



## Boreal Forest Soils: Capturing Interest and Carbon

Did you know that soils are the largest carbon pools in the boreal forest? How can opening stands, whether naturally or as a result of silvicultural measures, influence the properties and carbon storage capacity of soils? The following answers were drawn from the work carried out by Canadian Forest Service (CFS) researchers.

### Soil: a reflection of the forest

The boreal forest is currently undergoing an ecological transition between two forest ecosystems. Open canopy lichen forests are encroaching southwards on the territory of the more productive closed canopy black spruce forests. Are soil properties different for these two forest types? The answer is yes. At the northern edge of Quebec's managed forests, i.e. where ecotones present a major challenge for forest management, differences in vegetation cover density are associated with significant variations in both physical and geochemical soil properties. This also has an impact on their capacity to store carbon, since the soils of closed canopy black spruce forests store three times more carbon than those of open canopy



Photo: NRCan

lichen forests through podzolization, the effects of which are felt over the long term. Podzolization is a complex process in which organic

materials and minerals (commonly iron and aluminum) are solubilized and leached from the upper soil horizons to accumulate in the B horizon, resulting in a rust colour.



Photo: NRCan

Whatever the cause (natural or anthropogenic), the present opening of black spruce forests is an ecological, economic and a climate issue with underlying consequences, especially with regard to long-term carbon sequestration capacity.



# Branching Out

from the Canadian Forest Service - Laurentian Forestry Centre

## Opening up, but...

In the boreal forest, the presence of gaps in low-productivity stands is associated with a lichen cover in dry sites populated with jack pine, and with a sphagnum cover in damp sites where black spruce grows. The composition of the vegetation covering the soil would contribute to maintaining these gaps by affecting soil moisture, nutrients and tree rootlets. These effects could be detrimental to stand productivity. In this context, silvicultural measures that open up the forest canopy, such as pre-commercial thinning, are not recommended on low-productivity (very dry or very humid) sites. Note that pre-commercial thinning aims to select promising young trees and clear the area around them by removing less promising neighbouring trees that hinder their growth. This increases forest quality and diameter growth. Pre-commercial thinning is best suited to dense, even-aged stands.

This is an additional element that must be taken into account when planning forest interventions in order to maintain site productivity, and especially to foster rapid regeneration in humid sites prone to paludification (bog formation) and in dry sites prone to become lichen tundra.



Photos: NRCan

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