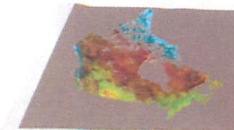




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Modeling Water Flux (Transpiration) for an Ontario Boreal Spruce Plantation Childerhose Flux Site near Timmins, Ontario

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The ability of forests to sequester carbon varies. Young vigorously growing plantations may have greater potential to do so than mature stands. Carbon sequestration can be measured directly or indirectly estimated by measuring and monitoring diurnal and seasonal water flux. Stand water flux (transpiration, sapflow) was monitored throughout the growing season for a 20-year-old black and white spruce plantation located near Timmins, Ontario.



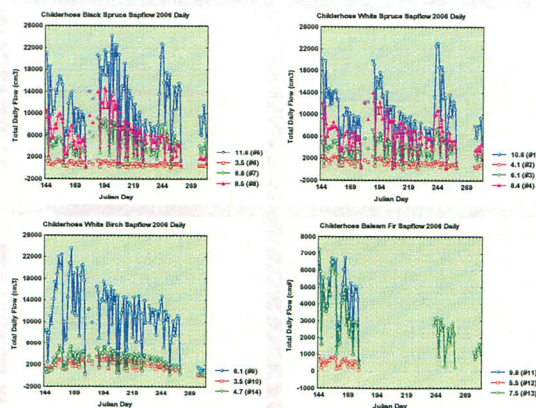
Dynamax TDP 30 mm probes were installed in the sapwood of 4 black and 4 white spruce trees for the range of stem diameters present. A similar approach was used for other naturally regenerated species (balsam fir and white birch) in the plantation. Probes were reset periodically to avoid signal decay. Live sapwood widths were determined from stained increment cores. Sapwood widths were then combined with sapflow rates to calculate diurnal, daily, monthly, and seasonal water flux volumes.

These data were then combined with a population census for each species in order to estimate water flux on a per hectare basis.

Water Flux (Sapflow) Research

Objectives:

- to determine temporal, spatial, and species differences in transpiration on a regional basis for boreal mixedwood forests
- to estimate forest canopy carbon fixation using transpiration data for boreal mixedwood forests
- to compare estimates of forest canopy carbon fixation using both regional and national sapflow and eddy covariance data



Monthly Water Flux Trends

- Water flux volumes generally peaked in July, and were higher for black spruce in June-August, and were slightly higher for white spruce in spring and autumn months
- Monthly water flux volumes for birch during summer was comparable or sometimes higher than for spruce.
- Monthly water flux was lowest for balsam fir, generally about half that observed for spruce.
- Conifer flows sustained in shoulder seasons (spring and fall) before hardwood leaf-out and after leaf abscission.



Results and Conclusions

- Daily water flux volumes highest for hardwoods.
- Daily water flux volumes lowest for conifers.
- Water flux volumes related to diameter (dbh).
- Flux volumes highest to lowest were: black spruce, white spruce, white birch and balsam fir.

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