	*Typha domingensis*	1 to 5%	1 to 5%	
A321	312556	6081778	314137	6081811	*Phragmites australis*	26 to 50%	1 to 5%	
A322	314137	6081811	313514	6081798	*Phragmites australis*	0%	0%	
A323	313514	6081798	314115	6081810	*Typha domingensis*	6 to 25%	0%	
A324	314115	6081810	314803	6081825	*Typha domingensis*	0%	0%	
A325	314803	6081825	319220	6081915	*Typha domingensis*	26 to 50%	0%	
A326	319220	6081915	319511	6081921	*Phragmites australis*	1 to 5%	0%	
A327	319511	6081921	319562	6081922	*Phragmites australis*	6 to 25%	0%	
A328	319562	6081922	319498	6081920	*Phragmites australis*	1 to 5%	0%	
A329	319498	6081920	318425	6081899	*Phragmites australis*	0%	0%	
A330	318425	6081899	318213	6081894	Bare	0%	51 to 75%	
A331	318213	6081894	317994	6081890	*Phragmites australis*	26 to 50%	0%	
A332	317994	6081890	318020	6081890	*Phragmites australis*	0%	0%	
A333	318020	6081890	318513	6081900	Bare	0%	>75%	
A334	318513	6081900	319717	6081925	*Phragmites australis*	6 to 25%	0%	
A335	319717	6081925	320001	6081930	*Phragmites australis*	6 to 25%	0%	
A336	320001	6081930	320226	6081935	*Phragmites australis*	0%	0%	
A337	320226	6081935	320650	6081943	*Phragmites australis*	6 to 25%	0%	
A338	320650	6081943	321549	6081961	*Phragmites australis*	1 to 5%	0%	
A339	321549	6081961	322063	6081971	*Phragmites australis*	6 to 25%	0%	
A340	322063	6081971	322159	6081973	Bare	0%	>75%	
A341	322159	6081973	322227	6081975	*Phragmites australis*	0%	0%	
A342	322227	6081975	322335	6081977	Bare	0%	>75%	
A343	322335	6081977	322448	6081979	*Typha domingensis*	0%	6 to 25%	
A344	322448	6081979	322468	6081979	Bare	0%	>75%	
A345	322468	6081979	322463	6081979	*Phragmites australis*	0%	6 to 25%	
A346	322463	6081979	322430	6081979	Bare	0%	>75%	
A347	322430	6081979	322426	6081979	*Typha domingensis*	1 to 5%	26 to 50%	
A348	322426	6081979	322438	6081979	Bare	0%	>75%	
A349	322438	6081979	322459	6081979	*Phragmites australis*	0%	6 to 25%	
A350	322459	6081979	322502	6081980	Bare	0%	>75%	
A351	322502	6081980	322616	6081982	*Phragmites australis*	0%	1 to 5%	
A352	322616	6081982	322760	6081985	*Phragmites australis*	6 to 25%	0%	
A353	322760	6081985	322865	6081987	*Phragmites australis*	0%	0%	
A354	322865	6081987	323008	6081990	*Phragmites australis*	6 to 25%	0%	
A355	323008	6081990	323311	6081996	*Phragmites australis*	0%	0%	
A356	323311	6081996	323617	6082002	*Phragmites australis*	1 to 5%	0%	
A357	323617	6082002	324106	6082012	*Phragmites australis*	0%	0%	
A358	324106	6082012	324577	6082021	*Phragmites australis*	26 to 50%	0%	
A359	324577	6082021	323806	6082006	Bare	26 to 50%	6 to 25%	
A360	323806	6082006	323958	6082009	*Phragmites australis*	0%	0%	
A361	323958	6082009	324472	6082019	*Phragmites australis*	0%	26 to 50%	
A362	324472	6082019	324897	6082027	*Phragmites australis*	1 to 5%	6 to 25%	
A363	324897	6082027	325271	6082034	*Phragmites australis*	26 to 50%	0%	
A364	325271	6082034	325622	6082041	*Typha domingensis*	6 to 25%	6 to 25%	
A365	325622	6082041	325738	6082043	*Typha domingensis*	1 to 5%	0%	

	Start Coordinates		Finish Coordinates					
Site Name	**Easting**	**Northing**	**Easting**	**Northing**	**Cluster Dendrogram Group**	**% cover of *Schoenoplectus validus***	**% cover without large emergent species**	**Comments**
A366	325738	6082043	325808	6082045	*Typha domingensis*	26 to 50%	0%	
A367	325808	6082045	325718	6082043	*Typha domingensis*	0%	0%	
A368	325718	6082043	325669	6082042	*Typha domingensis*	0%	0%	
A369	325669	6082042	325774	6082044	*Phragmites australis*	6 to 25%	0%	
A370	325774	6082044	325887	6082046	*Typha domingensis*	0%	0%	
A371	325887	6082046	326319	6082055	*Phragmites australis*	0%	0%	
A372	326319	6082055	326578	6082060	*Phragmites australis*	0%	6 to 25%	
A373	326578	6082060	326765	6082063	*Phragmites australis*	26 to 50%	0%	
A374	326765	6082063	326994	6082068	*Phragmites australis*	0%	0%	
A375	326994	6082068	327464	6082077	*Phragmites australis*	6 to 25%	0%	
A376	327464	6082077	327724	6082082	*Phragmites australis*	1 to 5%	0%	
A377	327724	6082082	328088	6082089	*Phragmites australis*	1 to 5%	0%	
A378	328088	6082089	328114	6082089	*Phragmites australis*	1 to 5%	0%	
A379	328114	6082089	327189	6082072	*Phragmites australis*	0%	0%	
A380	327189	6082072	326992	6082068	*Phragmites australis*	6 to 25%	0%	
A381	326992	6082068	326894	6082066	*Phragmites australis*	0%	26 to 50%	
A382	326894	6082066	326716	6082062	*Phragmites australis*	0%	0%	
A383	326716	6082062	326181	6082052	*Phragmites australis*	26 to 50%	0%	
A384	326181	6082052	325973	6082048	*Phragmites australis*	0%	0%	
A385	325973	6082048	325883	6082046	*Phragmites australis*	6 to 25%	0%	
A386	325883	6082046	325885	6082046	*Phragmites australis*	0%	0%	
A387	325885	6082046	325746	6082044	*Phragmites australis*	26 to 50%	6 to 25%	
A388	325746	6082044	325711	6082043	Bare	0%	26 to 50%	
A389	325711	6082043	325672	6082042	*Phragmites australis*	0%	0%	
A390	325672	6082042	325604	6082041	Bare	0%	>75%	
A391	325604	6082041	325549	6082040	*Phragmites australis*	0%	0%	
A392	325549	6082040	326192	6082052	Bare	0%	>75%	
A393	326192	6082052	326597	6082060	Bare	1 to 5%	>75%	
A394	326597	6082060	326826	6082065	Bare	0%	>75%	
A395	326826	6082065	326987	6082068	Bare	0%	26 to 50%	
A396	326987	6082068	327182	6082071	Bare	6 to 25%	6 to 25%	
A397	327182	6082071	327452	6082077	*Phragmites australis*	26 to 50%	0%	
A398	312332	6081773	312048	6081767	Bare	6 to 25%	26 to 50%	
A399	312048	6081767	311787	6081762	*Typha domingensis*	1 to 5%	0%	
A400	311787	6081762	311335	6081752	*Typha domingensis*	6 to 25%	6 to 25%	
A401	311335	6081752	311280	6081751	*Typha domingensis*	6 to 25%	0%	
A402	311280	6081751	311203	6081750	Urban/modified	0%	0%	
A403	311203	6081750	311122	6081748	*Typha domingensis*	6 to 25%	6 to 25%	
A404	311122	6081748	310548	6081736	*Typha domingensis*	26 to 50%	0%	
A405	310548	6081736	309775	6081720	*Typha domingensis*	6 to 25%	0%	
A406	309775	6081720	309470	6081713	*Typha domingensis*	6 to 25%	0%	
A407	309470	6081713	308877	6081701	Urban/modified	6 to 25%	0%	
A408	308877	6081701	308386	6081690	*Schoenoplectus validus*	51 to 75%	0%	
A409	308386	6081690	308284	6081688	Bare	0%	>75%	
A410	308284	6081688	308133	6081685	*Schoenoplectus validus*	51 to 75%	1 to 5%	
A411	308133	6081685	308022	6081682	Bare	0%	>75%	
A412	308022	6081682	307657	6081674	*Schoenoplectus validus*	26 to 50%	6 to 25%	
A413	307657	6081674	307246	6081666	Bare	0%	>75%	
A414	307246	6081666	306664	6081653	*Typha domingensis*	26 to 50%	6 to 25%	
A415	306664	6081653	306633	6081653	*Phragmites australis*	26 to 50%	0%	
A416	306633	6081653	306645	6081653	Bare	0%	>75%	
A417	306645	6081653	306661	6081653	Bare	6 to 25%	26 to 50%	
A418	306661	6081653	306580	6081651	*Phragmites australis*	6 to 25%	0%	
A419	306580	6081651	306049	6081640	*Phragmites australis*	26 to 50%	0%	
A420	306049	6081640	305965	6081638	*Phragmites australis*	0%	0%	
A421	305965	6081638	305232	6081622	*Phragmites australis*	0%	0%	
A422	305232	6081622	304752	6081612	*Phragmites australis*	0%	0%	
A423	304752	6081612	305013	6081617	*Phragmites australis*	0%	0%	
A424	305013	6081617	305741	6081633	*Phragmites australis*	0%	0%	
A425	305741	6081633	306073	6081640	*Phragmites australis*	0%	0%	
A426	306073	6081640	306161	6081642	*Phragmites australis*	0%	0%	
A427	306161	6081642	305836	6081635	*Phragmites australis*	6 to 25%	0%	
A428	305836	6081635	305727	6081633	*Typha domingensis*	6 to 25%	6 to 25%	
A429	305727	6081633	305848	6081636	*Phragmites australis*	0%	0%	
A430	305848	6081636	306021	6081639	*Phragmites australis*	0%	0%	
A431	306021	6081639	306088	6081641	*Typha domingensis*	6 to 25%	0%	
A432	306088	6081641	306196	6081643	*Typha domingensis*	6 to 25%	0%	
A433	306196	6081643	306336	6081646	*Phragmites australis*	0%	0%	
A434	306336	6081646	306623	6081652	*Typha domingensis*	6 to 25%	0%	
A435	306623	6081652	307069	6081662	*Phragmites australis*	1 to 5%	0%	
A436	307069	6081662	307364	6081668	*Phragmites australis*	26 to 50%	0%	
A437	307364	6081668	307930	6081680	*Typha domingensis*	0%	0%	
A438	307930	6081680	308134	6081685	*Typha domingensis*	26 to 50%	0%	
A439	308134	6081685	308184	6081686	*Typha domingensis*	0%	0%	
A440	308184	6081686	308345	6081689	*Typha domingensis*	6 to 25%	6 to 25%	
A441	308345	6081689	307819	6081678	*Typha domingensis*	6 to 25%	0%	
A442	307819	6081678	305877	6081636	*Phragmites australis*	6 to 25%	0%	
A443	305877	6081636	304571	6081608	*Phragmites australis*	0%	0%	
A444	304571	6081608	304120	6081598	*Phragmites australis*	1 to 5%	0%	
A445	304120	6081598	303339	6081581	*Phragmites australis*	0%	0%	
A446	303339	6081581	302750	6081568	*Phragmites australis*	0%	0%	
A447	302750	6081568	302943	6081572	*Phragmites australis*	1 to 5%	0%	
A448	302943	6081572	303360	6081581	*Phragmites australis*	0%	0%	
A449	303360	6081581	302683	6081567	*Phragmites australis*	0%	0%	
A450	302683	6081567	302238	6081557	*Phragmites australis*	6 to 25%	0%	
A451	302238	6081557	302057	6081553	*Phragmites australis*	0%	1 to 5%	
A452	302057	6081553	301960	6081551	*Typha domingensis*	6 to 25%	0%	
A453	301960	6081551	301806	6081547	*Phragmites australis*	0%	0%	
A454	301806	6081547	301610	6081543	*Phragmites australis*	6 to 25%	0%	
A455	301610	6081543	301453	6081539	*Schoenoplectus validus*	26 to 50%	0%	
A456	301453	6081539	301353	6081537	*Schoenoplectus validus*	51 to 75%	0%	
A457	301353	6081537	301105	6081532	Bare	0%	>75%	
A458	301105	6081532	300907	6081527	*Typha domingensis*	6 to 25%	0%	

	Start Coordinates		Finish Coordinates					
Site Name	Easting	Northing	Easting	Northing	Cluster Dendrogram Group	% cover of *Schoenoplectus validus*	% cover without large emergent species	Comments
A459	300907	6081527	300661	6081522	*Phragmites australis*	0%	0%	
A460	300661	6081522	300213	6081512	*Phragmites australis*	6 to 25%	0%	
A461	300213	6081512	300002	6081507	*Typha domingensis*	0%	0%	
A462	300002	6081507	299808	6081503	*Phragmites australis*	26 to 50%	0%	
A463	299808	6081503	299619	6081499	Bare	0%	>75%	
A464	299619	6081499	299546	6081497	Bare	0%	26 to 50%	
A465	299546	6081497	299478	6081496	Bare	6 to 25%	>75%	
A466	299478	6081496	298629	6081477	Bare	0%	>75%	
A467	298629	6081477	298354	6081470	*Typha domingensis*	0%	0%	
A468	298354	6081470	298833	6081481	*Typha domingensis*	1 to 5%	1 to 5%	
A469	298833	6081481	299059	6081486	*Typha domingensis*	0%	0%	
A470	299059	6081486	299170	6081489	*Phragmites australis*	1 to 5%	0%	
A471	299170	6081489	299277	6081491	*Typha domingensis*	1 to 5%	0%	
A472	299277	6081491	299503	6081496	*Typha domingensis*	6 to 25%	26 to 50%	
A473	299503	6081496	299626	6081499	*Typha domingensis*	0%	0%	
A474	299626	6081499	300128	6081510	*Typha domingensis*	26 to 50%	26 to 50%	
A475	300128	6081510	300477	6081518	*Phragmites australis*	6 to 25%	26 to 50%	
A476	300477	6081518	300984	6081529	*Typha domingensis*	0%	0%	
A477	300984	6081529	301403	6081538	*Typha domingensis*	0%	0%	
A478	301403	6081538	301924	6081550	*Typha domingensis*	0%	0%	
A479	301924	6081550	302101	6081554	*Typha domingensis*	1 to 5%	1 to 5%	
A480	302101	6081554	302380	6081560	*Typha domingensis*	1 to 5%	0%	
A481	302380	6081560	301986	6081551	*Typha domingensis*	6 to 25%	0%	
A482	301986	6081551	302094	6081554	*Typha domingensis*	0%	0%	
A483	302094	6081554	302190	6081556	*Typha domingensis*	1 to 5%	0%	
A484	302190	6081556	302304	6081558	*Typha domingensis*	0%	0%	
A485	302304	6081558	302191	6081556	*Phragmites australis*	1 to 5%	0%	
A486	302191	6081556	302038	6081552	*Typha domingensis*	6 to 25%	0%	
A487	302038	6081552	298853	6081482	*Typha domingensis*	0%	0%	
A488	298853	6081482	298862	6081482	Urban/modified	0%	0%	
A489	298862	6081482	299125	6081488	*Typha domingensis*	6 to 25%	0%	
A490	299125	6081488	299365	6081493	*Typha domingensis*	6 to 25%	0%	
A491	299365	6081493	300139	6081510	*Typha domingensis*	1 to 5%	0%	
A492	300139	6081510	300910	6081527	*Typha domingensis*	0%	0%	
A493	300910	6081527	301019	6081530	Urban/modified	0%	0%	
A494	301019	6081530	300711	6081523	*Typha domingensis*	6 to 25%	0%	
A495	300711	6081523	300117	6081510	*Typha domingensis*	6 to 25%	6 to 25%	
A496	300117	6081510	299828	6081503	Bare	0%	>75%	
A497	299828	6081503	299596	6081498	*Typha domingensis*	26 to 50%	6 to 25%	
A498	299596	6081498	299459	6081495	*Typha domingensis*	0%	51 to 75%	
A499	299459	6081495	299160	6081488	*Typha domingensis*	26 to 50%	0%	
A500	299160	6081488	299167	6081489	Urban/modified	0%	0%	
A501	299167	6081489	299903	6081505	Urban/modified	26 to 50%	0%	
A502	299903	6081505	300423	6081517	*Typha domingensis*	1 to 5%	0%	
A503	300423	6081517	301029	6081530	*Typha domingensis*	1 to 5%	0%	
A504	301029	6081530	301628	6081543	*Typha domingensis*	1 to 5%	0%	
A505	301628	6081543	302309	6081558	Urban/modified	1 to 5%	0%	
A506	302309	6081558	303051	6081575	Urban/modified	6 to 25%	0%	
A507	301909	6081550	301274	6081536	Urban/modified	6 to 25%	0%	
A508	301274	6081536	300584	6081520	Urban/modified	0%	0%	
A509	300584	6081520	299668	6081500	Urban/modified	6 to 25%	0%	
A510	299668	6081500	299185	6081489	Urban/modified	6 to 25%	0%	
A511	299185	6081489	299039	6081486	Urban/modified	1 to 5%	0%	
A512	299039	6081486	298770	6081480	Urban/modified	0%	0%	
A513	298770	6081480	299828	6081503	Urban/modified	6 to 25%	0%	