

## SOIL CHARACTERISTICS 30-YEARS POST-HARVEST ON MAINE SPRUCE FLATS: PRELIMINARY RESULTS

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The objective of this retrospective study was to quantify the effects of tree harvesting on spruce flats in northern Maine, 30 years post-harvest. Spruce flats are dominated by shallow-rooted species and, therefore, nutrients vertically redistributed in the mineral soil following disturbance may be biologically out of reach. In order to test this hypothesis we selected stands cut 30 years ago representing three harvest intensities (30%, 50%, and 80% removal) and two unharvested reference sites. Samples from the O and B horizons were collected from pits excavated near each of ten mature red spruce selected at each site. These samples were analyzed for C, N, exchangeable cations, extractable P, pH, and exchangeable acidity. O horizon soil moisture was calculated from samples collected during the summer of 2004.

Preliminary results indicate that a threshold exists between 50% and 80% removal-by-volume beyond which the impacts on the soil are noticeable, 30-years post-harvest. Beyond this threshold, the O horizon is significantly thinner and has a lower C:N ratio. Total C and total N in the mineral soil were highest in the 80% harvest. This indicates increased leaching of dissolved organic matter from the O horizon post-harvest. The mass of extractable P and exchangeable K in the O horizon was significantly lower in the 80% harvest, while concentrations in the B horizon of the three stands after 30 years were indistinguishable. Phosphorus and K were not adsorbed by the upper 20 cm of the mineral soil and likely were leached below the sampling depth or from the system. Conversely, the mass and concentration of exchangeable Mn were higher in the O horizon of the 80% harvest.

A threshold exists between 50% and 80% removal beyond which nutrient dynamics are adversely impacted. In these shallow-rooted systems, some limiting nutrients likely are redistributed to locations where they are unavailable to trees. This can impair the fertility and productivity of these stands. The results from this study can help foresters implement management plans that will help maintain the integrity of the region's spruce-fir forests.