

You are invited to attend the presentation of the

## Final PhD Defense of Dean Koch

Date March 13, 2020

Time 1:00 p.m.

Location CAB 657 Public Presentation

“The spread of the mountain pine beetle: challenges and solutions in large-scale spatial ecological modeling”

The mountain pine beetle (MPB) is among the most destructive eruptive forest pests in North America. Modern approaches to studying the MPB often entail the analysis of large-scale, aerially surveyed data on damage to pine forests. Large sample sizes and spatial effects create a need for new modelling tools to handle the unique challenges in spatially referenced ecological survey data. In my thesis I develop these tools and apply them to studying the spread and attack behaviour of MPB. My results include: a novel statistical framework for handling spatial autocorrelation using covariograms; A PDE for random movement that unifies a number of previously unconnected results on redistribution kernels; and a comprehensive model for the spatial spread of infested stems, coupled by MPB dispersal flights. I will explain how, using aerial survey data, these tools lead to an accurate estimate of the size of the cryptic endemic MPB population -- which formerly has been measurable only by means of costly and time-intensive ground surveys.