

**Decline in sugar maple growth and regeneration
near its elevation limit in the Green Mountains, VT**

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Abstract

We hypothesized that sugar maples (*Acer saccharum* Marsh.) growing near upper elevation limits are particularly responsive to temporal changes in the growing environment, and that sugar maple may therefore be expanding its elevational range in response to perceived increases in global temperatures. Basal area increment (BAI), regeneration, and sapling top death were studied on five west-facing slopes in Vermont at the elevation limit and at elevations of 25m, 50m, and 100m below the limit. BAI per tree, averaged over five year intervals, declined steadily and significantly from 1973-77 (15cm²/yr) to 1988-92 (8.5 cm²/yr), but the most striking decline between successive growth intervals was the most recent (27% BAI reduction from 1983-87 to 1988-92). BAI was consistently and significantly lowest at the limit, but relative changes in BAI over time were most pronounced at 25m and 50m. Monitoring of temporal change in radial growth would therefore be most effective at this elevation. Regeneration was abundant at 100m (43,100 germinants/ha), but declined to zero as the limit was approached. Surprisingly, all saplings near the elevational limit regenerated by root sprouts and almost all (88%) saplings experienced multiple top deaths. The cause of these phenomena is unclear, but a combination of biotic and abiotic factors is suspect.