**Denny mortality work**

**Rationale**

* There is concern that forests are at risk of shifting to treeless states
* Ultimately shifts in the state of a system require that recruitment does not compensate death.
* There are many different mechanisms that have the potential to influence tree mortality. It has been widely seen that mortality is high amongst small trees as a result of competition, relatively low in trees of intermediate size and higher for large trees as a result of senescence. Recent work has also shown that trees that show reduced growth may be more likely to die, with reduced growth rate indicative of low tree vigour.
* In addition to individual level characteristics the characteristics of the ecosystem and its disturbance regime can have profound effects on tree mortality. For example mortality of large trees in fragmented landscapes is elevated by increased wind throw and higher physiological stress (e.g. lower moisture availability, higher evapotranspiration etc).
* However, relatively few studies that have investigated shifts in forest systems have been examine mortality since they are largely space-for-time studies.

**Questions**

1. Did recruitment of different species keep pace with mortality for each survey period?
2. What influences the likelihood of tree death for different species during each survey period?
3. Using parameters from models of tree recruitment and death, what is the trajectory of the woodland likely to be in the next 100 years?

**Hypotheses**

* Recruitment did not keep pace with mortality for any species during any of the survey periods
* Mortality likelihood is u-shaped in relation to tree size
* Slow growing trees are more likely to die
* Proximity to trees that have died is more likely to result in tree death
* Under current conditions the woodland will show increased loss of tree cover. In situations where recruitment is maximized dramatic losses will be averted.

Figures I need to show this

* Recruitment and death during the survey periods (standardised to per year)
* Plot of mortality with tree size (separate plot for each survey period?)
* Plot of mortality with growth rates (separate plot for each survey period?)
* Plot of mortality with distance to nearest dead tree – maybe specify tree >45cm DBH? – smaller trees are not likely to cause much difference in this
* Stem density of trees for different scenarios of mortality/recruitment.