Restore Carbon Dynamics

BERA Project Summary

Linear Disturbances Shift Boreal Peatland Plant Communities Toward Earlier Peak Greenness

Project Completion
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Project Theme Area
Soils and Ecohydrology

Project Code
IN3b

Project Location
Peace River, Alberta, Canada

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Why is this study important?
Industrial activities for oil and gas mining across boreal North America can result in a vast network of linear disturbances called seismic lines. These are narrow clearings cut across peatlands and forests, resulting in the removal of trees and compaction to the soil, leading to changes in both the vegetation communities and how these ecosystems function. One such impact is how the ground-layer vegetation communities green up over the course of the growing season and how this affects how productive they are.

How was it completed?
In this study, we investigated the greenness patterns of vegetation communities at two different peatland types impacted by seismic lines. To do this, we collect photographs using smartphones, alongside vegetation surveys and carbon exchange measurements.

What are the core findings and management implications?
We found that these disturbances significantly impact the greenness of these communities, with disturbed areas becoming more productive faster. Using smartphones to collect photographs provided a quick and easy method to collect greenness data without the need for expensive equipment or fixed infrastructure. Furthermore, our ability to link the easy-to-measure greenness indices with productivity measurements also shows promise as a way to monitor and map shifts in peatland carbon exchange in response to linear disturbances and recovery over time. This would be valuable to regional to national accounting of greenhouse gas emissions. This would help improve management and restoration post-disturbance, providing a less intensive methodology for monitoring post-restoration trajectories.

What key uncertainties still remain?
Given we now know at the plot scale, linear disturbances cause significant changes in vegetation communities and phenological characteristics at two different peatland types. We could now use the greenness measured using these photographs and upscale this data using remote sensing products e.g., high resolution, high frequency satellite imagery that incorporate the overstory canopy in order to investigate temporal changes in vegetation productivity across much larger spatial scales.

Boreal Ecosystem Recovery & Assessment