

Quantifying 40 years of forest dynamics in UMass experimental forests

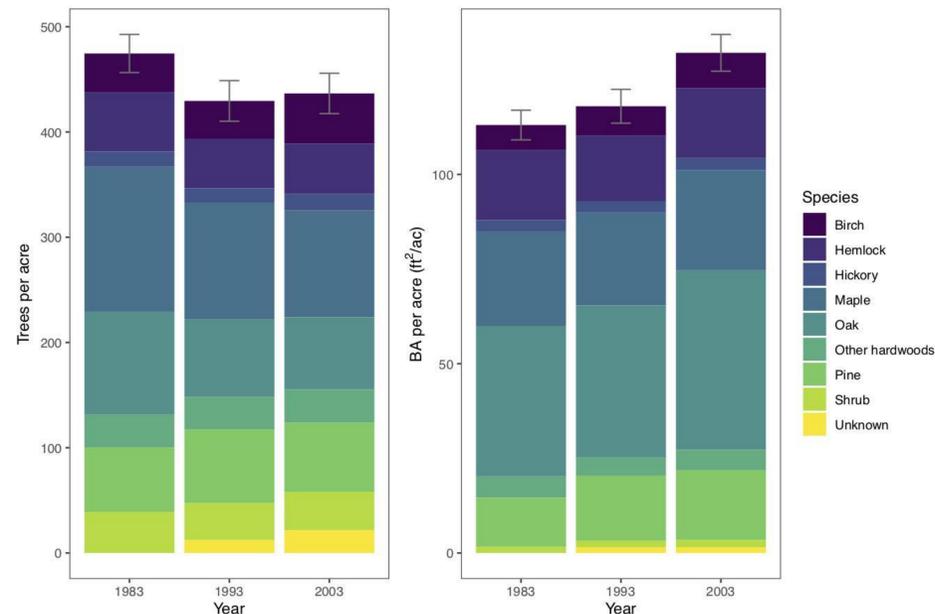
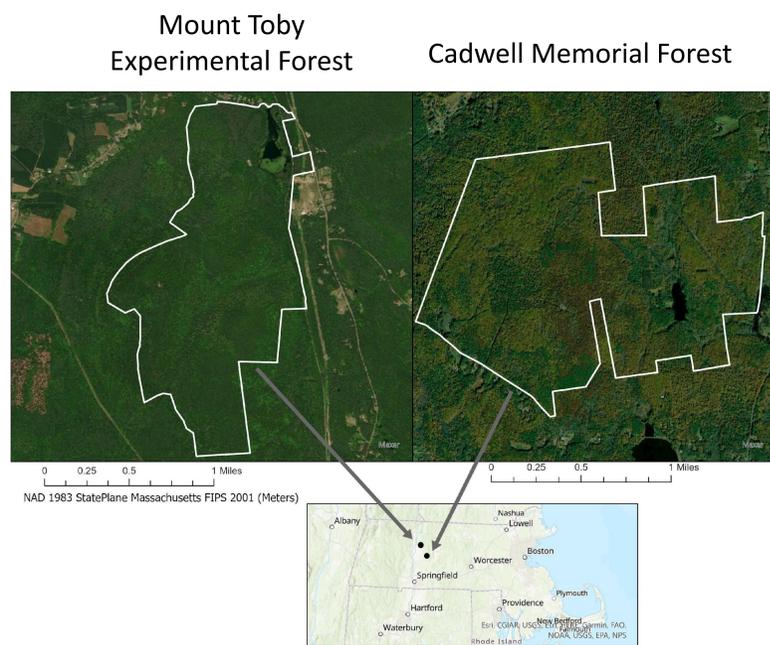
Isaac Gordin

Background

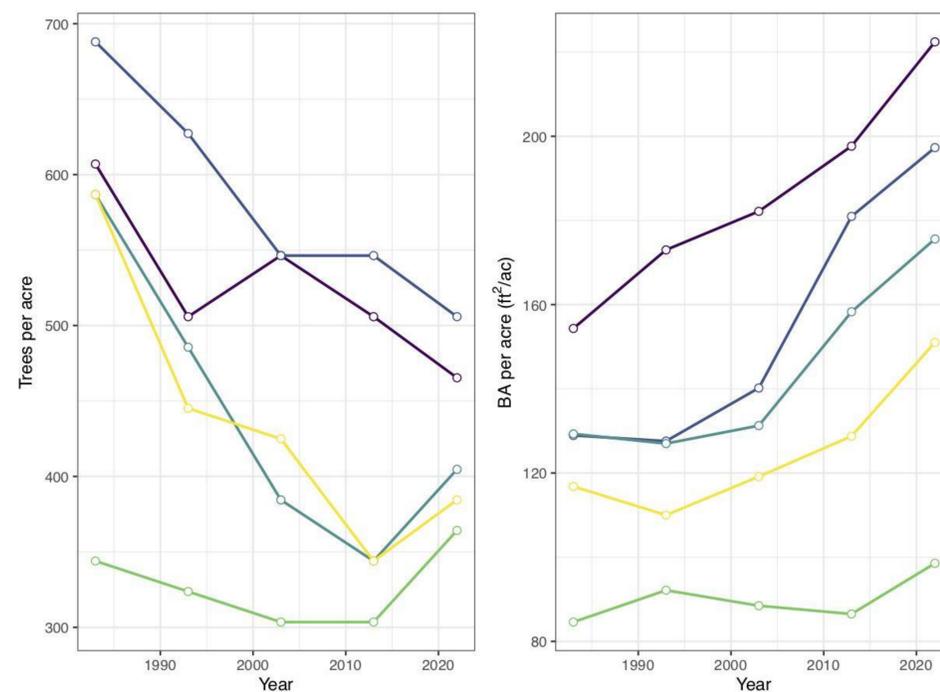
- Continuous Forest Inventory (CFI) is the practice of sampling forest ecosystems regularly over a period of time.
- Individual tree variables measured include diameter, height, crown class, vigor, and crowding.
- In addition, variables including stem density, basal area per acre, regeneration, and disturbance are measured at the forest or stand level.
- These data are used to track changes in a forest ecosystem over time driven by growth, mortality, and regeneration.
- This information is used to better understand forest dynamics in response to changing conditions and to inform the development of management plans.

Forest Properties

Cadwell Memorial Forest was donated to UMass in 1952. It spans 1,200 acres and is primarily mixed central and northern hardwoods including oaks, maples, pines, and hemlocks. Mount Toby Experimental Forest was acquired in 1916. It spans 755 acres and is primarily a mixed hemlock, pine, and hardwood forest.



Mean stem and basal area density by genus over three complete inventory cycles.



Plot-level changes in stem and basal area density over time in five plots re-measured during summer 2022.

Field Methods

- I collected CFI data at 9 plots at Cadwell Memorial Forest this summer.
- I followed the protocol from the prior decades of research.
- The data I collected included: diameter at breast height (DBH), vigor, and crown class.
- I collected tree cores with an increment borer to aid in tree growth analysis.
- Tree cores provide information on tree demography.
- This information is used to age stands and measure the radial growth on an annual basis.



Clockwise from top left corner: Measuring DBH, determining tree vigor and crown class, using increment borer to collect tree core sample, sanded down tree core sample.

Results & Future Work:

- The plots show stem density decreasing and basal area increasing, consistent with a mid-successional forest in the maturation phase of development.
- The remeasurement of the Cadwell and Mt. Toby plots will be completed over the next two years.
- The updated CFI data will be used to inform emerging models of forest dynamics to better understand the factors underlying changing composition and structure in these forests.

Acknowledgements

Malcolm Itter, Samantha Myers, Bill Patterson, Bill Wilson, James Rigney, and friends and family

Sources

Caputo, J. and D'Amato, A. (2006) Mount Toby Demonstration Forest Management Plan.
D'Amato, A., Buckley, S., Johnson, H., Hutcheson, D., Moreno, M., et al. (2003) Cadwell Forest Management Plan.