General Thesis Idea Brainstorming and Notes

Don’t have very thorough data on site characteristics beyond elevation for some of the data.

According to allometric view: allocation is a function entirely of size. Therefore, time is imbedded in the model as a site-level fixed effect: the time it takes for a plant to reach a size wherein its allocation = x, is dependent of the fixed characteristics of its environment/site.

How can I test allometry with this data though? Can’t do total allocation really. Although I guess one could as a percentage of total biomass.

Plasticity – change in allometric trajectory due to change in environment.

Would be very useful to have data on density, moisture, site history, soil quality among different sites. Perhaps it is possible to acquire this as each site comes from different experimental forests, depending on how data was collected could be appropriate to at least get precip data for each site. Density would be difficult to infer.

Age is important to include in allometric models because of the effects of stand structure, density etc.

Could develop a model with age as an explanatory variable to avoid having to use different equations depending on stand/tree age? Perhaps we could include a variable that represents tree age (or size even) in relation to stand age (using stand age as a proxy for stand size).

Species effect is obviously important. Especially shade tolerance as it relates to canopy position.

Hierarchical model with branch and leaf biomass embedded as being a probability given the biomass of the stem? Or perhaps given biomass of stem and local random effect (should be fixed effect) and canopy position?

Weiner

* There must be some optimum allocation wherein the tree is devoting a maximum amount of its resources to volumetric growth.
  + But according to Kevin secondary growth is last on the chain of allocation following maintenance and primary growth
    - Perhaps if there was less branch structure to maintain?
    - But then you would have less photosynthetic potential unless only non photosynthetic branches were removed.
* Allometric growth as the null hypothesis
  + Plasticity as the alternative hypothesis
  + Could we test something like this with the data we have?
    - Would that even be interesting?

Fatemi

* Allometric equations often applied outside of the populations in which they were derived leading to much error.
* Claim that Whittaker’s stand of interest was only 55 years old at the time of study, this is in contrast with the data provided to me.
* Get pretty good fits (R^2 values) for their regressions…

Fahey

* Biomass data derived from allometric equations from Whittaker
  + Used allometric data that they acquired to expand those equations into the size ranges encountered in their study

Battles:

Predicting biomass from linear measurements. Trees of different ages. Within same biological province

How you predict it:

How does biomass vary by species/forest age/size

Fundamental nature of the fit

Deal robustly with uncertainty with any estimates. If carbon flux/pp has changed through time.

Feeding into the food web.

Gets done sloppily or quickly a lot.

Data is very specific, predict biomass, cut down plot and measure everything – 3 plots

Best we’ve ever seen – tons of work.

Density measurements?

None have been planted

Some uncertainty in terms of individual tree age

Set this up as a thought experiment

Whittaker just fit stuff as he thought life should be

Dealing with the error

What’s the nature of the predictor

Thinking about doing it for Hubbard Brook

Allometry of a tree is baked in – why would age matter?

Differences in leaf area

Data:

Don’t know exactly where they were done – a lot of them done by watershed.

Glm

Linear model?

For a certain complexity of model, need to do random effects integrations