



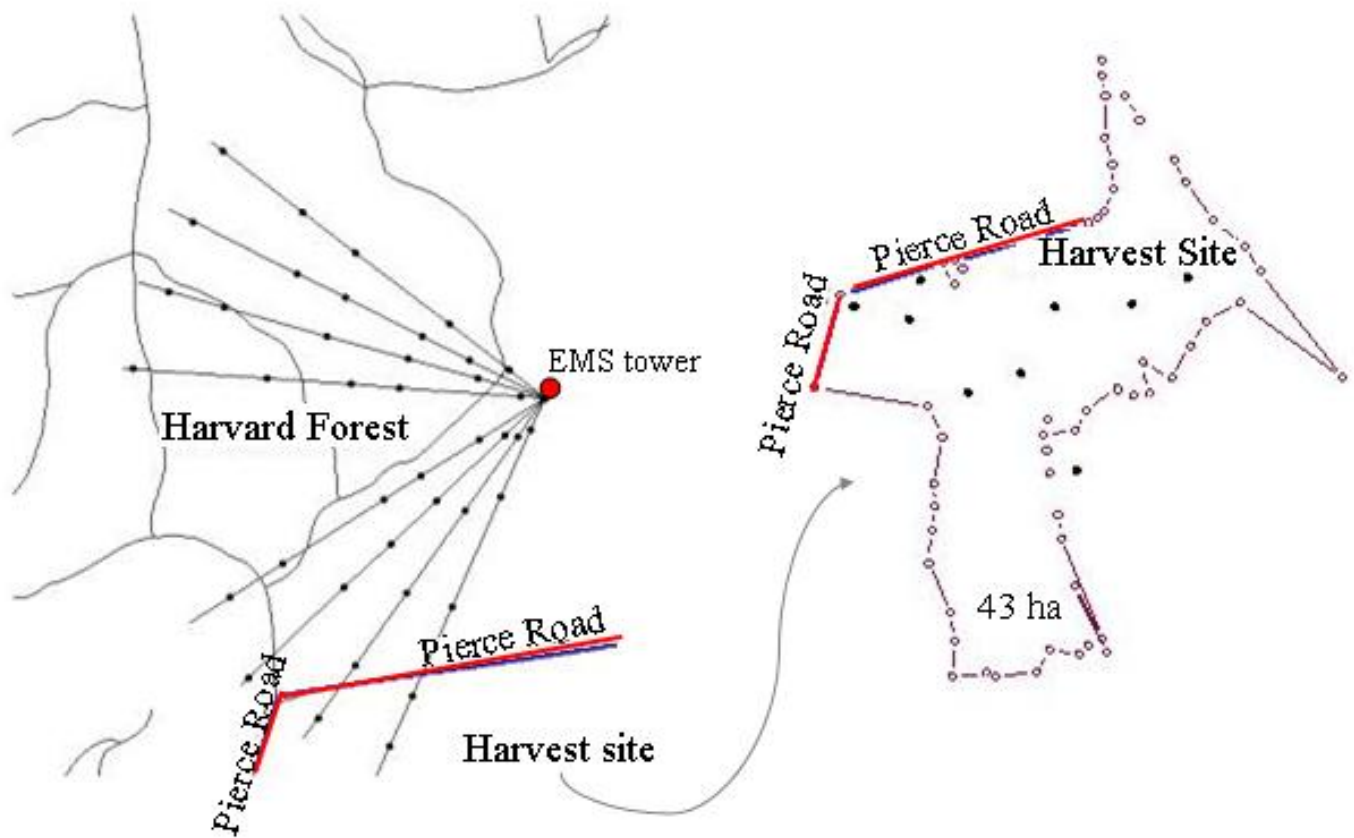
Preliminary effects of selective harvest on carbon stocks and stand structure adjacent to the Prospect Hill tract

**L. Hutyra, C.C. Barford, E.H. Pyle, D.M. Bryant,
B. Curry, J. Silvis, R. Wofsy, S.C. Wofsy**

Research Questions

- **What are the long-term and short-term effects of selective logging on forest carbon dynamics?**
- **How will the aboveground woody increment change with the altered stand structure?**
- **Will the site be a source for carbon as a result of the large quantities of slash left on the site?**
- **How will the species composition and demographics shift as this site recovers from disturbance?**

Site Location



Long-term Site Measurements

- Aboveground woody increment via dendrometry
- Coarse Woody Debris (CWD)
 - CWD stocks and inputs via mortality & plots
 - CWD respiration via chamber based measurements
 - CWD density–species and decay class based estimates
- Soil moisture via TDR
- Soil respiration via chamber based measurements
- Litter decomposition via litterbags
- Canopy & gap responses



2001 Harvest Statistics

Saw Timber

- 289 MBF saw timber planned for removal (682 m³)
- 284 MBF saw timber actually for removed (671 m³, 392 Mg C)

Firewood

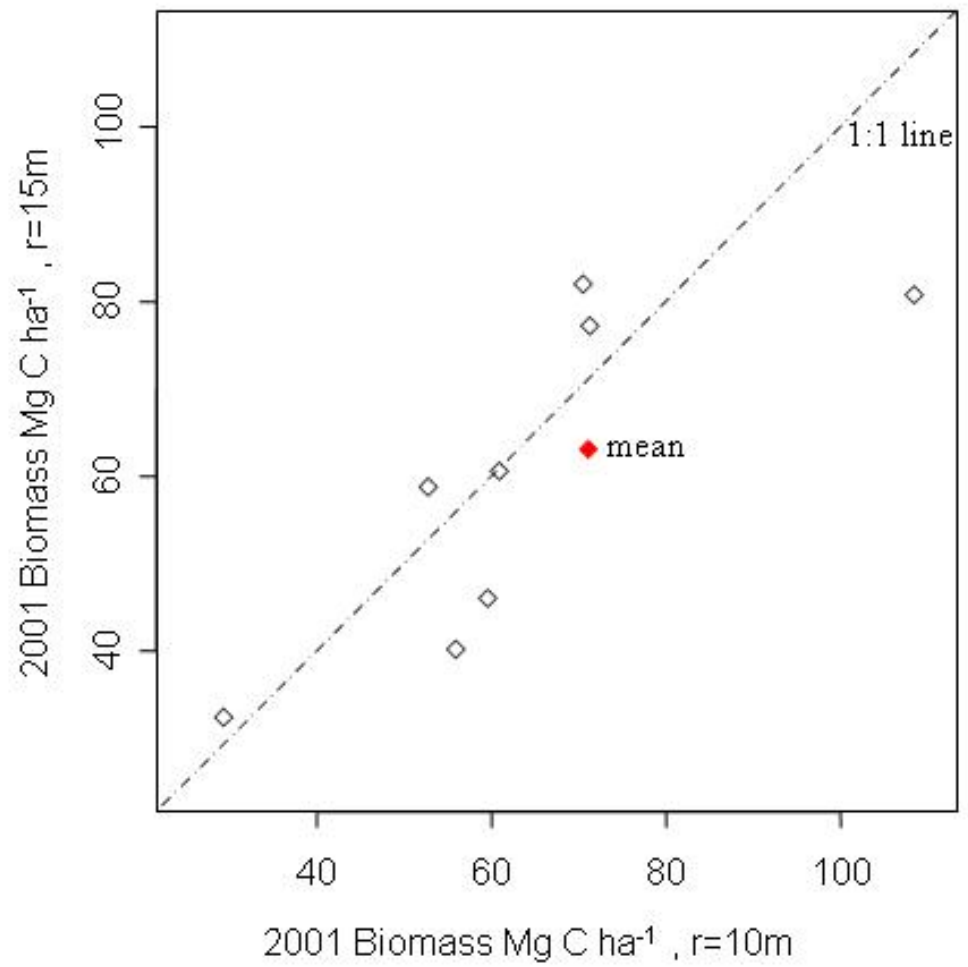
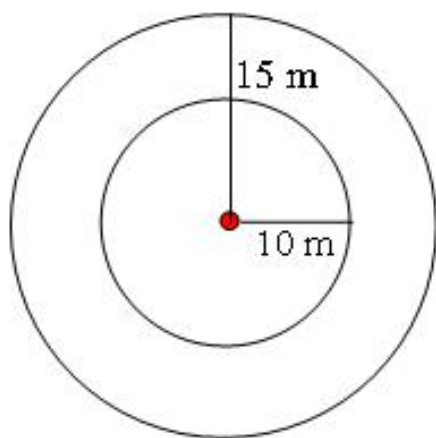
- 130 cords firewood planned for removal (313 m³)
- 487 cords firewood actually for removed (1174 m³, 205 Mg C)

Total

- 64% of total volume was firewood.
- 35% of the total biomass was firewood.
- Total mean removal was 42.8 m³ ha⁻¹ (~14 Mg C ha⁻¹)

Typical Quabbin harvest rates 44.7 m³ ha⁻¹
(Kittredge personal comm.)

Harvest Plot Expansion



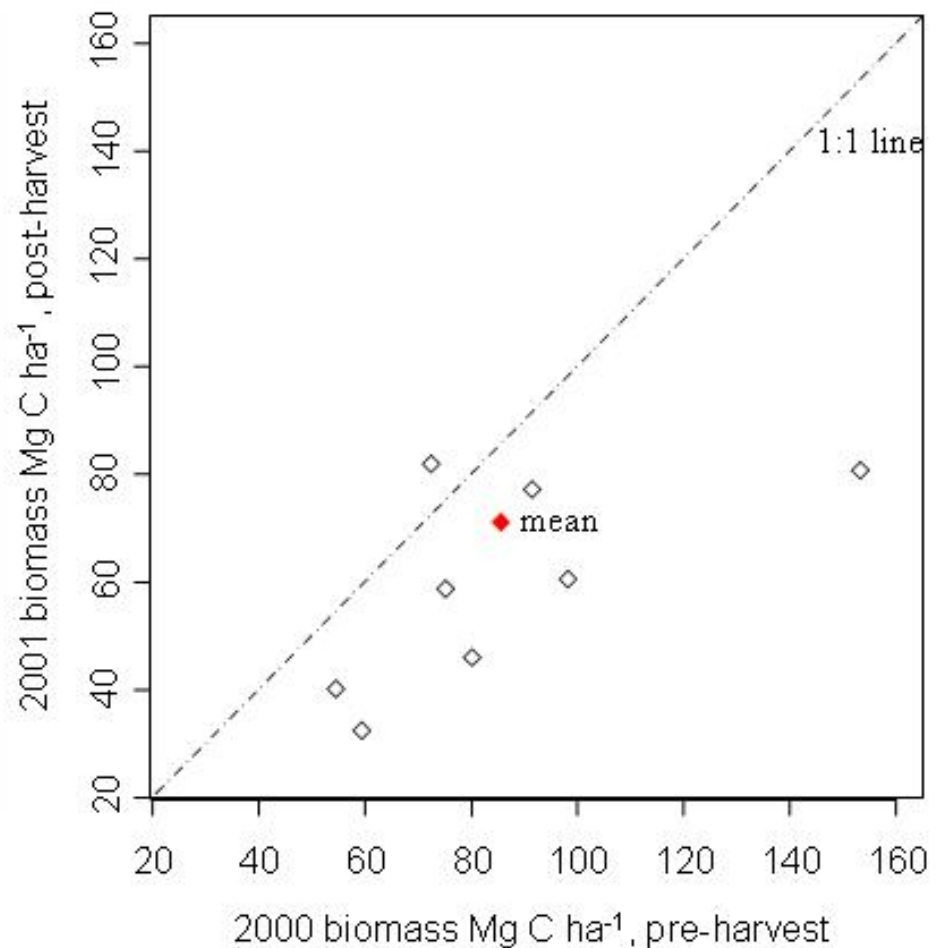
Standing Live Biomass

Mean 2000 standing live biomass, pre-harvest:
85.6 Mg C ha⁻¹

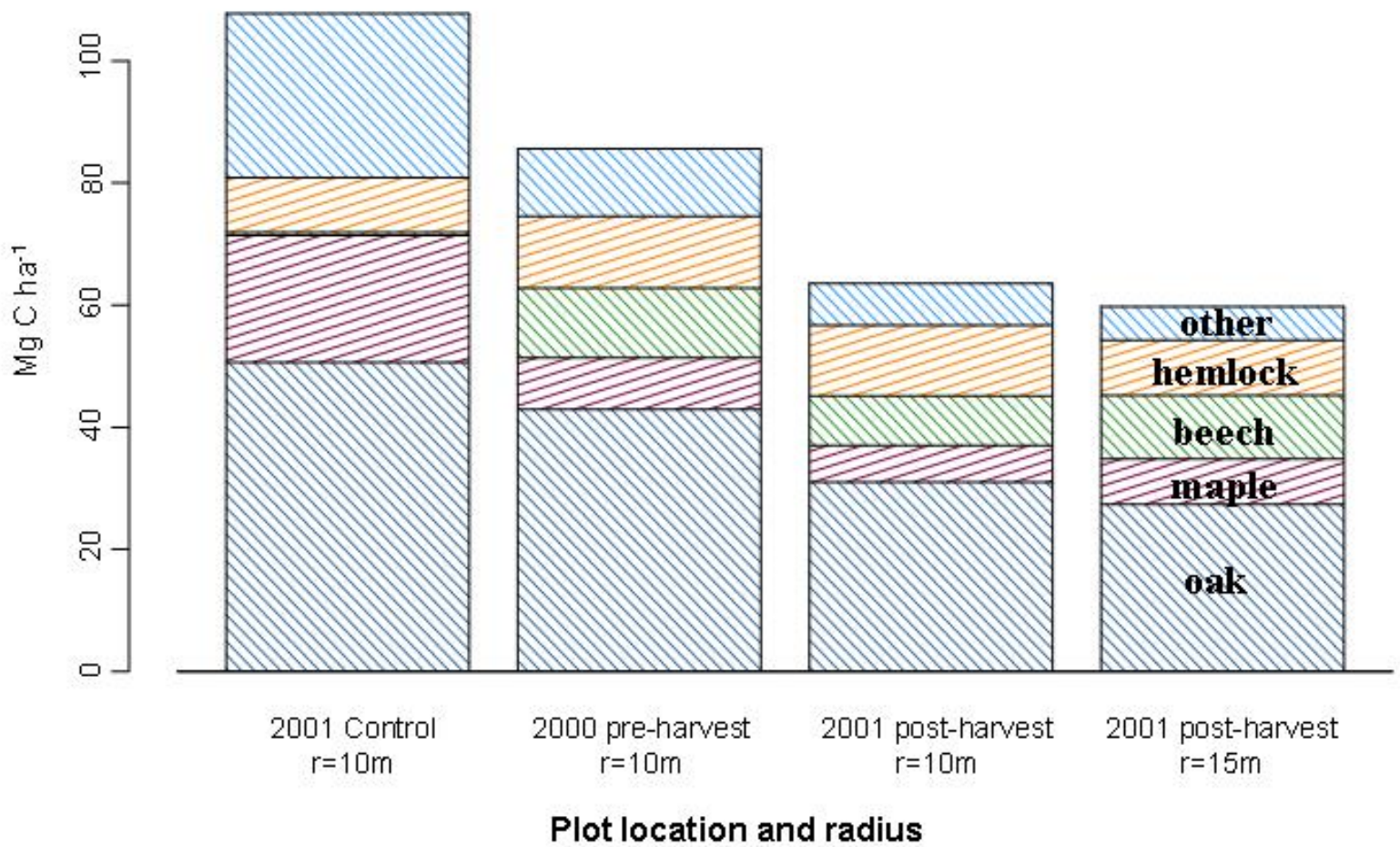
Mean 2000 aboveground woody increment, pre-harvest:
1.3 Mg C ha⁻¹

Mean 2001 standing live biomass, post-harvest:
56.7 Mg C ha⁻¹

Mean 2001 aboveground woody increment, post-harvest:
0.7 Mg C ha⁻¹



Species Distribution





The heterogeneity in coarse woody debris was very high, with a large fraction of the biomass stored in small diameter wood.

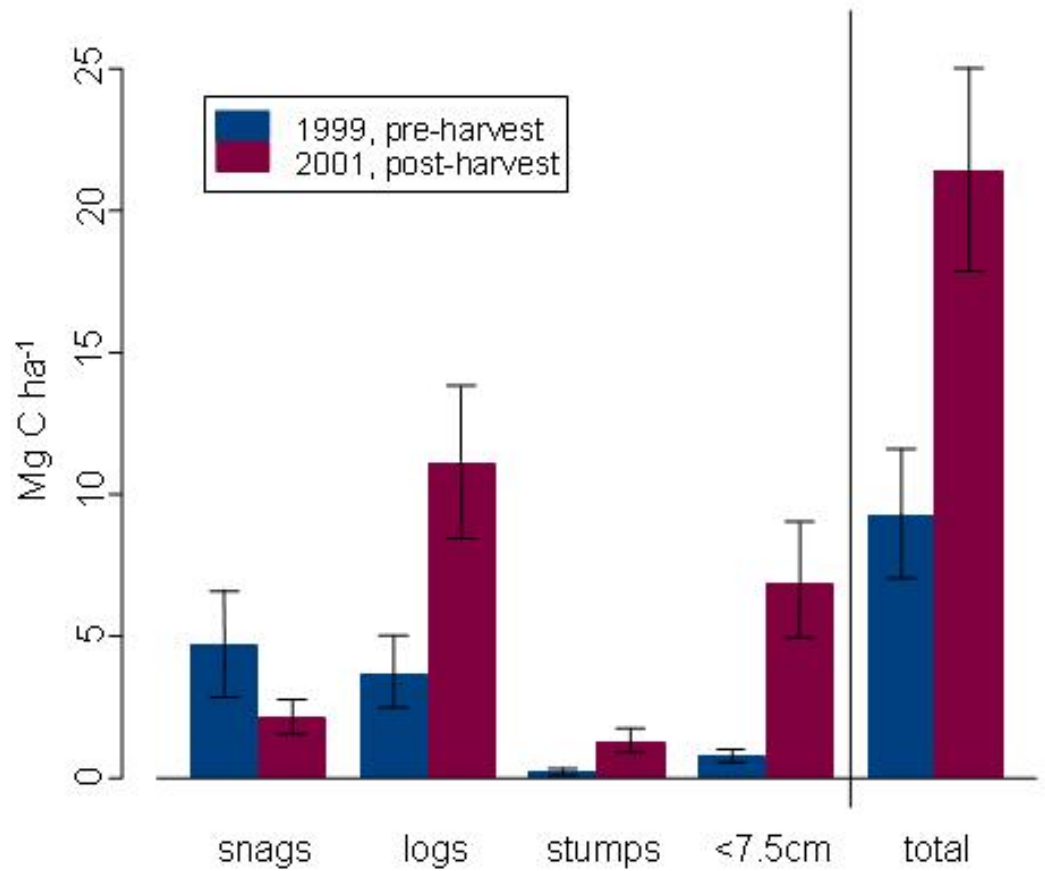


Much of the soil organic layer was removed along the network of skid trails.

Initial Coarse Woody Debris (CWD) Results

1999 mean CWD,
Pre-harvest:
9.3 Mg C ha⁻¹

2001 mean CWD,
post-harvest:
21.4 Mg C ha⁻¹



Conclusions

- Standing live biomass decreased by 28.9 Mg C ha⁻¹ with harvest, from 85.6 to 56.7 Mg C ha⁻¹.
- Coarse woody debris (CWD) increased by 12.1 Mg C ha⁻¹ with harvest, from 9.3 to 21.4 Mg C ha⁻¹.
- Total harvested wood was ~14 Mg C ha⁻¹, 9.1 Mg C ha⁻¹ in saw timber & 4.8 Mg C ha⁻¹ in firewood.
- Assuming a 6% annual mass loss rate for CWD, approximately 1.3 Mg C ha⁻¹ will be released per year in the initial post-harvest years.
- For the first several years post-harvest, this site is expected to be releasing carbon due in large part to respiration of CWD and the diminished rates of aboveground woody increment.



Acknowledgements

**Fred Heyes
&
Jack Edwards**

**REU's & Undergraduates:
Bridgid Curry, Julia Silvis,
Rachel Wofsy, Shane Heath,
Felicia Frizzell, David Patterson**