Natural Resources Canada
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2BILLION TREES

2 BILLION TREES SCIENCE

Research in Support of Tree Planting

NOTE 3

Monitoring tree survival and carbon accumulation in 2BT urban plantations using drones

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CFS CENTRE:
Northern Forestry Centre

PROJECT LOCATION:
Edmonton, AB

Project Drivers

Monitoring the fate of planted trees is an important aspect of the 2 Billion Trees (2BT) program. Monitoring and reporting the trees' growth and survival will allow program staff to estimate overall carbon sequestration and climate change mitigation benefits. Survival and establishment surveys are used to determine the viability of planted trees and the development of emerging new or restored forests. Surveying instruments mounted on drones can be a cost effective and a time saving method to do so. This method has the potential to replace manual surveys, especially for sites with an area less than 10 hectares, such as those typical of urban and suburban plots. However, there is a need to establish which workflows and specifications are most suitable for these sites, and assess trade offs between accuracy and cost. This project will test different drone-based methods to monitor survival and aboveground carbon accumulation in 2BT plantations <10ha. This project will provide monitoring practices and methods that can be replicated by 2BT participants or hired monitoring companies, and supply cost estimates for the tested monitoring options that prove to be accurate.

Project Approach

This project will involve both ground and drone surveying in a number of newly planted and already established sites in the Greater Edmonton Area. The project team will conduct multiple drone surveys, using both photometry and LIDAR at each site to test different parameters and determine the accuracy of results. The survival survey will aim to identify and count tree seedlings. It will be repeated a year later to determine both the overall proportion of surviving trees and areas within the site that potentially need replanting in the second year. For seedling detection, the team will use deep learning methods proposed in the latest literature. The establishment survey will determine the height and crown area of each individual tree at the site. Using this information, the project team will estimate the total amount of carbon that has been accumulated aboveground in the site since planting.

Anticipated Outputs and Impacts

This project is expected to provide a fast, cost-effective approach for determining tree survival rates after tree planting. The drone-based methods of estimating carbon accumulation that this project introduces will allow 2BT program staff to provide reliable estimates of the early carbon sink generated by the program by 2030. This project is targeted to participants in the

urban tree planting stream of the 2BT program, who have particular challenges when it comes to monitoring due to the unique characteristics of these planting sites. Planting agencies will have access to information necessary to replicate the monitoring and will be provided with recommendations on what drone parameters to use.

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Aussi disponible en français sous le titre : Suivi aérien par drone du taux de survie des arbres et de leur accumulation de carbone dans les plantations urbaines du programme 2GA.

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