1145-92-2239 **James A Powell*** (jim.powell@usu.edu), Logan, UT. *One spot, two spot, red spot grew spots: How differential dispersal, phenology and the Allee effect predict pattern formation in mountain pine beetle impact.*

The mountain pine beetle (MPB), is an aggressive insect which attacks pine trees. Pines have significant physical/chemical defenses, requiring the beetles to attack en masse to successfully colonize. Beetle larvae consume the phloem, killing the host and requiring dispersal to find new hosts. Temperatures nonlinearly control development and emergence, creating a thermal niche depending on synchronized timing and dispersal. Warming has broadened this niche across western North America, causing recent tree mortality over 60 million hectares. Observed patterns run the gamut from apparently random, persistent spots to aggregating spots and growing patches to complete mortality in susceptible age classes. A mechanistic model based on differential beetle motility between forested and unforested habitats (ecological diffusion), temperature control of MPB and the Allee effect recovers most variability at landscape scales but misses spots appearing at low emergence levels. Landscape resistance to movement (minimal travel time) can be calculated using host-dependent motility, and we argue that spots should follow a power-law distribution in travel time from previous infestations. The power-law hypothesis is tested against data from MPB outbreaks in Idaho, Colorado and Washington state. (Received September 25, 2018)