

## ***Remote Sensing Team: Simple Drone Workflow Finds Conifer Seedlings in Forest Harvest Areas***

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### **Research Team:**

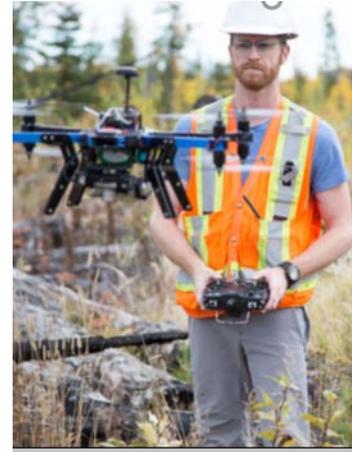
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### **Project Summary**

In Canada, establishment surveys are required after re-planting forest harvest areas. These surveys assess the adequacy of spacing, survival, growth, and species composition in the regenerating cutblock. In this study, we compared manual counts of conifer seedlings on the ground to those generated automatically using drone photography on two cutblocks in Alberta. We showed that the two methods largely agreed, with drones finding more than  $\frac{3}{4}$  of the seedlings counted on foot. We used a simple workflow that could perform in an operational context, avoiding complex photogrammetric processing of the entire area and relying instead on an efficient sampling-based approach, consumer-grade cameras, and straightforward image handling. Our results suggest that drones can be used to detect coniferous seedlings in an operational capacity with consumer-grade cameras alone, although our workflow relies on seasonal leaf-off windows where seedlings are distinct from their surroundings.



### **Management Implications and Lessons Learned**

Our research shows that drones can be used to detect coniferous seedlings in an operational capacity with standard RGB cameras, although our workflow relies on seasonal leaf-off windows where seedlings are spectrally distinct from their surroundings. Our methods could be further enhanced with multiple decision rules designed to handle diversity in species and other sources of variability.

The technology we demonstrate could lead to cheaper, faster surveys of survival of replanted conifer seedlings in regenerating harvest areas.

### **Publication(s)**

Feduck, C., 2017. Detection and Classification of Coniferous Seedlings from UAV Imagery: An Object-Based Machine-Learning Approach. MGIS final project, Department of Geography University of Calgary.

Feduck, C., McDermid, G.J. and Castilla, G., 2018. Detection of coniferous seedlings in UAV imagery. *Forests*, 9(7), p.432.