ABSTRACT

TITLE:	Does Natural Disturbance Impact Zoonotic Disease Prevalence: A Test of The Dilution Effect Hypothesis in the Deer Mouse - Sin Nombre Virus System
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ABSTRACT: Loss of species diversity resulting from habitat disturbance is a commonly cited mechanism that has contributed to increased prevalence of infectious disease. In directly transmitted disease systems, biodiversity acts to reduce disease prevalence by reducing the number of potential disease-transmitting encounters between individuals, a phenomenon referred to as the Dilution Effect. We chose to evaluate the Dilution Effect hypothesis by examining changes in vegetation structure associated with Sudden Aspen Decline (SAD), a natural form of habitat disturbance that is common in Southwestern Colorado. Specifically, we chose to evaluate how SAD altered small mammal biodiversity and the prevalence of Sin Nombre virus (SNV), a hantavirus hosted by deer mice (Peromyscus maniculatus). From May-June 2010, we sampled small mammal community composition and SNV prevalence on 9 sites with high, moderate and low levels of SAD. Our results show distinct differences in both small mammal biodiversity and SNV prevalence across the SAD gradient. SNV prevalence on high SAD sites was roughly triple that of low and moderate SAD sites ($F = 6.02$, $P < 0.01$). Species diversity also varied across the SAD gradient, with greater species diversity on low and moderate SAD sites ($D = 0.77$ and $D = 0.68$, respectively), compared to high SAD sites ($D = 0.28$; $F = 4.65$, $p = 0.01$). These results suggest that changes in vegetation structure impact both small mammal community composition and zoonotic disease prevalence, supporting predictions of the Dilution Effect hypothesis.