Seasonal Spatial Dynamics of Butterfly Migration

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Abstract

Understanding the seasonal movements of migratory species underpins ecological studies. Nearly 600 butterfly species show migratory behaviour, yet the spatial pattern of these migrations is poorly understood. We developed climatic niche models for 405 migratory butterfly species globally to estimate patterns of seasonal movement and the distribution of seasonal habitat suitability. We discover strong seasonal variation in habitat suitability for most of the migratory butterflies with >75% of pixels showing seasonal change in predicted occupancy for 85% of species. In contrast to bird migrations, the greatest rate of seasonal switching occurs in the tropics. Several species showed extreme range fluctuations, exceeding 10-fold for 53 species (13%) and more than 100-fold for nine species (2%); such species may be at elevated extinction risk. Our results can be used to search for the ecological processes that underpin migration in insects, as well as to design conservation interventions for declining migratory insects.

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