Promote Return to Forest Cover

BERA Project Summary

How Mounds are Made Matters

Project Completion
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Project Theme Area
Soils and Hydrology

Project Code
SY3a

Project Location
Cold Lake, Alberta

Working Group
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Why is this study important?
This study compared changes to soil properties from different mounding techniques on peatland seismic lines. Understanding changes to soil properties, which in turn promotes a return to forest cover, provides information that will help land managers better assess the use of different mounding techniques. Restoring natural carbon dynamics in disturbed peatlands is another important goal of restoration. With the difficulty of measuring carbon loss on remote seismic lines, soil properties could be useful as indicators of C loss.

How was it completed?
Effects of mounding on soil properties were determined through analysis of surface peat and peat cores from seismic lines crossing fens near Cold Lake and Brazeau, Alberta. An incubation study using surface peat samples examined the effectiveness of easily measured decomposition markers as indicators of C loss from mineralization.

What are the core findings and management implications?
Inverted mounding showed a decrease in soil quality that may reduce forest recovery. Additionally, inverted mounding altered vegetation communities with lower moss cover and higher bare ground cover. The two newer mounding methods – intact mounding and hummock transfer, which keep the soil profile intact – did not show these changes and were largely comparable to natural conditions.

Intact mounding, also referred to as inline mounding, is a similar technique to inverted mounding apart from keeping the peat profile intact. Hummock transfer uses a different method by moving natural hummocks onto the seismic line. Hummock transfer has the advantage of not creating water-filled holes on the seismic lines but creates some disturbances in adjacent natural areas.

The findings of this study suggest the use of intact mounding or hummock transfer may result in higher soil quality than current methods of inverted mounding. Results from the incubation study suggest that easily measured soil properties, $\delta^{13}C$ and C/N ratios, could replace or support traditional carbon flux measurements. For hard to access sites, time and expenses in the field could be saved by using one-day soil sampling over weekly carbon fluxing.

What key uncertainties still remain?
Although soil properties are strongly linked to forest recovery, more research would be needed to confirm the direct effects of altered soil properties on the goal of returning to forest cover. More long-term studies would be beneficial to assess the effects of new mounding techniques on tree growth and survival. The relationship of soil $\delta^{13}C$ and C/N ratios with carbon loss needs to be confirmed in the field.

Boreal Ecosystem Recovery & Assessment