

Variation in body size drives spatial and temporal variation in lobster-urchin interaction strength

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Abstract

Size-scaling relationships generated across huge variation in body mass from zooplankton to elephants offer critical insight into understanding similarities in species interactions across ecosystems. Yet to what extent ecologists can borrow from these relationships to effectively predict interactions between a single species pair remains poorly understood. Here, we combine experiments and long-term data to test how accurately published size-scaling relationships predict interactions between an economically and ecologically important predator-prey pair. We demonstrate that interaction strength is highly dependent on predator size, prey size, and prey density. We then used this relationship to predict plausible interaction strengths across ten years of data at five sites. Our analysis reveals that variation in body size accounts for up to 91% of the variation in interaction strength compared to density. However, predictions generated from even the closest size-scaling relationship from the literature underestimated the strength of interactions by a factor of 4.

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