Restore Carbon Dynamics

BERA Project Update

Are We Trading Understory Structure and Function for Improved Tree Growth?

Project Update Year
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Project Theme Area
Soil/Hydrology & Vegetation

Project Code
IN3a

Project Location
Northern Alberta; multiple sites

Working Group
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Why is this study important?
Recent efforts to restore seismic lines involve mechanically recreating microtopography to encourage pre-disturbance soil and vegetation dynamics. Understory vegetation influences tree microhabitat conditions and competition, as well as ecosystem productivity and nutrient cycling. This study aims to assess understory plant diversity between seismic lines with mounding treatments, untreated (unmounded), and reference sites in bogs and fens in multiple locations across Alberta. By examining multiple metrics of diversity, including taxonomic (species), phylogenetic, and functional trait diversity, we can better understand seismic line impacts and restoration treatment efficacy.

How was it completed?
We measured the relative abundance and evolutionary relationships among 82 vascular and non-vascular plant species across six sites, including Foster Creek, Kirby and Clyde BERA study sites and additional seismic lines near Peace River, AB. Functional trait data for 36 species was obtained from publicly available plant trait databases for plant height (H), leaf dry matter content (LDMC), leaf nitrogen (N) and phosphorus (P) contents.

What are the core management implications to date?
Mounded sites differed from untreated lines and reference sites, with shifts towards higher community-weighted H, LDMC, N, and P These changes are caused by turnover of species with different functional attributes; for example, species unique to the mounds were predominantly horsetails, herbs, and graminoids with relatively larger leaf N and P. It appears that mounding pushes plant community structure and its function further from the reference system. This suggests we may be trading off function of the understory for improved tree growth. Although these changes may be temporary as plant communities undergo succession, more information is needed to assess the long-term success of mounding treatments on restoring pre-disturbance vegetation dynamics. In particular, directly measuring functional traits in the field within species, especially species that occur in seismic lines (treated and untreated) and reference sites would provide key information on plant and ecosystem function between untreated and restored seismic lines.

Boreal Ecosystem Recovery & Assessment