



University
of Victoria

Graduate Studies

Notice of the Final Oral Examination
for the Degree of Master of Science

of

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BEng (Hochschule Weihenstephan-Triesdorf, 2015)

**“Monitoring Forest Restoration Effectiveness on Galiano Island,
British Columbia: Traditional and New Methods”**

School of Environmental Studies

Thursday, September 13, 2018
10:00 A.M.
Clearihue Building
Room B019

Supervisory Committee:

Dr. Eric Higgs, School of Environmental Studies, University of Victoria (Supervisor)
Dr. Cecil Konijnendijk, School of Environmental Studies, UVic (Member)

External Examiner:

Dr. Stephen Murphy, School of Environment, Resources and Sustainability, University of Waterloo

Chair of Oral Examination:

Dr. Julie Zhou, Department of Mathematics and Statistics, UVic

Dr. David Capson, Dean, Faculty of Graduate Studies

Abstract

I compared forest structural parameters of treated and untreated control plots on a forest restoration site on Galiano Island, British Columbia. The site was replanted with Douglas-fir (*Pseudotsuga menziesii* (mirb.) Franco) after being intensively logged in the 1970s. I collected data on tree diameter, tree height, vegetation percentage cover and coarse woody debris with ground methods. I used data collected in 2007 to compare diameter growth between treatment and control plots. I then reviewed the literature on the use of unmanned aerial vehicles (UAV) in ecological restoration and recommended potential future use. Finally, I used images taken from a consumer grade UAV to assess forest structure of the restoration site and compared my results with my ground measurements. I found that treated plots showed improved measures of structural diversity like diameter growth, crown ratios and plant diversity, but I was unable to relate the increased diameter growth to the restoration treatments. If applied correctly, UAVs can increase the amount of available data before, during and after restoration and therefore help improve our scientific understanding of ecological processes involved in restoration. UAVs can increase access to remote areas and decrease disturbance of sensitive ecosystems. Regulations, limited flight time and processing time remain important restrictions on UAV use. I found a canopy height model (CHM) from UAV images delivered good relative tree heights for the study site, but underestimated mean tree height and stem densities. Canopy gaps accounted for 6% of the canopy. UAV images and the resulting CHM represent a valuable visualization of the study site and can be a helpful tool in the communication of restoration outcomes to a wider audience.