

Fruit bat migration matches green wave in seasonal landscapes

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Abstract

Migrating animals respond to seasonal changes in the environment, and therefore they should time migration to coincide with peaks in resource abundance. However, it is unclear if and how frugivorous animals use phenological events to time migration, especially in the tropics. The straw-colored fruit bat (*Eidolon helvum*), Africa's most gregarious fruit bat and a key seed disperser, forms large seasonal colonies through much of sub-Saharan Africa. We hypothesized that aggregations of straw-colored fruit bats match the timing of their migration with some landscape phenologies. Using monthly colony counts from seventeen sites across much of their range, we matched peak colony size to peaks in remote sensing measures of enhanced vegetation index (EVI), instantaneous rate of green up (IRG), precipitation (PRP), and the instantaneous rate of change of precipitation (IRP). Peak colony size was closest to peak IRG (60% of peak sizes occur within 1 month of peak IRG), while IRP was a close second. Sites with closer temporal matching by colonies typically had higher maximum EVI, high seasonal variation, or a short growing season, and larger peak colony size. *E. helvum* seem to time their migrations to move into highly seasonal landscapes and away from their core distributional range in the tropical forest belt to exploit short-lived explosions of food. The link between rapid changes in colony size and phenological match may also imply a potential collective sensing of the environment, which could be threatened by overall decreasing bat numbers along with various threats faced by large colonies.

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