

May 17th, 9:00 AM

Effects of predator diversity on optimal communities for prey suppression

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Title: Effects of predator diversity on optimal communities for prey suppression

Abstract: There is long-standing interest in the relationship between biodiversity and ecosystem services. In this talk, we will focus on the effect of predator diversity on prey suppression, which is associated with the service “biological control of pest species.”

Predator diversity has a complicated effect on prey suppression. Increasingly diverse predator communities might be resilient to environmental changes, allowing effective prey suppression over long timespans. However, diverse predator communities might also be prone to increased levels of consumption between predators, reducing prey suppression overall. We employ a generalizable differential equation model to describe the different mechanisms driving the positive and negative effects of predator diversity on prey suppression. The model is parameterized according to predator body mass and foraging area, allowing us to investigate the effect of diversity in these traits on prey suppression. We apply the model to a community of insects and investigate the interplay between these traits and mechanisms in determining prey suppression. We note the conditions under which diverse predator communities are beneficial or detrimental to biological control by studying optimal communities for suppression of the prey species.