**HIGHER DEGREE RESEARCH CANDIDATE AND SUPERVISOR’S**

**THESIS CORRECTIONS/AMENDMENTS REPORT**

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| **CANDIDATE DETAILS (please PRINT clearly or TYPE)** | | | |
| Family Name |  | Given Name |  |
| Student No |  | | |
| Supervisor’s Name |  | | |
| Faculty |  | | |

**Part A: Detailed report (to be completed by the candidate)**

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| **Examiner**  **Name** | **Thesis Page Reference** | **Summary/extract of Examiner’s Comments or Requirements** | **Substantive Corrections/Amendments made (additional information including a list of typographical error corrections may be included as an attachment)** | **Revised Thesis page Reference** |
| Merritt | 5 | “Flow regime is thought to be a dominant abiotic control on the composition and  structure of riparian plant communities” is too weak a description of accepted thought about the role of flow regime. | I believe my cautious phrasing is warranted given the results of Chapter 4, which show that flow regime does not necessarily explain variation in functional diversity independently of other environmental factors. In addition, much of the extant literature describes North American and European systems, with only a minority of articles addressing Australian systems. | NA |
| Merritt | 6 | Merritt takes issue with my comment that western North American systems are dominated by a limited set of species. | Have modified text from “This approach is effective in  western North America, where well-understood systems are dominated by a limited set of species.” to “This approach is effective in western North America, especially where systems are dominated by relatively few species.” | 6 |
| Merritt | 26 | Further references are suggested which describe the use of functional approaches to ecohydrology (two of which were published subsequent to publication of Chapter 2 in Journal of Ecology). | Have updated text to include suggested references.  “While ecohydrological classification is becoming established as a tool to explain plant community attributes such as species richness, stand structure and composition \citep{Poff2010a, Arthington2012}, to date only a small number of studies used functional approaches to investigating the ecohydrology of riparian plant communities \citep{bejarano2012, aguiar2013, stromberg2015riparian, Hough-Snee2015}, and use of quantitative functional traits has been rare.” | 26 |
| Merritt | 53 | “Statements like ‘functional approaches to ecohydrology can give insight into likely changes in riparian plant assemblages and associated changes in ecosystem function” could use some speculation about what they might be” | I already make some suggestions regarding possible changes in riparian vegetation in reponse to climate change in the lines preceding this statement. E.g. “Projected increases in climatic variability (Hennessy et al., 2008) may therefore overlay the already strong natural variability induced by ENSO to produce significant alterations to streamflow. Under such conditions,  near-channel abundance of opportunistic terrestrial species (with their broad diversity of wood density strategies) may decline in favour of rheophyte-dominated assemblages whose ecological strategies are optimized to harsh hydrological conditions.” | 53 |
| Merritt | 68 | Merritt questions the realm of inference of the work in Chapter 3. | I discuss the generalisability of these results in the discussion on page 99 (where I suggest that I may have identified the ascending half of a unimodal curve associated with mild to intermediate environmental harshness and in the last paragraph of the discussion (pages 101-102). |  |
| Merritt | 32, 77 | The use of interpolated hydrological data is described as weak and difficult to repeat given the detail. | Unfortunately interpolation of hydrological data has limitations but in this circumstance was the only possible avenue for filling in data. Similar techniques and software have been used by contemporaries – e.g. in Arthington et al. (2012) Ecological limits of hydrologic alteration: a test of the ELoHA framework in south-east Queensland. National Water Commission, Canberra, Australia.  With respect to Chapter 4, the reader is referred to Mackay et al. (2014) for full details on the interpolation procedure. |  |
| Merritt | 136 | Concern about validity of using imputation to fill in missing trait data. | These concerns have been addressed in Penone (2014) which is cited in the text. This article reccommends imputation of missing data to reduce associated bias. A table of error estimates for imputation of missing data has been added to Appendix 3a. |  |
| Merritt | 220 | “The statement that ‘using functional traits as descriptors of ecological strategy provides generality across systems’ needs some fleshing out. This is stated but no elaboration about what this means of how transfer across systems would work. Examples would be useful. | Changed ““Using functional traits as descriptors of ecological strategy provides generality across systems \citep{Lavorel2002, Suding2008}” to  “Using functional traits as descriptors of ecological strategy provides generality across systems \citep{Lavorel2002, Suding2008}, for example by allowing comparison of communities with dissimilar assemblages”. |  |
| Merritt | 98 | “The statement that the traits selected were to capture a broad spectrum of ecological strategies (not biasing the work towards traits related to flow regime), leave many questions in the reader’s mind. If one were explicitly trying to relate functional traits to flow regime, would it not be defensible to select traits most likely to have been selected for by pressures associated with flow regime? | The point of selecting traits which capture a broad spectrum of ecological strategies was to show that that even when one doesn’t consider flow specific traits and look at traits that describe the most generally important components of ecological strategy, flow regime is still more important than soil or climate. |  |
| Merritt | 101 | Commentary about management implications is weak. Request for suggestions about potential future shifts in functional groups under climate change. | I don’t think I can comment directly on shifts in functional groups of riparian plants because I have focused on biodiversity in general in Chapter 3, rather than responses of specific trait combinations along environmental gradients. The main management implications lie in the use of functional diversity as a proxy for ecosystem functioning and for making inferences about community assembly. I spend several paragraphs in the discussion of Chapter 3 (not just one sentence as commented by the examiner) discussing how the findings are important from an applied river management and conservation perspective (page 100-101). |  |
| Merritt | e.g. 123 | “Some terms are used in in appropriate ways – e.g. p123 ‘fluvial hydrology’, ‘hydrologic flow regime’. Fluvial means related to flowing water so stands alone. | Have changed ‘fluvial hydrology’ to ‘hydrology’ and ‘hydrological flow regime’ to ‘flow regime’ throughout the entire text. |  |
| Merritt | Chapter 4 | “Adjustment of richness by untransformed area is unconventional and generally not supported by the literature”. Merritt suggests a natural log transformation of plot area, or better, a rarefaction-based estimation of true species richness. | I have redone the analysis in Chapter 4 using Chao’s Richness Estimator (rarefaction-based estimation) instead of richness adjusted by untransformed area as used before. The results of this analysis have changed somewhat and the manuscript has been partially rewritten to reflect the altered results.  SUMMARY:  The conclusion that hydrology is again (as in Chapter 3) shown to be the ‘master variable’ controlling riparian vegetation composition is weakened. In the updated results, the optimal hydrological model is not shown to explain substantial variation independently of other environmental factors. Relationships with extent of hydrological modification are maintained, however. Overall, the combined environmental model now explains substantially less variation in species richness than previously. This has led me to conclude that other factors which were not quantified in this study, such as local site history and intraspecific interactions, may be as important in driving riparian vegetation composition as broad scale environmental conditions such as hydrology, flow modification, catchment land use, soil composition and climate.  The conclusion that “the absence of strong linkages between the extent flow modification and metrics of functional diversity or exotic abundance suggests that use of environmental flows may not be effective as a tool for riparian rehabilitation in modified subtropical landscapes such as south-eastern Queensland” is strengthened, and is not featured in the abstract of the chapter.  SPECIFIC DETAILS:  A number of minor changes have been made to the manuscript to reflect the updated result for species richness. As this represented only one component of study described in Chapter 4, the revisions have been relatively minor.   * Abstract modified to remove the claim that hydrology is shown to be the master variable. * Abstract modified to comment on the limited likelihood that environmental flows would be effective in modified SE QLD landscapes. * Added paragraph to Methods detailing estimation of species richness: “True species richness values were estimated by rarefaction according to species accumulation across the three replicate transects taken at each site. We used the "chao1" function in the fossil package in R \citep{vavrek2011fossil} to calculate abundance-based Chao's Species Estimator \citep{chao1987}. Abundance of exotic species was calculated as the number of exotic individuals divided by the total number of individuals counted at each site.” * Updated results subsection “Environmental drivers of variation in species richness” to reflect updated results. * Updated Figure 2 to reflect updated results. * Updated Discussion to remove emphasis on hydrology as the master variable controlling vegetation composition / diversity (first paragraph). * References in the discussion to the results of the species richness analyses have been updated to reflect the new results (3rd and 5th paragraphs of Discussion). * Added comment about the inability of the combined environmental model to explain substantial variation in functional diversity (as compared with in unmodified environments studied in Chapter 2): “Competitive interactions may play a more important role in assembly of diverse subtropical plant communities than in more austere environments dominated by abiotic forces \citep{callaway1995positive}. Indeed, as is characteristic of subtropical forests, many of the species identified in this study were not obligate riparian species (James et al., in review) and could not necessarily be expected to display traits associated with adaptation to the riparian environment.”   Chapter 6 (general Discussion) has also been updated to reflect the changes to Chapter 4.   * 6th paragraph of subsection “Ecological responses of riparian plant communities to hydrology” has been updated to summarise the updated results. * 1st paragraph of subsection “Could environmental flows be a useful tool for river rehabilitation in south-eastern Australia?” updated to reflect an additional relevant result (contingency of maximum flows in addition to contingency of minimum flows)   Appendix 3b updated to reflect updated results. | - |
| Merritt | 8 | Incorrect citation. | This was an error in my citation management system. Fixed. |  |
| Merritt | 9 | Reference request (Stromberg 2007) | Added reference. |  |
| Merritt | 8 | Reference request (Poff 2007) | Added reference. |  |
| Merritt | 22 | Typographical suggestion (apostrophise ‘plants’ in Abstract) | Appears not to be a valid suggestion. |  |
| Merritt | 29 | “How representative were the selected study sites? To what area can the inference be made?” | Refer to the top of page 29 “These are the best represented flow classes in eastern New South Wales and Victoria” |  |
| Merritt | 31 | “Why was heartwood used and not functional xylem?” | I acknowledge that cavitation resistance is better associated with sapwood characteristics, but most environmental gradient studies of wood density have been conducted on heartwood. See Chave et al. 2009 “Towards a worldwide wood economics spectrum” |  |
| Merritt | 45 | Discrepancy between value quoted in Chapter 2 Fig 4 and in caption. | Damn, this is in the published version too! The correct value is 80.3. Fixed for thesis version. |  |
| Merritt | 48 | Request for more citations to support statement “the exact role that woody fibres play in stabilising xylem vessels appears to be inconsistent (Martinez-Cabrera et al., 2009). | Added Larjavaara reference (2010) “Rethinking the value of high wood density”, as well as canonical Hacke 2001 reference for contrast. |  |
| Merritt | 48 | Citation request (Horton et al. 2001). | Added citation. |  |
| Merritt | 50 | Request for family names of *Casuarina* and *Tristanopsis* | Added family names. |  |
| Merritt | 51 | Suggested addition to sentence | “High wood density species tended to occur further up the bank, so would be subject to only the more intense flooding events.” >> “High wood density species tended to occur further up the bank, so would be subject to only the more intense flooding events (and least moisture availability.)” |  |
| Merritt | 53 | Typographical error | “continents climate patterns” >> “continent’s climate patterns” |  |
| Merritt | 70 | “Metrics of functional trait diversity are more powerful than taxonomic metrics as indicators of ecosystem functioning, ecosystem resilience” – comment that quoted text seems overstated and should come after results. | I disagree that this is an overstatement. The statement is representative of the content of these references and is a key point in the argument for the relevance of the current study. |  |
| Merritt | 71 | Reference (Diaz et al. 2007) did not have full author list. | Fixed. |  |
| Merritt | 72 | Suggested reference (Merritt 2010) | Suggestion appears to be inappropriate. |  |
| Merritt | 77 | Request for detail about interpolation of hydrological data. | “Missing data were approximated by multiple linear regression (4 sites) and linear interpolation (1 site) using the Time Series Manager module in the River Analysis Package (Marsh et al., 2003).”  >>  “Missing data were approximated by multiple linear regression and linear interpolation using the Time Series Manager module in the River Analysis Package \citep{marsh2003river}. Consistency of the resulting outputs were checked by visual  inspection of hydrographs. For Mammy Johnsons River, Mann River, Sportsmans Creek and Wallagaraugh River, multiple linear regression was chosen as the most  appropriate method for estimating missing data values. Linear interpolation was used for Jilliby Creek data.” |  |
| Merritt | 81 | Request for clarification why only species present at >1% were included in the analysis. | “Only species present at >1% cover in plots were included in the analysis”  >>  “Due to data limitations, only species present at >1% cover in plots were included in the analysis” |  |
| Merritt | 86 | Request for p values and R2 values for linear regressions. Request for explanation of outliers. | P values and R2 values are provided in the text of the Results section. See Discussion, last paragraph of page 98, beginning “Two sites had anomalous values for FDis that do not fit within this conceptual  model of disturbance and low variability providing high niche heterogeneity.” |  |
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**Part B: Confirmation by the Principal Supervisor**

**(to be completed by the supervisor and endorsed by the Head of Department and the Associate Dean (HDR) of Faculty)**

**To: Higher Degree Research Committee.**

I confirm that I have seen the corrected copies of the thesis by the above mentioned student with the title of:

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I have read the reports of the examiners, and I can confirm that the candidate has completed the corrections and/or amendments as required by the examiners and the Higher Degree Research Committee.

I recommend that the thesis now be accepted and passed.

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| Signature | Signature | Signature |
| Name | Name | Name |
| **Supervisor** | **Head of Department** | **Associate Dean (HDR) of Faculty** |