

# Soil Respiration Rates for Three Recently Harvested Ontario Boreal Forest Sites

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## Wells Township LTSP Site:

- 18 yr old intensively managed Jack Pine plantation
- Component of Ontario Long-term Soil Productivity Study (LTSP)
- A component of North American LTSP Study
- Satellite Site for Canadian Carbon Program (CCP)
- Forest canopy Carbon & water flux research
- This study reports on the tree length (TL) harvested, disc trenched (DT), non-herbicide treated sub-plots for the Wells jack pine plantation site near Thessalon, ONT, north-central Ontario

## Ontario Childerhose Flux Station:

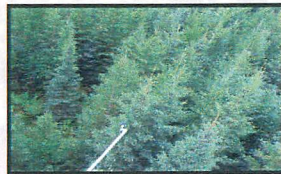
- 20-yr old spruce (Sb & Sw) plantation
- Component of Fluxnet Canada Research Network (FCRN) & Canadian Carbon Program (CCP)
- Tower eddy-covariance measurements
- Forest canopy Carbon & water flux research

## Ontario McKeown Lake Flux Station:

- Previously 80-year old uneven-aged boreal mixedwood forest
- Harvested winter 2009 (Tembec)
- Component of FCRN & CCP
- Before harvest major species included white spruce, balsam fir, yellow birch, white birch, trembling aspen
- Tower eddy-covariance measurements
- Forest canopy Carbon & water flux studies



Wells LTSP Site



Childerhose Flux Site



McKeown Lake Flux Station Before and After Logging

## Objectives of this study were:

- To quantify seasonal soil respiration differences among differing boreal forest types and forest stand chronosequence ages
- To ascertain if major seasonal soil respiration differences exist for these forest types and chronosequences
- To provide data to be compared with other methods such as eddy covariance measures

## Methods:



Installing Soil Collar



Soil Collar Near Water Flux Tree at Wells Site



Soil Collar at McKeown Lake



Li6400 Measuring Soil Flux and Soil Temperature



Soil Chamber on Collar and Temperature Probe



Measuring Soil Moisture at Wells with Hydrosence TDR

## Results & Conclusions:

- Soil respiration peaked in July declining thereafter (Figure 1)
- No significant differences between any of the 3 sites at any of the measurement times (Figure 1)
- Nominally speaking, Childerhose largest values and Wells smallest values (Figure 1)
- Nominally, silt loam sites had largest values
- For the McKeown Lake site, no significant differences between any of the 3 measurement years
- Nominally speaking, 2008 pre-harvest values largest and 2009 1st post-harvest values smallest (Figure 2)
- Soil temperatures 2 to 4 degrees higher after harvesting (Figure 3)
- The lack of statistical differences between sites suggests that for modeling purposes, a generalized curve could be fit to all the data to adequately describe soil respiration rates for a wide range of drier boreal forest types and soils that have been recently harvested (1 to 20 years) and reforested

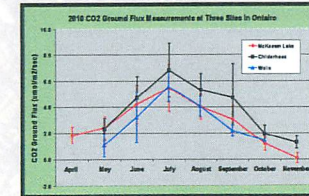


Figure 1

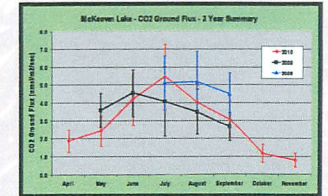


Figure 2

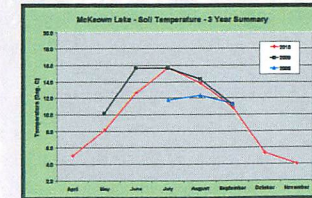


Figure 3

## Further Work:

Data will be combined with daily diurnal meteorological data in order to estimate soil respiration on a per hectare basis for varying forest types and age chronosequences

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