DEVELOPMENT OF ENVIRONMENTAL DNA METHODS FOR THE DETECTION AND MANAGEMENT OF AMAZON FROGBIT INCURSIONS

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SUMMARY

Effective biosecurity operations are dependent on detecting invasive species when they are locally rare, including early detection of new incursions and assessing the success of eradication programs. Traditional surveys can be time-consuming and ineffective when the target species is rare. New technologies for detecting trace levels of organism DNA in the environment (eDNA) provide a breakthrough in species surveillance and biomonitoring. Amazon frogbit (*Limnobium laevigatum*) is an aquatic plant, native to Central and South America. It was first detected in QLD in 2011, and has since spread to NSW and VIC. It is a Prohibited Matter species in NSW, requiring eradication. Amazon frogbit is temporarily controlled by herbicides and manual removals, but often returns at sites through vegetative propagation and its long-lived seed bank. We developed a qPCR assay for rapid and specific detection of Amazon frogbit DNA. To assess the sensitivity of this assay for trace detection of Amazon frogbit in water, we analysed water samples from tanks spiked with small quantities of the weed and from natural water bodies where it is present. Water is sampled by filtration through a membrane, specifically designed for eDNA capture in the field. In the laboratory, the DNA is released from the membrane and purified, before being analysed using the qPCR assay. Our trial results are presented here, and we discuss how this new information will help us to design the most effective sampling strategy for eDNA detection of Amazon frogbit. For example, improved understanding of the sensitivity of the assay and longevity of DNA in the water will inform on optimal spatial and temporal sampling strategies required for detection of the weed in different aquatic habitats and systems. Finally, we will show how generalisations from these results could be used to design protocols for eDNA detection of other invasive plant species.

**Keywords:** *Limnobium laevigatum*, eDNA, qPCR, biosecurity, aquatic weeds