SQ QLD RIPARIAN FUNCTIONAL DIVERSITY NOTES

*Hydro analysis*

44 sites, 20 rivers

East – west gradient in rainfall, but not really temperature. East dominated by rainforest, west dominated by dry sclerophyll. Some melaleuca swamp – might want to omit these?

Steve Mackay produced modelled ‘reference’ hydro data (using IQQM) model for every reach. He calls the actual gauge data ‘historic’ data.

He then calculates a Gower’s dissimilarity between reference and historic data to give an index of alteration.

All Gower’s dissimilarities were < 0.25, so the magnitude of hydrologic alteration in the region isn’t large, despite being pervasive (every site was altered in some way).

Some specific metrics exhibited large alterations: “The greatest changes have occurred in hydrologic metrics describing discharge magnitude, especially low-spell duration (increased), mean rates of rise and fall (increased), mean monthly discharge (decreased) and annual minima (decreased). Metrics describing flow frequency, duration, variability and timing also exhibit change from reference conditions.”

I wonder whether values were normalised by mean daily flow, and what would happen if I did this?

Every dam has been altered in a different way

*Riparian veg survey methods*

“At each site, riparian vegetation was surveyed within three 50-metre-long transects randomly located perpendicular to a 100-metre stream section. To accommodate variation in vegetation densities, channel forms and adjacent land uses across study sites, sampling areas varied between 260 m2 and 1013 m2 with the sampling area for most sites being greater than 400 m2 as recommended by Walker and Hopkins (1984). All transects were conducted on the same side of the river to ensure any land-use impacts were similar. Variables recorded included the species, distance from the water’s edge, canopy height, trunk diameter at breast height, the presence and composition of vines (both exotic and native) and a measure of plant health ranging from 0 (dead) to 4 (healthy with >75% canopy cover and little or no evidence of disease or insect damage). Densities of reeds, rushes (including mat-rush, Lomandra spp.) and sedges were also estimated.”

*Riparian veg results (differences between regulated and unregulated)*

“When all sites were considered, no significant differences were detected between regulated and unregulated sites in either the tree and shrub assemblage data or riparian vegetation metrics, for bankfull or near-stream vegetation. Significant differences were detected, however, for two bankfull riparian vegetation metrics, D\_SPECIES and BA\_LATE, when sites strongly impacted by hydrologic alteration only were compared. Furthermore, where comparisons between regulated and unregulated sites could be made within specific hydrologic classes (see Table 4.3), significant differences were apparent in the bankfull tree and shrub assemblage data in RFC 5 and HFC 2.

A significant effect of flow regulation was detected for two riparian vegetation metrics, including the density of reeds, rushes and sedges (D\_LOMAND) for which higher densities were found in all regulated sites than were predicted from regression models for unregulated sites. Species density (D\_SPECIES) was also lower in strongly regulated sites.

No evidence was found to support the hypothesis that increasing hydrologic alteration will result in predictable patterns of increasing biotic change, as proposed in the ELOHA framework.”

“Finally, evidence was mixed regarding the hypothesis that riparian vegetation species diversity has been reduced in regulated sites. Overall, species diversity was significantly lower in strongly regulated sites compared to unregulated sites. However, in contrast to the subhypothesis that reductions in species diversity will occur where hydrologic variability is reduced, higher species richness values were actually associated with low rather than high variation in dry season flows.”

*Ideas for paper*

Does functional diversity follow the same patterns as in FD manuscript?

* Could compare models with AIC?
  + FDis ~ reference
  + FDis ~ historic
  + FDis ~ gower
  + FDis ~ historic + gower
  + FDis ~ historic \* gower

Mackay calculated Gower’s dissimilarity over a bunch of things – maybe I could just calculate it over the metrics I am interested in?

I could generate a calibration curve for relationships between FDis and a few hydro metrics - whichever ones I get a linear relationship with (perhaps from unaltered sites?) Then I could: a.) look at whether altered sites appear to sit in the right place according to their hydrologies, b.) compare where altered sites sit compared with where they might sit according to their reference hydrologies.

Could compare FD at dammed vs reference (see page 60 for pairs, or 76 – still not sure what predevelopment and historic refer to – does it have anything to do with the modelled data?)