FACTORS AFFECTING THE DISTRIBUTION AND ABUNDANCE OF EXOTIC EARTHWORMS IN THE HURON MOUNTAIN CLUB, UPPER PENINSULA, MICHIGAN

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ABSTRACT

Exotic earthworms are becoming established in previously earthworm-free areas of the Great Lakes region with the potential to alter forest ecosystems. Understanding the factors controlling their distribution and abundance across the landscape will aid in efforts to determine their consequences and potential forest management solutions. Presence and abundance of earthworms were measured at the Huron Mountain Club (HMC) in the Upper Peninsula (UP) of Michigan to characterize factors influencing their distribution and abundance.

A preliminary GIS-based risk model for earthworm invasion was developed and used to select randomly located sample points stratified across risk levels and focusing on high risk areas. Earthworm presence was confirmed by earthworm signs and middens created by the deep burrowing *Lumbricus terrestris* (common night crawler). At each sampling point, site characteristics and aspects of earthworm invasion were recorded including midden count, forest floor condition (ranked from 1-highly altered to 5-minimally altered), earthworms signs (castings, salt and pepper, missing layers), and presence of earthworms.

Signs of earthworm activity were observed at 57.6 percent of the points visited, while middens (exclusive to *L. terrestris*) were observed at 20.3 percent of points. As expected, forest floor condition was related to midden count: those sites with more middens had lower quality forest floors as altered by *L. terrestris*. Points with middens present were significantly closer to roads than those without ($p < 0.001$). The number of preferred trees present (e.g., basswood, maple, ash, and balsam fir) was significantly greater on sites with middens than without ($p = 0.009$), as was the percent of preferred trees of all those present ($p = 0.012$). Points with middens had significantly higher soil pH than those without ($p < 0.001$), although pH may not affect the abundance of middens, suggesting a possible threshold effect. No relationships were found between earthworm activity and distance to hydrologic features, drainage index, elevation, or slope. Analysis of the field and available GIS data is ongoing, and additional factors may be found to be significant. The results will be used to develop a spatial model using significant factors to predict the potential distribution of earthworms across the UP.