**Thesis scope and structure**

The research described in this thesis uses functional trait approach to understand how fluvial hydrology and other environmental variables template the ecology of riparian plant communities.

The thesis consists of six chapters: an Introduction, four chapters based on primary data which have been prepared as manuscripts for submission to peer-reviewed journals, and a Discussion. The Introduction discusses the role of different environmental factors in shaping riparian plant communities and highlights the utility of functional traits as a tool for understanding riparian plant community assembly. Chapters 2 and 3 present the findings of a field campaign across south-eastern Australia, and describe the role of fluvial disturbance and flow variability in determining functional trait composition and diversity in riparian plant communities. Chapter 4 investigates the role of environmental heterogeneity as a control on taxonomic and functional trait diversity in riparian plant communities of south-eastern Queensland, with an emphasis on the impacts of flow modification and land-use intensification. Chapter 5 describes a manipulative glasshouse experiment on the interactive effects of inundation and elevated atmospheric CO2 on gas exchange, growth, and functional traits of three riparian tree species native to south-eastern Australia. The Discussion chapter summarises and contextualises the original findings of this body of work, and suggests directions for future research.

Each data chapter was prepared as a stand-alone manuscript, and as such the thesis contains unavoidable repetition of introductory material and methods. The structure and formatting of each chapter varies according to the specific requirements of the journal the manuscript was prepared for. Chapter 2 has been published as: Lawson JR, Fryirs KF, Leishman MR (2015) Hydrological conditions explain variation in wood density in riparian plants of south-eastern Australia. *Journal of Ecology* 103(4):945-956. Chapter 3 is currently in press with *Freshwater Biology*, DOI: 10.1111/fwb.12649. Chapter 4 has been prepared for submission to *Journal of Applied Ecology*, and Chapter 5 is in review with *AoB Plants*.