
Very high synchrony of survival between species for temperate songbirds: which climate contribution?

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Abstract

Climatic fluctuations affect animal populations (population size, phenology, distribution). However, few studies have identified the underlying demographic processes. For passerine birds, are these changes generated by changes in adult survival or in fecundity and recruitment? This study tests for an effect of climatic conditions (spring/winter) on annual, local adult survival at large spatial (a country, 254sites), temporal (25years) and biological (23species) scales. The Constant-Effort-Site ringing has allowed the collection of capture-mark-recapture data for 100.000 adult individuals since 1989, over France.

We specifically developed a set of multi-year, multi-species, multi-site Bayesian-models describing variations in local survival and recapture probabilities. This method allows for a statistically powerful hierarchical assessment (global versus species-specific) of the effects of climate variables on this survival.

A major part (79%) of between-year variations in survival rate was common to all species, whereas only 21% of temporal variation was species-specific.

Although changing spring climate is commonly invoked as a cause of population size fluctuations, spring climatic anomalies (mean precipitation/temperature for March-August) don't impact adult survival. However, for sedentary birds winter climatic anomalies (North-Atlantic-Oscillation) had a significant, quadratic effect on adult survival, birds surviving less during intermediate years than during more extreme years. For migratory birds, we don't detect an effect of winter climatic anomalies (Sahel-Rainfall). We will analyze the life history traits (migration, habitat) that could explain a different sensitivity of species to

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climate anomalies.

We conclude that changes in population sizes for passerine birds could be induced by other demographic parameters, like fecundity.

Keywords: Bayesian approach, capture, recapture, climate anomaly, constant effort sites scheme, passerine, seasons, survival