



## **n-Alkane distributions as indicators of novel ecosystem development in western boreal forest soils**

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Novel ecosystem development is occurring within the western boreal forest of Canada due to land reclamation following surface mining in the Athabasca Oil Sands Region. Sphagnum peat is the primary organic matter amendment used to reconstruct soils in the novel ecosystems. We hypothesised that ecosystem recovery would be indicated by an increasing similarity in the biomolecular characteristics of novel reconstructed soil organic matter (SOM) derived from peat to those of natural boreal ecosystems. In this study, we evaluated the use of the homologous series of very long chain ( $>C20$ ) n-alkanes with odd-over-even predominance as biomarker signatures to monitor the re-establishment of boreal forests on reconstructed soils. The lipids were extracted from dominant vegetation inputs and SOM from a series of natural and novel ecosystem reference plots. We observed unique very long n-alkane signatures of the source vegetation, e.g. Sphagnum sp. was dominated by C31 and aspen (*Populus tremuloides* Michx.) leaves by C25. Greater concentrations of very long chain n-alkanes were extracted from natural than novel ecosystem SOM ( $p<0.01$ ), and their distribution differed between the two systems ( $p<0.001$ ) and reflected the dominant vegetation input. Our results indicate that further research is required to clarify the influence of vegetation or disturbance on the signature of very long chain n-alkanes in SOM; however, the use of n-alkanes as biomarkers of ecosystem development is a promising method.