1138-34-73 **Zhilan Feng*** (zfeng@math.purdue.edu), 150 N. University Street, Department of Mathematics, Purdue University, West Lafayette, IN 47907. *Plant toxins and trophic cascades alter fire regime and succession on a boreal forest landscape.*

Earlier models of plant-herbivore interactions relied on forms of functional response that related rates of ingestion by herbivores to mechanical or physical attributes such as bite size and rate. These models fail to predict a growing number of findings that implicate chemical toxins as important determinants of plant-herbivore dynamics. Specifically, considerable evidence suggests that toxins set upper limits on food intake for many species of herbivorous vertebrates. Herbivores feeding on toxin-containing plants must avoid saturating their detoxification systems. We developed mathematical models with toxin-determined functional responses to study the effects of inter-specific plant competition, herbivory, and a plant's toxic defenses against herbivores on vegetation dynamics. The new models exhibit much more complex dynamics including Hopf and homoclinic bifurcations. We used the model to estimate the effects of different levels of wolf control. Simulations indicated that management reductions in wolf densities could reduce the mean time to transition from deciduous to spruce by more than 10 years, thereby increasing landscape flammability. The integrated model can be useful in estimating ecosystem impacts of wolf control and moose harvesting in central Alaska. (Received January 29, 2018)