Questions: Do grass influence…

Pool grasses, test with and without graminoids

Native vs exotic

Perennial vs exotic

All statistical analyses were performed using R Version 4.0.0 (cite) and are available in reproducible documents at <http://jennabraun.github.io/many_analysts_jb/index.html>.

To test for evidence that grasses influences seedling recruitment in ecs, we fit generalized linear mixed-models (GLMM) using the R package glmmTMB (citation) with negative binomial error distributions to account for overdispersion detected in the data (performance, citation). The number of seedlings within a quadrat was using as a response variable, and each stage of development – less than 0.5 m, between 0.5 m and 2 m and greater than 2 m. Our exploratory analyses indicated a correlation between small and medium sizes so we modelled outcomes for small and large seedlings only, representing initial establishment and more successful establishment. We modelled the outcome as logistic because there were so many zeroes, therefore models predict the probability of euc seedling or older seedling presence.

Resource availability mediates the outcome of plant-plant interactions (citations) and so we included annual precipitation as an interaction… Further, our exploratory analyses indicated property-level differences in seedling density, therefore we included precipitation…. We included each grass: exotics, natives with an interaction terms for precipitation. We dropped the insignificant interactions from the model and compared these candidate models using AIC. We tested for the significance of the predictors using likelihood ratio test (car anova type 2)

We modelled this using 2 steps – the probably that a eucalyptus seedling is present within a quadrat, and then what influences the seedling density within places with a least one seedling.

Results

We completed a total of 351 surveys over 3 seasons at 18 properties. Within a quadrat, small - (< 0.5 m) and medium-sized (between 0.5 m and 2 m) were significantly correlated (Pearsons: 0.27, p < 0.001). There was no relationship between large-sized seedlings and small seedlings (Pearsons: 0.04, p = 0.471) or large-sized and medium seedlings (Pearson’s: 0.007, p = 0.902).

There were no differences between seasons in the number of small or medium-sized seedlings, but there was a differences in large-sized. Only nine quadrats contained larger seedlings.

The properties vary in annual precipitation.

There was no influence of precipitation or any of the grasses on small seedlings.

There was a significant interaction between precipitation and native perennial grass cover on the large sized seedlings. At high levels of annual precipitation, there is no influence of perennials grass on euc. However at low levels, there is a positive effect of perennial grass. At low levels precipitation does not benefit eucs, but there are more eucs at sites with higher precipitation. There is also a marginally significant negative influence of invasives on eucs.

Table 1: Results from logistic GLM… Significance LR tests

Table 2: Results from poisson regression…

Figure 1: A map of the different study sites

Figure 2: A grouping of the significant predictors for the logistic model