

El Niño events, the lean versus fat scenario, and long-term guild dynamics of vertebrate predators in a South American semiarid ecosystem

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Abstract

Predator assemblages are complex systems in which asynchrony in the dynamics of resources and consumers, and the idiosyncratic perception of environmental conditions by the predators may obscure the detection of expected patterns. We disentangle the specific effects of these variables on the guild structure of a vertebrate predatory assemblage in a semiarid ecosystem of western South America. Over 16 years, this system faced dramatic fluctuations in prey availability associated with four El Niño events. After controlling for other sources of variation, we tested if increased resource availability is associated with higher niche overlaps, as expected from the lean/fat scenario. We determined the existence of two trophic guilds of predators (specialized mammal-eaters and omnivorous species with emphasis on arthropods) and found that they responded to increased productivity both at the guild and whole assemblage levels. However, the population response of arthropod prey (almost simultaneous) and of different small mammal prey (delayed by 1 or 2 years) to productivity imposed a degree of asynchrony in prey availability and in the response of predators. This resulted in the between-guilds exchange of predator species depending on mammal prey scarcity or abundance. As a consequence, the observed pattern was an apparent lack of response at the assemblage level. Despite differences in the perception of prey levels by predators, we conclude that each one of them responded accordingly to theoretical predictions following a simple rule: if prey resources are not limiting, predators behave opportunistically converging over the most abundant resources, thus increasing niche overlap; if prey shortages occur, predators specialize on those prey resources that they gather most efficiently, thus lowering niche overlap; if resources become even scarcer, all predators converge again upon the few prey resources still available, thus increasing overlap – out of necessity.