Boreal Ecosystem Recovery & Assessment
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REMOTE SENSING TEAM FALL 2018: *MAPPING GROUNDWATER TABLE IN ALBERTA'S BOREAL REGION USING REMOTE SENSING TECHNIQUES*

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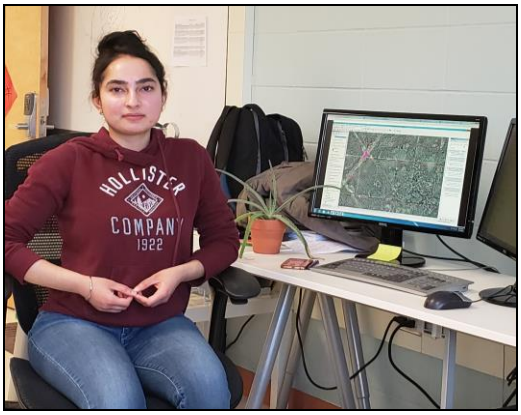

Project summary

The purpose of this research is to develop a workflow for mapping groundwater level (GWL) over diverse boreal terrain using remote sensing. Our approach takes advantage of the fact that water bodies are abundant in the boreal forest and can be used as predictor of GWL. The basic method, published previously by Rahman et al. (2017) was developed over a small (~60-hectare) study area near Peace River; in this project I will attempt to map groundwater across all of Kirby South (~3,000 hectares). Previous experience has shown that the method works well in open wetland areas where surface water is visible and abundant, but experiences errors in regions with dense canopy/uplands. I will attempt to determine a functional method for accurate GWL mapping across a broader range of boreal landscape types using airborne LiDAR, optical, and photogrammetric techniques. In doing so, I anticipate proposing alternative techniques for use in regions where the previous method fails.

Progress to date

I performed a literature review on groundwater-detection techniques this summer, in order learn about the various techniques (our lab's current technique, wet-areas mapping, etc.) that are available. I started working on the project application in Kirby South this Fall. The study area has been divided into equal sized 100x100 grids to get the water-elevation samples. Currently, we are working towards the selection of water-elevation sample points, one for training and one for testing, from each of the grids. Next steps are to determine the GWL for the whole region and identify the areas where the existing technique works and where doesn't. This will be followed by testing an alternative method for predicting the GWL for the areas that are presently not being estimated accurately. I anticipate completing my work by Dec, 2018.

Management implications

Groundwater is a subsurface phenomenon that is difficult to measure directly, but has significant impact on the environment. Information about GWL is crucial in understanding plant growth, forest productivity, methane release/greenhouse gas (GHG) emissions, and other factors associated with forest restoration. Remote sensing-based approaches to GWL are rare, and have significant advantageous over traditional field-based techniques.

Geographic location

I am working in Kirby South near Conklin, AB