

ALLEE EFFECTS AND GYPSY MOTH INVASIONS

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ABSTRACT

The ever increasing trends in global trade and international travel have increased the likelihood of arrivals of non-indigenous species, which are consequently a mounting threat to native ecosystems. Previous studies of habitat invasibility have highlighted the importance of understanding and identifying components that increase or decrease the ability of an exotic species to successfully invade a particular ecosystem. Another important aspect of invasibility is the role that Allee effects could play in the invasion process. Allee effects collectively refer to decreases in population growth rate with decreases in population abundance, and causes include the inability to locate mates, inbreeding depression, and failure to satiate predators. Allee effects can play a critical role in slowing or preventing the establishment of low density founder populations of non-indigenous species. Similarly, the spread of established

invaders into new habitats can be influenced by the degree to which small founder populations ahead of the invasion front are suppressed through Allee effects (Whitmire and Tobin 2006). Understanding Allee effects can be critical in assessing extinction risks from the perspective of conservation biology, and there is growing recognition of their potentially important role during the establishment phase of biological invasions. We developed an approach to use empirical data on the gypsy moth, a non-indigenous invader in North America, to quantify the Allee threshold across geographic regions. We report that the strength of the Allee effect is subject to spatial and temporal variability, and we present what is to our knowledge the first empirical evidence that geographic regions with higher Allee thresholds are associated with slower speeds of invasion (Tobin et al. 2007).