Invasion of aquatic macrophytes in peri-urban waterways of south-east Queensland

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Summary Because rivers flow through a variety of land use types, riverine plant communities can be altered by local and whole-catchment pressures. Nutrient inputs, changes in the light environment and alteration of stream geomorphology are examples of anthropogenic influences immediately relevant to the structure and function of freshwater plant communities. These and similar anthropogenic changes are likely to increase as a result of peri-urban development throughout Australia. Because of the well documented ability of invasive wetland plants to capitalise on light (Canfield and Hoyer 1988, Bunn, *et al.* 1998) and nutrient (Bini *et al.* 1999, Quinn *et al.* 2007) enrichment, we set out to explore relationships between invasive macrophyte populations and resource availability in peri-urban areas.

Two peri-urban catchments in south-east Queensland (SEQ) were surveyed in spring 2007. Along with measurements of the aquatic plant communities at the 12 sites, we obtained water samples and quantified the light environment. Water samples were tested for dissolved nutrients, dissolved CO_2, pH and other water quality variables. We then used multivariate techniques to determine relationships between macrophyte community structure (proportion introduced vs native) and environmental variables.

Introduced and native groups were influenced by several common environmental factors, but subtle differences existed. For example, both introduced and native groups were affected by dissolved CO_2, but introduced plants were positively related to this factor while native plants showed an inverse relationship with it. Only native groups were affected by dissolved nutrients, showing a decline in the presence of phosphates and an increase where ammonium was present. Both groups responded positively to sunlight.

These patterns may present unexpected complexities for managers seeking simple solutions to aquatic weed problems in peri-urban settings. However, we are currently building upon this preliminary dataset with planned surveys in six of Australia's capital cities. With this additional data, we hope to pinpoint key environmental factors that can be used to accurately predict and protect invasion-susceptible locations.

Keywords Aquatic invasive macrophytes, peri-urban catchments.

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REFERENCES

Bini, L.I., Thomaz, S.M., Murphy, K.J. and Camargo, A.F.M. (1999). Aquatic macrophyte distribution in relation to water and sediment conditions in the Itaipu Reservoir, Brazil. *Hydrobiologia* 415, 147-54.

Bunn, S.E., Davies, P.M., Kellaway, D.M. and Prosser, I.P. (1998). Influence of invasive macrophytes on channel morphology and hydrology in an open tropical lowland stream, and potential control by riparian shading. *Freshwater Biology* 39, 171-8.

Canfield, D.E. and Hoyer, M.V. (1988). Influence of nutrient enrichment and light availability on the abundance of aquatic macrophytes in Florida streams. *Canadian Journal of Fisheries and Aquatic Sciences* 45, 1467-72.

Quinn, L.D., Rauterkus, M.A. and Holt, J.S. (2007). Effects of nitrogen enrichment and competition on growth and spread of giant reed (*Arundo donax*). *Weed Science* 55, 319-26.