1128-92-28 **Jacob P Duncan***, 149 Le Mans Hall, Notre Dame, IN 46556, and **James Powell**.

Spatiotemporal Insect Epidemic Modeling: Predicting Outbreak Severity in a Changing Climate.

Outbreaks of phytophagous forest insects are largely driven by ambient thermal energy, host demographics, and spatial effects of dispersal. We develop a structured integrodifference equation (IDE) outbreak model that tracks the demographics of sedentary hosts under insect infestation pressure. The temperature-dependent model is appropriate for a spectrum of pests attacking the later age classes of long-lived hosts, including mountain pine beetle (MPB), spruce budworm, and spruce beetle. We parameterize the model using MPB infestation data taken during a recent outbreak in central Idaho. The mechanistic model generates a train of periodic waves of infestation. We approximate the IDE with a partial differential equation and search for traveling wave solutions. The resulting ordinary differential equation predicts the shape of an outbreak wave profile and peak infestation as functions of wavefront speed, which can be calculated analytically. These results culminate in the derivation of an explicit approximation of invasion wave amplitude (a measure of outbreak severity) based on the temperature-dependent reproductive rate of the infesting insect, thus elucidating the connection between recently more severe insect epidemics and global climate change. (Received January 24, 2017)