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Abstract: Associations between extinction and habitat fragmentation have been modelled and described,but we document the first clear mechanistic link between habitat fragmentation and population persistence, demonstrating that a rapid evolutionary response to fragmentation can yield conditions wherein some populations are more vulnerable to extinction. Historical differences in the partitioning and tenure of land in southwestern North America has resulted in vast differences in parcel sizes. Smaller parcels at the eastern edge (western Oklahoma) of the shortgrass prairie are bounded by far more fence and traversed by far more roads and power lines than are larger parcels at the western edge (eastern New Mexico). The increased extent of fencing, roads and power lines is associated with higher mortality of female, but not male, lesser prairie-chickens (*Tympanuchus pallidicinctus*), a rare species endemic to the south-central United States. Differences in mortality rates appear to have selected for differences in life history strategies: relative to females in New Mexico, female prairie-chickens in Oklahoma lay larger clutches and nest fewer years but make more attempts within a year. The results of this trade-off have left Oklahoma birds far more susceptible to year-to-year environmental perturbations, explaining that population's rapid decline relative to the more stable populations in New Mexico.