An agent-based model of a Hemlock Woolly Adelgid *Adelges tsugae A.* infestationimplemented in the Python language with optional biocontrols

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The latest exotic tree pest to arrive in the Northeastern U.S. is the Hemlock Woolly Adelgid (HWA) *Adelges tsugae* Annand. This aphid-like insect is capable of killing eastern hemlock *Tsuga canadensis* throughout most of the Appalachian range. The unique role hemlock plays in these ecosystems will cause its loss to dramatically alter the landscape of this region. This study seeks to develop a method to model the dynamics of HWA infestations and find pathways to control them. The model will allow for the study of the dynamics of the infestation on the forest composition, and the possible options for biocontrol strategies. Here a predator prey competition style model is developed in the Python scripting language to capture the dynamics of the spread of the Hemlock Woolly Adelgid across a forest in Central Massachusetts. Multiple two-parameter sweeps are used to evaluate the functioning of the model. These sweeps confirm the model to behave as expected but suggest the need for further tuning and development. Future directions involve integration with an existing cellular automata to model the spread of the HWA across a landscape, and three-dimensional visualization of the affected forest stands.