Abstract

1. Invasive earthworm species, such as *Lumbricus rubellus*, can cause changes to forest soils, which may result in reduced forest biodiversity. Individual Based Modeling (IBM) offers a way to predict the spread of invasive species, and can provide insight for control.
2. We developed an individual-based, spatially explicit, population dynamics model (WORMSPREAD) using the NetLogo environment. The user interface is designed to be easy to learn and flexible enough to incorporate new data.
3. WORMSPREAD allows ecologists and conservationists to better understand how variations in landscape structure and demographic parameters affect predicted earthworm abundance and distribution. Results can help determine where to concentrate conservation efforts and control strategies.
4. An example study of the spread of *L. rubellus* in a portion of the Adirondack Park, New York State, illustrated challenges to the implementation of WORMSPREAD for this and other species. In particular, more data on the relationship between species demography and environmental conditions are needed – even for this common and well-studied species. The computational demands of IBMs over spatial and time scales relevant to management also may be limiting.
5. WORMSPREAD can be used to predict population growth in real landscapes, with real variation in environmental conditions. However, it will only lead to accurate predictions if the underlying physiological and behavioral traits of the invading species are known. Indeed, our assessment of these traits for L. rubellus indicate that more data are needed for this species, and the situation is likely to be worse for less well-studied species. A better understanding of earthworm physiology and behavior will increase the efficacy of this and other efforts to model the spread of invasive earthworms.